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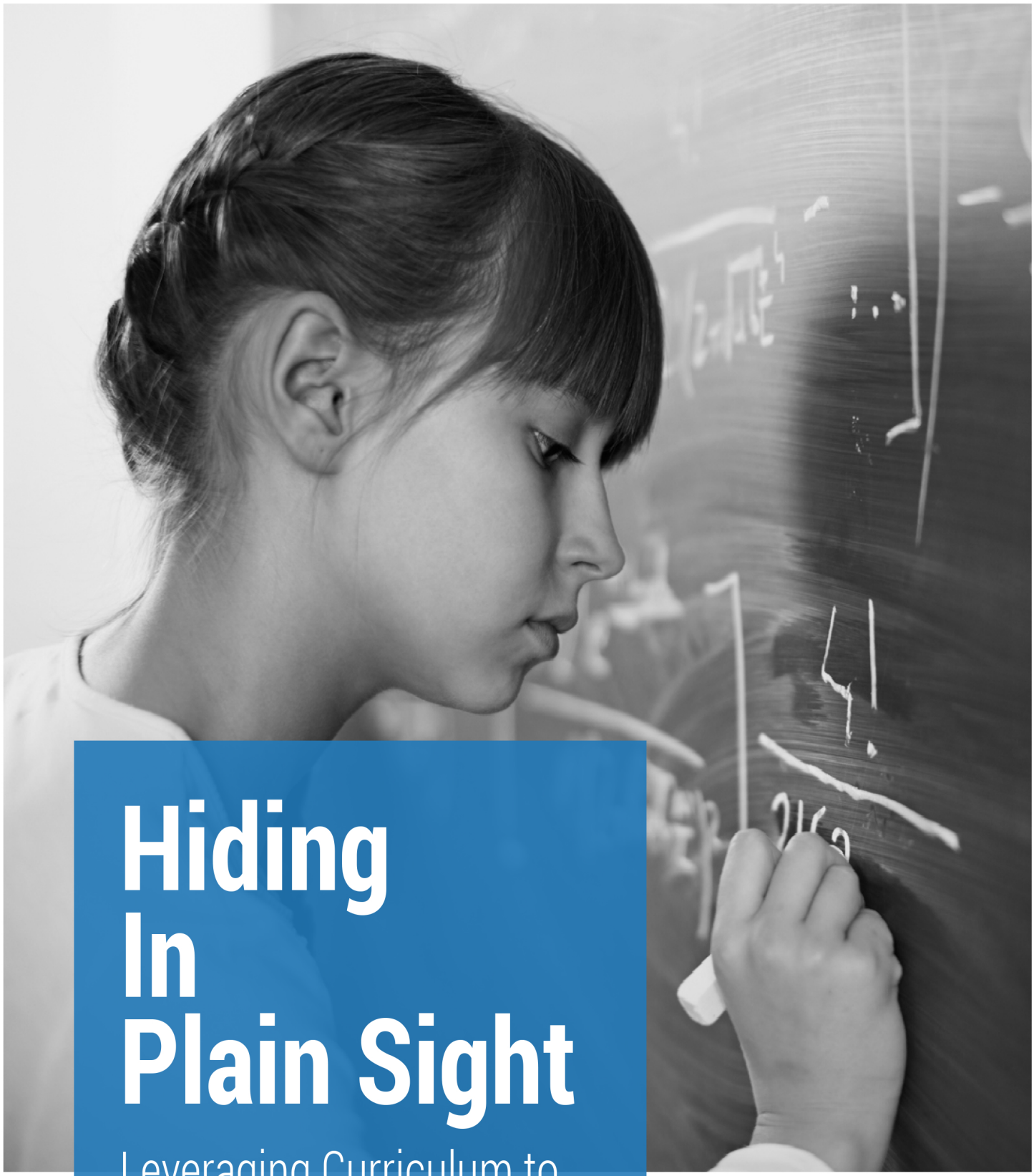


Hiding In Plain Sight

Leveraging Curriculum to Improve Student Learning

CHIEFS for CHANGE

CONTENTS

EXECUTIVE SUMMARY[1]

A relatively nascent but powerful body of research suggests that content-rich, standards-aligned, and high-quality curricula exert a powerful influence on student achievement. There is also early evidence that switching to a high-quality curriculum may be a more cost-effective way to raise student achievement than several other school-level interventions.

Leadership Lessons for States and Districts Considering Curriculum Reform

Leading states and districts are showing how smart strategies can be used to ensure that high-quality standards are matched with high-quality instructional materials, in a way that respects local control and supports strong student outcomes. Their experiences reveal lessons that other state and district leaders should apply to similar reforms in their own contexts.

1. Use **incentives**, not mandates, to maintain local autonomy.
2. Emphasize **evidence** – and start small if a research basis hasn't been developed.
3. Leverage teacher expertise and **teacher leaders** in the work.
4. Use the **procurement process** to expand use of the highest-quality curricula.
5. Create **professional learning** focused on curricular content.
6. **Messaging matters**, and external partners and validators can help.

This would come as no surprise to education leaders in high-performing countries around the world, most of which prescribe rigorous academic content that all students must learn and believe in the value of high-quality, content-rich curriculum – which emphasizes a specific body of knowledge that must be mastered, rather than the acquisition of skills that have been deemed independent from content.[2] For historical and political reasons, however, curriculum has often been considered a third rail in American education policy, one dismissed despite extensive efforts to develop clear standards,

aligned assessments, and robust accountability systems. Nevertheless, leading states and districts – from New York to Louisiana to Washington, D.C. – are showing how smart strategies can be used to ensure that high-quality standards are matched with high-quality instructional materials, leading to strong student outcomes – without trampling on local control of education. Moreover, their experiences reveal lessons that other state and district leaders can apply to similar reforms in their own contexts.

These lessons include:

1. Use incentives, not mandates, to maintain local autonomy;
2. Emphasize evidence – and start small if a research basis hasn't been developed;
3. Leverage teacher expertise and teacher leaders in the work;
4. Use the procurement process to expand use of the highest-quality curricula;
5. Create professional learning focused on curricular content; and
6. Messaging matters, and external partners and validators can help.

These states and districts offer a powerful example for other policymakers who otherwise may overlook a promising reform strategy, hiding in plain sight: curriculum.

INTRODUCTION

Standards-based reform has dominated education policy for more than three decades. Since the 1983 publication of *A Nation at Risk* showed persistently low achievement amongst America's students, policymakers have sought to create an aligned system rooted in high academic standards for what all students should know and be able to do, assessments of whether students have (in fact) learned that content, and accountability measures to back them up. Despite widespread buy-in for standards-based reform from policymakers – from the 1989 Charlottesville Education Summit between President George H.W. Bush and the nation's governors, to the bipartisan passage of the Every Student Succeeds Act (ESSA) in 2015 – policymakers have not always connected the dots between rigorous standards and rigorous instruction. The missing link? Policies that support high-quality instructional materials and effective educator training to ensure that they are used (see **"What's the Difference? Standards vs. Curriculum"** below).

What's the Difference? Standards vs. Curriculum

Though they are often conflated, standards and curriculum serve very different purposes. Academic standards set out the expectations for students in critical subject areas, clarifying what students will know and be able to do by the end of each year, while curriculum is the means to get there.

Under federal law, each state must establish standards for all public schools and public school students in at least three subject areas, reading/language arts, mathematics, and science. States may establish standards for other academic subjects. Moreover, states must ensure that students meeting the standards at high school graduation will be **college-and career-ready**; specifically, under ESSA, standards must be aligned with the entrance requirements for credit-bearing courses in the state's public colleges and universities and with relevant career and technical education standards. While these are requirements in federal law, defining the standards is a state responsibility. The federal government is prohibited from prescribing or controlling the standards any state uses.

Curriculum, as this brief defines it, encompasses the program of instruction and sequence of experiences – and related resources (like lessons, activities, units, and textbooks) – that school districts use to ensure students master the academic standards each year in their coursework.[3] While the standards lay out what students are expected to know in a given subject, curriculum provides an instructional guide for teachers so that their students meet those expectations. Curriculum includes teaching materials such as those that can be found in commercial textbooks and software applications; it also includes the pedagogy for delivering those materials when educators receive guidance on how to teach the curriculum, or when software manages the pacing, prompts, and feedback that students receive as they engage with the materials.[4] Unlike the reading/language arts, mathematics, and science standards, which are created by states, curriculum choices are made at the local level, with varying degrees of state involvement or oversight. For example, some states create lists of approved textbooks that districts must choose from.[5] Moreover, instructional decisions about what to do with that curriculum are made every day by classroom teachers. With curriculum decisions driven at the local level, ensuring alignment with state standards is a challenge.

The lack of attention placed on curriculum in the standards-based reform playbook means that many states have little information about which curricula are used, and which are effective in helping students meet the standards.[6] Recent efforts to evaluate the alignment and quality of published materials – such as independent reviews, like EdReports.org, and tools to guide teachers and administrators on the ground, like Achieve's EQuIP (Educators Evaluating the Quality of Instructional Products) and Student Achievement Partners' IMET (Instructional Materials Evaluation Tool) – have mostly revealed the relative *lack* of high-quality, aligned materials on the market. And even when information about quality and alignment is available, many state and district leaders lack the legal authority or the political will to incentivize the use of the best-in-class curricula.[7]

That is not to say that the standards movement has had no impact. On the contrary, the development of the Common Core State Standards and similar college- and career-ready standards has spurred positive changes in instruction. One study, for instance, showed that 80% of math teachers and 70% of English language arts teachers indicated they had changed at least half of their materials in response.[8] But such changes have not led to an inevitable rise in the *quality* of those materials or of classroom instruction. Without specific reform policies that also address the content and quality of curriculum and instructional materials, any positive effects on student learning from more rigorous standards are blunted.

WHAT WE KNOW ABOUT TODAY'S CURRICULA

Lacking Alignment

Many common instructional materials billed as "standards-aligned" simply don't live up to that promise. Independent analyses often reveal significant gaps between what various curricula actually cover and what college- and career-ready standards demand. Whether they originate from nonprofits, academic researchers, think tanks, private companies, or state education agencies, the aggregate conclusion of such analyses is that many widely used curricula fall far short.[9]

And even strong curricula may be delivered alongside weak materials from a variety of sources. A 2016 RAND Corporation report found that many teachers mix and match formal, published curricula and informal, online lessons; self-developed and district-selected; well-aligned to standards and not-so-well aligned. In math, teachers reported high use of self-developed or -selected materials (82% of elementary and 91% of high school teachers, "at least once a week").[10] Additional research corroborates this finding: 80% of English language arts teachers and 72% of math teachers from a five-state sample reported using materials developed by themselves and staff at their schools on a weekly basis, and other materials less frequently.[11] Teachers also draw upon online resources, including Google, Pinterest, and Teacherspayteachers.com. Some of these websites, such as EngageNY.org (described further below), clearly focus on providing standards-aligned materials, but many others do not.

Such varied resources make it difficult to determine whether a classroom's content is well-sequenced or well-aligned to the state's standards. There is no judgment here about the quality of teacher-created curricula – merely an acknowledgement that, with so many teachers creating so many different bodies of material, many of our nation's students may be missing the opportunity to experience a well-rounded, rigorous, sequenced curriculum.

Lacking Content[12]

Studies of educationally top-performing countries across the globe indicate that one of the very few characteristics they share is a high-quality, content-rich curriculum – which emphasizes a specific body of knowledge that must be mastered, rather than the acquisition of skills that have been deemed independent from content. The most extensive study to date found that a comprehensive, content-rich curriculum was the salient feature in nine of the world's highest-performing school systems as measured by the Programme for International Student Assessment (PISA). Despite the vast cultural, demographic, political, and geographic diversity of Finland, Hong Kong, South Korea, Canada, Japan, New Zealand, Australia, the Netherlands, and Switzerland, their educational systems all emphasized content-rich curriculum and commensurate standards and assessments.[13]

Decades of individual research also support the importance of background knowledge.[14] So does the National Research Council's seminal work, *How People Learn*, which emphasized the role of content

knowledge in learning as one of its three central findings: In summary, "'To develop competence in an area of inquiry, students must: (a) have a deep foundation of factual knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) organize knowledge in ways that facilitate retrieval and application.'" More recent research corroborates these findings.[15]

School systems in the U.S., however, have shied away from teaching a coherent academic program in favor of a skills-based curriculum to the chagrin of advocates, like E.D. Hirsch, who support deep, sequenced background knowledge as the prerequisite for learning, the foundation for citizenship, and an equalizer between low- and high-income students – a position bolstered by research on school systems in France and Sweden.[16] Teacher preparation has followed the curriculum: In contrast to their international peers, America's teaching force is not, by and large, required to master strong academic content as a prerequisite to entry into the profession.[17]

This is a missed opportunity, given that national and international evidence suggests that requiring all students to learn demanding academic content narrows persistent achievement gaps. This finding holds whether examining academic rigor in the U.S., specific international school systems like Alberta, Canada, or the OECD's analysis of equity and excellence.[18] Given that the academic content students experience daily is driven by curricular choices, these findings suggest U.S. policymakers should hardly be indifferent to curriculum as a critical policy lever – alongside standards, assessment, and accountability – to improve student outcomes.

WHAT WE KNOW ABOUT THE CURRICULUM EFFECT[19]

Researchers are only now beginning to press on questions regarding the effects of curriculum on student achievement relative to other interventions. As the Brookings Institution noted in 2012, most of today's curricular materials have never been subjected to an impact evaluation, much less experimental studies, which are more methodologically rigorous. And the impact studies that do exist examine materials that pre-date the college- and career-ready standards in use today, limiting their relevance for today's classrooms. The field urgently needs additional research on curriculum effectiveness and studies on new curricula.

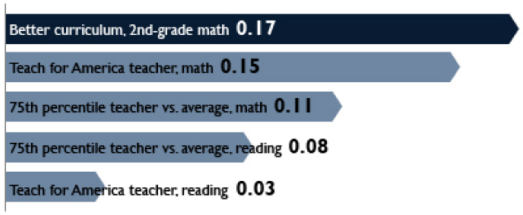
Nevertheless, existing evidence does offer several significant findings about curriculum's influence and demonstrates that curriculum matters in student learning. In fact, the Brookings report, cited above, together with very recent research on the impact of quality curriculum use by teachers of varying effectiveness suggest that **curriculum choices matter greatly**.

Compelling evidence shows that improving curriculum can positively impact student outcomes.

Emerging evidence: Investments in curriculum components are highly scalable, and effects are greatest with weakest teachers, who are disproportionately present in high-needs classrooms.

Curriculum selection has large and statistically significant effects on student outcomes, rivaling teacher effectiveness interventions.

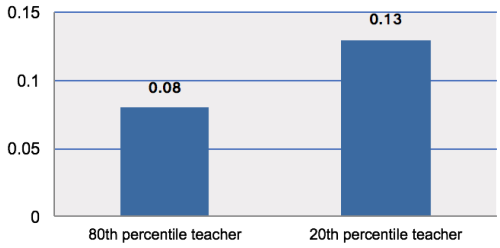
Effect size of selected interventions on student test scores*



Source: Matthew Chingos and Grover "Russ" Whitehurst, "Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core," Brookings Institution, 2012.

Curriculum impact is largest for weakest teachers, effectively bringing up the "floor".

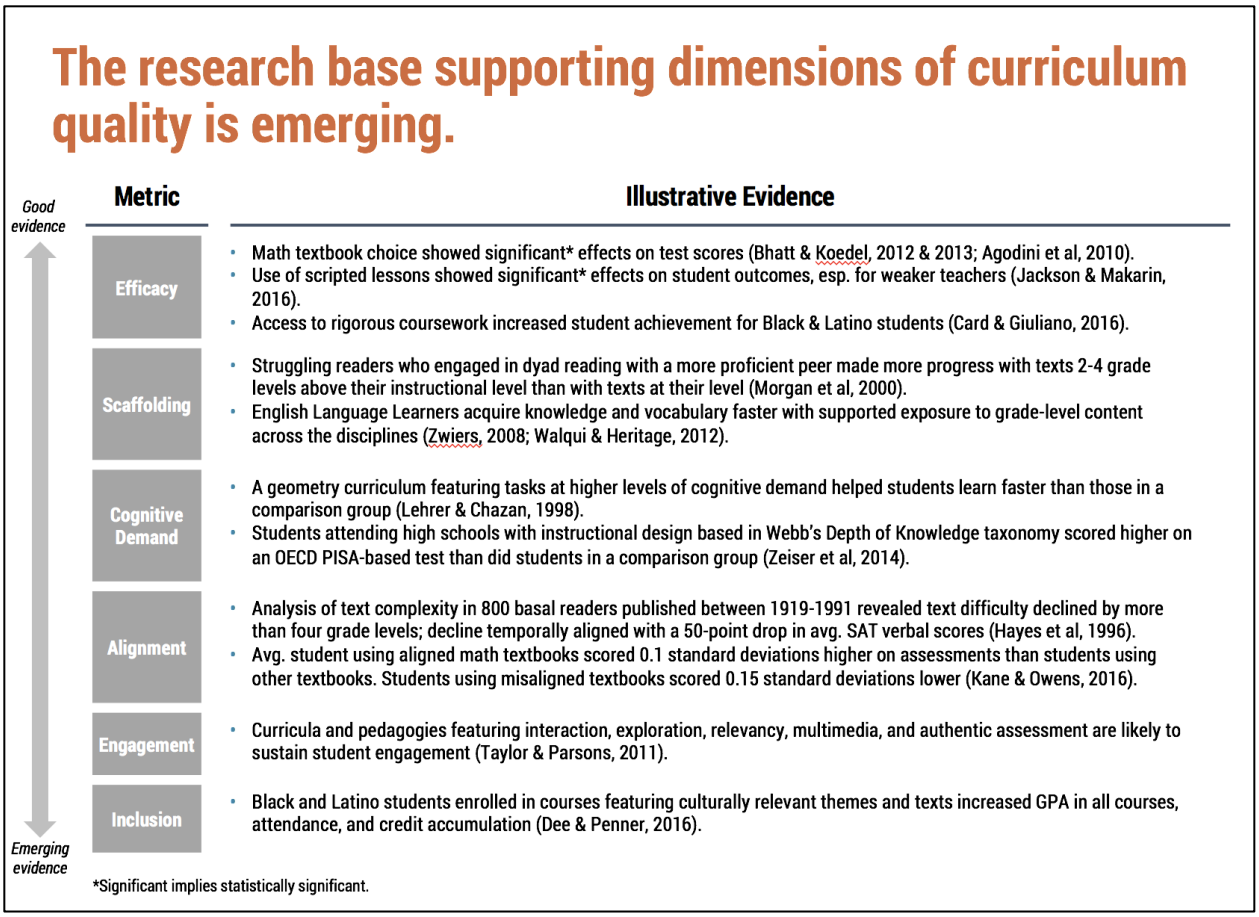
Effect size of using well designed math lessons on student test scores at different teacher effectiveness levels*



*In standard deviations

Source: C. Kirabo Jackson and Alexey Makarin, "Simplifying Teaching: A Field Experiment with Online "Off-the-Shelf" Lessons," National Bureau of Economic Statistics, Working Paper No. 22398, 2016.

These findings are part of a larger body of evidence spanning several decades that points to the multiple dimensions of what could be summarized as the "curriculum effect."



Note: The research cited in the figure above is referenced in the Notes section beginning on page 27.[20]

Research suggests that, in the aggregate and for specific instructional programs, changing from "business-as-usual" to a high-quality curriculum, or from a low-quality to a high-quality curriculum, can boost student achievement.[21] For instance, two major clearinghouses (the Visible Learning Project (VLP) and Johns Hopkins University's Best Evidence Encyclopedia (BEE)) find an average positive effect of published curricula on student achievement over "business-as-usual," as a recent analysis of the existing body of research on curriculum indicates.[22] The VLP found an average curriculum effect size of +0.45 – larger than the influence of a student's home (+0.31) and a student's school (+0.23).[23] As striking as this finding is, however, we urge caution. Because the VLP synthesized across a wide range of methodologies and studies of varying rigor, and used a much broader definition of curriculum,[24] its reported effect sizes tend to be on the large side and should be understood in that context. In contrast, the synthesis from BEE found curriculum interventions produced an effect size of +0.05 to +0.10.[25] To put this in context, a .07 effect size would mean roughly an additional 35 days of learning for a fifth- or sixth-grader in reading, and slightly less in math.[26]

There is also limited research on the academic effects of particular curricula. The above-mentioned research review lists several specific curricula that produce positive effects and have moved students' achievement in reading, math, and science performance from the 50th to the 60th, or even 70th,

percentile – a potentially transformative impact if aggregated across an entire class, grade, or school.[27] Another recent study investigated the effects of commonly used textbooks in five states during the transition to the Common Core. Use of three of the five had no impact on achievement in comparison with the use of other textbooks or no textbook. The remaining two, however, produced statistically significant effects in opposite directions: one, which was not disclosed, produced negative results, while Houghton Mifflin Harcourt's GoMath! yielded positive achievement outcomes that were independent of other factors.[28]

And the *annual* effect would be substantial: If all schools used a top-quartile (in terms of quality and alignment) textbook, student achievement would increase by an average of 3.6 percentile points. This modest-sounding gain is greater than that which students exhibit from an experienced teacher (defined as having three years or more in the classroom), as opposed to a novice one.

Research from individual states provides still more evidence that curriculum matters:

- In Indiana, researchers found statistically significant differences in student outcomes between three different math textbooks – in one instance, use of one textbook over another was associated with an effect size of 0.13 standard deviations on the state assessment ("where effect sizes of 0.10 translate into three additional months of learning on nationally normed tests").[29] Relatedly, in Florida, research has shown that particular curricula can outperform others with regard to students learning specific math content.[30]
- Recent research out of California compared the effects of four common elementary math curricula and found that students who had been taught using Houghton Mifflin's *California Math* consistently outperformed those who had been taught using the others.[31]

Specific research on content-rich curricula is limited, given its lack of use in the U.S., but from what research is available, content-rich curricula can have statistically significant, positive effects on student learning. Of the hundreds of curricula evaluated by the What Works Clearinghouse (WWC) and the BEE, only two are clearly content-based: Expeditionary Learning and Core Knowledge, which form the backbone of the K-8 English language arts curriculum developed as part of EngageNY (discussed in detail below). Just six studies on Expeditionary Learning and Core Knowledge met the criteria for inclusion in the WWC and the BEE; of the three on Expeditionary Learning, two found null effects and the other statistically significant, positive effects on student outcomes, while for Core Knowledge, all three studies found statistically significant, positive effects.[32]

In sum, there is an obvious disconnect between what research suggests about the curriculum impact, which curricular materials are available and used in classrooms today, and state and district policies. Each year, millions of dollars are spent on what may be poor-quality curricula in K-12 classrooms, when switching to more coherent, aligned curricula could increase achievement at relatively little extra expense or even at a cost savings (see **"Dollars and Sense: Curriculum Reform Is Cost-Effective"** on page 11).

Dollars and Sense: Curriculum Reform is Cost-Effective

Teachers have to use a curriculum, wherever it comes from – but the cost of placing strong, well-aligned curriculum in the classroom is not necessarily higher than using weak or poor-quality instructional materials. As researchers Morgan Polikoff and Cory Koedel put it, "Textbooks are relatively inexpensive and tend to be similarly priced. The implication is that the marginal cost of choosing a more effective textbook over a less effective alternative is essentially zero."[33]

For example, in the research study investigating Indiana's math textbooks, the per-student cost difference between the most effective curriculum and those that were less-effective was only $2.26 per student.[34] Similarly, a 2015 Center for American Progress report on curriculum reform identified the prices of 19 states' adopted elementary math textbooks, generated a per-student cost, and matched the cost of four specific textbooks whose effectiveness had been evaluated by the Institute of Education Sciences. They found that the difference between the highest- and lowest-quality curricula in the IES reports was only $13 per student.[35]

Curriculum reforms may also be more cost-effective than other, more popular interventions to improve student outcomes. In his research, the Brookings Institution's Grover "Russ" Whitehurst found that: "The effect sizes for curriculum are larger, more certain, and less expensive" than those for preschool, charter schools, and merit pay for teachers.[36] Similarly, the 2015 study from the Center for American Progress notes that, "The average cost-effectiveness ratio of switching curriculum was almost 40 times that of class-size reduction in a well-known randomized experiment."

In particular, leveraging high-quality open educational resources (OER) could make curriculum interventions cost-effective, or even less expensive, than previous instructional materials.[37] EngageNY, for instance, is widely used and available free of charge. Since Duval County, Florida began to use EngageNY district-wide in 2015, an internal audit indicates that the district saved more than $10 million over three years by using OER and printing the materials rather than using published curricula.[38]

The clear disconnect, however, between research and reality also presents a clear opportunity for action. Higher expectations for students (the standards), along with new technologies that enable economies of scale and new policy structures (such as the emphasis on evidence of effectiveness in ESSA), present a window in time that state and district leaders can leverage to:

- Develop **content-rich, high-quality curricular frameworks and materials** that match the new standards and are scalable; and
- Develop a **set of policies that incentivizes adoption** by school districts, researches their impact on student learning, and scales the use of the materials statewide.

We do not mean to imply that curricular reform will be easy. Policymakers in the U.S. have shied away from this lever for a reason, despite the emerging research: The barriers include a dominant ideology in academe about the right way to prepare new teachers, deep-rooted political controversy over how to interpret and teach subjects like social studies and science, and American norms that favor teacher

autonomy and local control.[39] However, we believe that smart and deliberate policy design mitigates these challenges. More importantly, leading states and districts – including the Chiefs for Change members profiled here – have already demonstrated that this work is possible when there is courageous leadership to undertake the effort.

THREE STEPS TO SUCCESS

Step 1. How to Start – The Policy Environment to Support a High-Quality Curriculum

Given what we know regarding the availability of high-quality, aligned curriculum, states need to first create policy environments that encourage the development or adoption of better materials.

Massachusetts.[40] The Bay State has been ahead of the curve when it comes to thinking thoughtfully about standards and curriculum. The Massachusetts Education Reform Act of 1993 required the state to establish high academic standards, a set of assessments measuring student performance against those standards, and a new accountability system, while overhauling the state's education funding formula to infuse new resources into the system to support the increased expectations.[41]

As part of the call to establish standards, the Reform Act required the Massachusetts Department of Elementary and Secondary Education (DESE) to create coherent, intellectually challenging curriculum frameworks. The Curriculum Frameworks articulate statewide guidance for teaching and learning, including the content and learning standards for each content area; the frameworks, however, are not curriculum.[42]

The Curriculum Frameworks became the foundation for subsequent reforms in Massachusetts, including teacher preparation, professional development, and testing. The state worked with university professors to sketch out the college-ready contours of each subject, and by 1998, work had progressed to include K-12 grade-level frameworks, backward-mapped from the college-ready expectations. The Curriculum Frameworks directly informed the assessment and accountability systems;[43] the resulting Massachusetts Comprehensive Assessment System (MCAS) has been in place since 1998, and the subjects and grades assessed have expanded with time – with Massachusetts launching a revised MCAS this past spring.

Additionally, the state committed to aligning its standards for students with its standards for educators at the pre- and in-service stages of their careers and has maintained this commitment over time. For example, the state listed "Expanding Educators' Knowledge of Subject Matter" as its highest priority in the June 1998 State Plan for Professional Development, so that teachers would have the subject matter expertise necessary to teach their students against the higher standards.[44] Today, the state requires pre-service teachers to demonstrate their subject matter knowledge. The "Subject Matter Knowledge" (SMK) requirements are aligned with the Curriculum Frameworks and with the Massachusetts Tests for Educator Licensure (MTELs) so that educators must demonstrate they have the subject matter knowledge to teach the standards expected of students.

Massachusetts' reforms were controversial, and continue to stir debate. For instance, when these changes were first initiated over twenty years ago, stakeholders argued over the content of the science and social studies standards; the National Conference of Teachers of Mathematics called the new

math standards "regressive;" and a group of professors at Boston College challenged the validity of the MCAS.[45] In 2010, Massachusetts updated its standards to better reflect college- and career-ready expectations – and the state board of education voted to adopt the Common Core. Although the 2010 standards and ongoing revisions to the Curriculum Frameworks – and more acutely, changes to the assessment system – came under fire from opponents, the state has also worked with hundreds of educators to develop over 100 model curriculum units in English language arts and literacy, mathematics, history and social science, STEM, and career technical education for preK-12. The model curriculum units are voluntary resources for districts to adopt and use, and help to ensure that educators have support in translating the new standards and Curriculum Frameworks into daily instruction.[46]

In March 2017, the state board of education unanimously adopted revisions to the English language arts and literacy and mathematics Curriculum Frameworks. As Commissioner Mitchell Chester wrote in his memo to the state board: "The revised standards presented here draw from the best of prior Massachusetts standards and represent the wisdom of hundreds of the Commonwealth's preK-12 and higher education faculty. The standards embody the Commonwealth's commitment to providing all students with a world-class education."[47] The updates to the frameworks were developed by DESE staff, collaborating with classroom teachers, curriculum specialists, and college faculty across the state, and reflected feedback from hundreds of educators and stakeholders.

After 25 years of implementing standards-based reforms, Massachusetts is the top-performing state on NAEP and on the PISA exam.[48] While learning opportunities are not yet equal for all students and achievement gaps remain, at every income level and across every subgroup, the state has achieved the strongest results in the country – results that are among the strongest in the world. If Massachusetts were a nation, based on the 2015 PISA, it would be first in world in reading performance, second in science, and just outside the top 10 in math.[49] Now, the state plans to build on this success; its recently submitted ESSA plan describes how DESE will focus on teaching practices for early literacy and middle grades math – two areas where teachers are in need of deeper support in their instructional planning and delivery to reflect the expectations of the Curriculum Frameworks.

Step 2. How to Spread – Building and Incentivizing Standards-Aligned Materials

Despite its academic and policy successes, Massachusetts also demonstrates a key challenge of this work: States can create a policy environment with high standards, strong professional development, and even high-quality model curricular units, but that environment alone will not necessarily lead to widespread adoption of better instructional materials. The two states below illustrate the local work that pertains. Although this section focuses on state-level action, districts can also take steps to improve instructional materials and practices, using different policy levers (see **"Districts Taking on Curriculum Reform" on pages 15-16**).

Districts Taking on Curriculum Reform

While this brief has focused primarily on states using curriculum successfully as a lever for change, enterprising districts are also exploring curriculum reform.

For example, in 2015 six school districts in Florida (Duval, Broward, Brevard, Pinellas, Pasco, and Highlands) formed an informal network with a goal "to improve the degree to which teachers and students are engaging in standards-aligned materials and practices."[50] Academic directors from each district convene regularly to discuss alignment of curriculum and materials to standards by using the Student Achievement Network's IMET and Achieve's EQuIP tools (both mentioned earlier), to prepare for curriculum adoption processes, and, in some cases, to make wholesale changes to the curriculum.[51] Highlights from the network include:

→ *Duval County*. In 2015, Duval County Public Schools, which supports 130,000 students in 160 district and 30 charter schools, adopted curricular materials from EngageNY, including Core Knowledge and Eureka Math. Duval County involved teachers and principals at every stage of the adoption process by training them in the use of Achieve's EQuIP tool, thus enabling them to evaluate various curricula and become invested in the higher-quality and better-aligned options. As former superintendent Nikolai Vitti acknowledged, "The EQuIP protocol allowed for the realization that there were huge gaps between our current curriculum and what the standards expected… We engaged hundreds of teachers on both the reading and math side, and it was clear, based on their own analysis, that the EngageNY material was superior. That gave us some credibility, buy-in, and support to move in a radically different way regarding the materials that we would use."[52] The district also partnered with external partners to provide instructional support to teachers. Simultaneously, Duval students have made achievement gains. For example, between 2014-15 and 2016-17, Duval's math proficiency rates for 3rd graders jumped six percentage points to 62% -- closing gaps between Duval students and the statewide average. Similar gaps were closed in 4th grade: math proficiency among Duval 4th graders increased 9 percentage points in two years, compared to statewide gains of only 5 percentage points.[53]

→ *Broward County*. Broward is combining two goals simultaneously: encouraging high-quality, standards-aligned, and content-rich instructional materials and using a district-wide, online learning platform to curate them. The district has invested in identifying high-quality content that is also digitized and can be disseminated through Canvas, their learning management system. Rather than selecting entire curricular programs wholesale, the team (curriculum specialists and teachers) identifies strong educational resources, places them on Canvas, and – over the next two years – will create a scope and sequence for students in grades 3-8. The Florida Department of Education also provides funds for a district's implementation of their digital classrooms model, which infuses personalized learning technology[54] into selected third-, fourth-, and fifth-grade classrooms. The model integrates frequent diagnostics into the classroom and creates granular feedback on student achievement. Annual evaluations are conducted using the 5th grade Florida Standards Assessments and the Technology Integration Matrix, which measures how technology is being utilized across five levels of teacher and student descriptors (Entry, Adoption, Adaptation, Infusion, Transformation) and five classroom learning environments (Active, Collaborative, Constructive, Authentic, Goal-Directed).[55]

Washington, D.C. offers another approach districts could emulate to create greater coherence between the state's academic standards and the curriculum used by schools and teachers:

→ *Washington, D.C.* The District of Columbia Public Schools (DCPS) has developed model tasks with complete instructional materials, which are embedded in DCPS's units of study in all content areas. Dubbed "Cornerstones," the 250 rigorous and engaging tasks were developed in partnership with DCPS teachers and are aligned to D.C.'s college- and career-ready standards. Students district-wide experience these Cornerstones in every subject, every quarter, in kindergarten through grade 12. By providing model tasks and materials that are engaging, content-rich, and rigorous, Cornerstones helps teachers make the instructional shifts required in the new standards. Further, they demonstrate the kinds of lessons that should be delivered on a regular basis, with the curricular resources teachers regularly use to teach the DCPS units of study. As a result, Cornerstones built a foundation for common professional development experiences across the district that prepare DCPS teachers to engage in standards-aligned instruction and use student work as a mechanism for teacher professional learning.[56]

New York. While Massachusetts created and sustained strong policy structures to scaffold the development and selection of high-quality curricula, New York took a more direct approach. As part of its Race to the Top proposal, New York articulated a vision that "all public school students…have access to a world-class curriculum based on rigorous, internationally-benchmarked Common Core standards and assessments that will prepare them for success in college and careers in the 21st century."

To achieve this vision, the state used part of its $700 million award to develop statewide curriculum models aligned to the standards and professional development resources for all teachers and principals. For example, the state developed tools, in conjunction with Student Achievement Partners, to help educators collect evidence in the classroom aligned to their curriculum to determine whether they were practicing the instructional shifts necessary to help students meet the new standards.[57] These are the kind of resources educators need to translate the standards into meaningful changes in classroom practice. Critically, the state promised that all of the curriculum frameworks and related resources for educators would be available online through the state's Education Data Portal.

These educator resources to support standards implementation and improve teaching and learning, along with a myriad of other tools, resources and materials, were incorporated into EngageNY – an Open Educational Resource (OER) for standards-aligned instructional materials and support.[58] Completely free of charge, the website also offers a coherent K-12 curriculum – including modules and lesson plans by grade – in English language arts and math, with professional development for teachers and user guides for parents and students. After issuing an RFP, the state selected Great Minds' Eureka Math for use in all grade levels (which was created, from scratch, as part of EngageNY) and four vendors in English language arts (Core Knowledge Foundation, Expeditionary Learning, the Public Consulting Group, and Odell Education). According to a 2017 RAND study, the EngageNY materials represent one of the first efforts to create a complete and sequenced OER curriculum aligned to academic standards.[59]

New York faced some political challenges in this endeavor, with critics confusing the materials as a mandated, scripted curriculum despite them being optional and adaptable by educators. But as in Massachusetts, staying the course paid off: Unlike most commercially available curricula, EngageNY's materials have been found to be highly aligned with the new standards. Eureka Math was the only curriculum (of those originally reviewed) that met EdReports.org's criteria for alignment at all grades, and EngageNY's English language arts materials have been favorably reviewed by independent experts as well.[60]

But the quality of the materials isn't the only thing that sets EngageNY apart; its spread across the country does as well. The 2016 RAND study found particularly high usage of EngageNY in states that had adopted the Common Core or similar standards: 44 percent of elementary, and 30 percent of high school, math teachers reported using its materials, which made EngageNY the third-highest source of instructional materials.[61] Based on this finding, RAND conducted a case study on the use of EngageNY and found that:

- EngageNY is the single most commonly used published material by elementary math teachers (35% report using it) and one of the most commonly used by secondary math and elementary and secondary school ELA teachers (at least 25% report using it);
- EngageNY use is more common in states that adopted the Common Core or similar standards, primarily as a result of its alignment to the standards, state or district guidelines (i.e., districts promoting EngageNY as a resource), and assessments;
- EngageNY seems to be expanding access to rigorous learning experiences, with 73% of math teachers surveyed reporting that EngageNY sufficiently addressed critical aspects of rigor embedded in the new standards, compared to only 35% with regard to other materials. An even higher percentage (96%) of English language arts teachers reported that it supported learning in key areas of emphasis in the new standards, compared to 55% for other materials;
- EngageNY is perceived to improve the quality of teaching and learning, with 88% of math teachers interviewed believing EngageNY had enhanced their teaching through its emphasis on academic rigor, and more than 70% of English language arts teachers feeling that their students' academic capabilities improved as a consequence of using EngageNY; and
- At the same time, the interviews flagged several concerns: Nearly a quarter of math teachers felt the materials were sometimes too difficult, and many English language arts teachers felt the materials were not sufficiently differentiated for students' learning needs.[62]

While the use of EngageNY and other OER materials warrants further research, the RAND studies demonstrate that teachers tend to draw upon coherent, high-quality instructional materials when given the opportunity – and the encouragement – to do so.

Louisiana.[63] In 2010, Louisiana was also revising its academic standards in English language arts and math to reflect college and career readiness, consistent with the Common Core; the standards have subsequently been reviewed, adjusted, and updated as the Louisiana Student Standards. And like New York, Louisiana chose to make curriculum a key lever in its bid to embed college- and career-ready instruction throughout the state. Specifically, the Louisiana Department of Education (LDOE) demonstrates that states can use carefully crafted *incentives* to encourage the widespread local use of high-quality instructional materials.

The RAND analysis of teachers' practices and perceptions, discussed earlier, included a surprise finding: "large and intriguing differences between surveyed teachers from states that have adopted [Common Core] and those in one particular state: Louisiana. Specifically, Louisiana teachers are using more instructional materials aligned with Common Core, and they report thinking and teaching in ways that are more in line with the tenets of Common Core."[64]

What happened in Louisiana to prompt this result? To find out, the research team did a deep dive into Louisiana's policy context, interviewing senior members at LDOE and reviewing related documents and presentations. The resulting follow-up report suggests that there is a connection between Louisiana's policies and teachers' improved understanding and use of high-quality materials and standards-aligned classroom practices.[65]

The LDOE achieved this result not by recommending or requiring the use of particular instructional materials via approved lists, but rather by bringing teachers into the process of reviewing, ranking, and reporting English language arts and math materials according to alignment and quality.[66] At the top is Tier 1 (exemplifies quality, meeting all non-negotiable criteria and scored highly on all indicators of superior quality); Tier 3 (not representing quality, failing to meet non-negotiable criteria) comes at the bottom. The standards for Tier 1-inclusion are high, and few make the cut: In the first year, only Eureka Math K-11 and Math Learning Center K-5 received the highest marks, while in English language arts, LDOE initially approved Tier 1 status to just one program, Core Knowledge K-3. Additional instructional materials have since gained Tier 1 status. Louisiana also reviews formative assessments in a similar manner, with an eye toward alignment with the state's standards and summative assessments. The result is that districts and teachers can easily find and opt to access resources that cohere with one another and with the state's academic goals.

Critically, LDOE couples its rankings of curriculum with financial heft: The SEA grants state contracts only to Tier 1 publishers, which results in discounts for Tier 1 materials. Districts may, of course, continue to contract with Tier 2 or 3 publishers, but at a naturally higher price. This creates strong incentives for local behavior, brings much-needed efficiencies to local procurement processes, and makes it easier to procure higher-quality materials. Like reforms in the other states profiled, this, too, has come with political pushback. In the words of a state official, "It's not pleasant when you give big publishers Tier 3 ratings… It would have been easy to let it go."[67]

The state places additional emphasis on high-quality and aligned curriculum and instruction by promoting professional development that prioritizes content- and curriculum-specific issues, which, if addressed, would help teachers implement their aligned curriculum. LDOE also publishes a list of professional development vendors who can demonstrate they help teachers use high-quality, Tier 1 instructional materials; build teachers' content knowledge; and provide educators opportunities to practice their skills and receive feedback.[68] This is another powerful influence on local behavior. While all states provide professional development opportunities for teachers, the RAND research team was hard-pressed to think of another state that had made connections between specific vendors and curricula, or to evaluate the quality of those vendors in this way.

Louisiana also leverages local buy-in by inviting teacher leaders into the work, thus helping to prevent criticism that these efforts impinge on local control (see **Louisiana's Teacher Leadership Approach** on the following page).[69] To present a clear message and simultaneously cultivate local leadership, the LDOE also recruits, selects, and trains a group of approximately 75 Teacher Leader Advisors from across the state to vet materials, lead professional development, and communicate between districts and the state. In addition, the state has enlisted these Teacher Leader Advisors to help fill in some of the quality gaps in publicly available English language arts curricula by developing ELA guidebooks, as no curriculum originally received a Tier 1 rating for all grade levels.[70] The work, which started as a modest effort to pull together examples of aligned instruction, was expanded through a partnership with LearnZillion to create an easily navigable website, with fully fleshed out curriculum units for grades 3-12 available statewide.[71] Through this process, the state positions itself as a clearinghouse that provides resources for districts and schools. One official stated: "A lot of our work has been about, 'how do you create governance structures over reforms that are not owned by reformers and bureaucrats but are owned by real people in communities?'"[72]

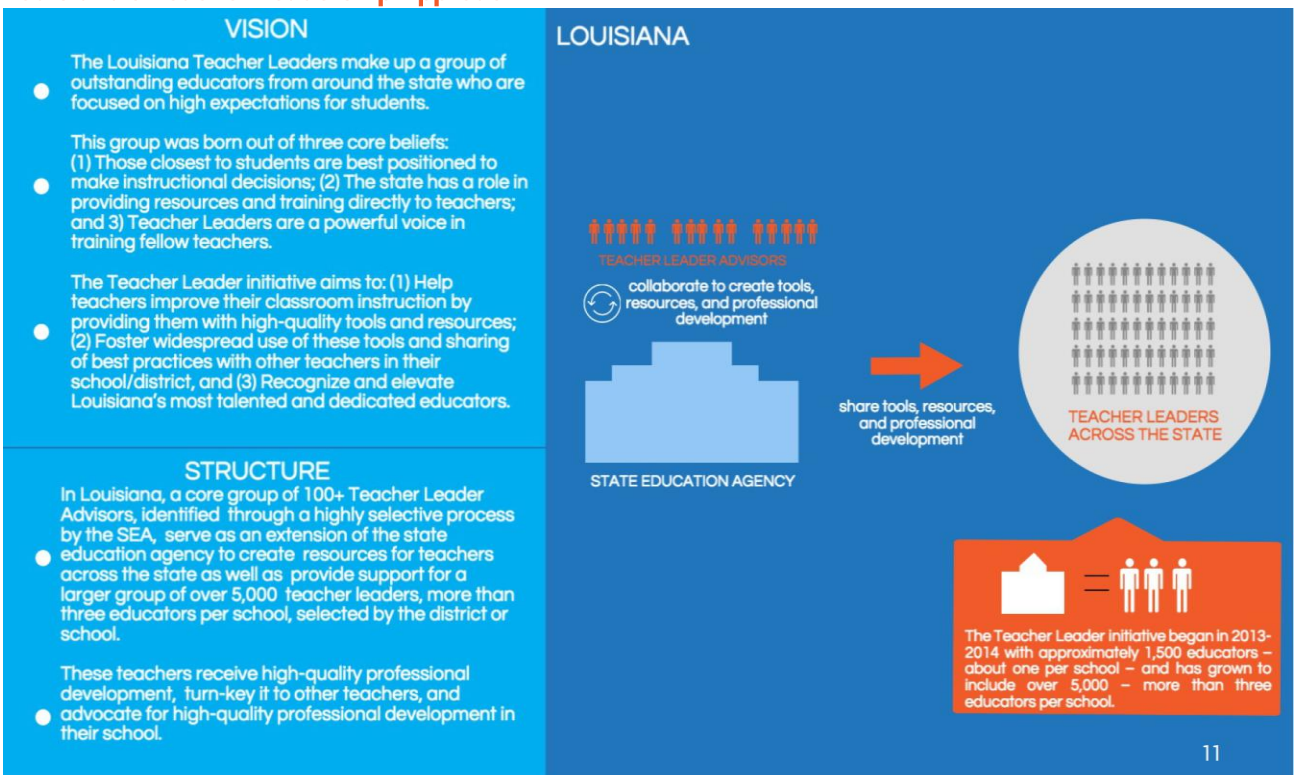
At an event hosted by the Johns Hopkins Institute for Education Policy, Rebecca Kockler, LDOE's Assistant Superintendent of Academic Content, summed up the efforts this way: "We make the best choice, the easy choice." And it shows: More than 80% of local systems use high-quality, aligned Tier 1 materials exclusively – up from 20% five years ago.[73]

Meanwhile, academic data suggest that Louisiana's trajectory is moving in the right direction, and strongly so:[74]

- The state's 4th graders led the nation in growth on the 2015 NAEP reading test and tied with Mississippi for the top growth in math; Louisiana was also among the top five states in narrowing several achievement gaps.
- Between 2014 and 2016, composite ACT scores increased more in Louisiana than in any of the other states administering the ACT statewide.

- Since 2012, the number of students scoring a 3 or higher on AP exams has increased by more than 3,700 students, an increase of over 135%, and the number of students taking an AP assessment has almost tripled.

Louisiana's Teacher Leadership Approach



Reprinted from the 2017 Chiefs for Change policy brief, "The Case for Teacher Leadership: Elevating the Teaching Profession and Sustaining Equity and Excellence."

LDOE's efforts are also garnering national attention from other state leaders, intrigued by the notion that curricular reforms could have led to measurable differences in the quality of instruction aligned to college- and career-ready standards. As profiled recently in *Education Next,* the state is "a laboratory from which other states can learn as they evaluate their own efforts to make more rigorous standards stick."[75] Of course, not only states but also districts can create a cluster of incentives and support that expands the use of high-quality materials and instruction, as the case studies on pages 15-16 present.

Step 3. How to Scale – Lessons on What Works and Policy Recommendations

Massachusetts has long been a national model, but efforts like those in New York and Louisiana – and the districts profiled here – are attracting attention from policymakers nationwide. As the Fordham Institute's Robert Pondiscio put it, "there is a story, and it's about curriculum—perhaps the last, best, and almost entirely un-pulled education-reform lever."[76] We know, from research and practice in the U.S. and abroad, that a high-quality curriculum promotes student learning, and often at a modest cost.

For state and district leaders that find this evidence, and the experiences of these trailblazing states and districts, compelling, what lessons might they take to apply to their own contexts?

1 *Use **incentives**, not mandates, to maintain local autonomy.*

States and districts should avoid heavy-handed mandates and recognize long-standing values of teacher autonomy and local control over instruction. However, policymakers should also recognize that it is possible to establish meaningful partnerships between teachers, districts, and the state to foster more effective curricular choices. In taking on curriculum, states and districts must consider the enabling conditions that support teachers as professionals in having the time, the tools, and the know-how to access information that enables them to make the best choices for the students in their classrooms. Investing in high-quality curricular resources – whether through external publishers or by developing them directly in partnership with teachers – will only pay off if educators use those materials in their daily instruction.

The experience of both EngageNY and Louisiana demonstrates the use of positive incentives to improve the quality of instructional materials and encourage their use at scale. In New York, the state ensured that only high-quality, standards-aligned materials would be available on its site and leveraged both the cost savings of OER – materials are free to download – and the power of suggestion – with the SEA itself and districts in New York, and across the country, listing EngageNY as a helpful Common Core resource – to promote take-up. Even though EngageNY materials are optional rather than required, the free and customizable nature of the curriculum and its endorsement by sources educators trust (such as their districts) likely contribute to rendering EngageNY the most commonly used, standards-aligned, curricular resource in the country.

Louisiana also chose not to mandate the use of Tier 1 curricula but, rather, made it attractive for districts to voluntarily do so. The state used the procurement process to make high-quality materials and professional development cost-effective. As a result, while districts maintain ownership over curricular decisions, they accrue tangible benefits when they select the stronger options. As a result, the prevalence of Tier 1 curricular resources has greatly increased, from 20% to over 80%.[77]

2 *Emphasize **evidence** – and start small if a research basis hasn't been developed.*

ESSA requires that school improvement funds be spent on interventions that are backed by promising, moderate, or strong evidence – that is, interventions with a statistically significant effect on improving student outcomes as demonstrated by at least one well-designed and well-implemented research study.[78] Districts apply for these funds on behalf of schools identified for support and improvement,

and states allocate funds to districts either by formula or competition. States and districts thus enjoy new levers through which to emphasize curriculum as a school improvement strategy.

States might, for instance, provide districts with information about curricula that meet the law's evidence standards, or states could include questions about the quality and alignment of a school's curriculum in their applications for school improvement funds. For its part, a district could incorporate curriculum into its needs assessment for each school identified for support and require that curriculum be addressed in each school's improvement plan.

However, in order to fully maximize ESSA's evidence requirements as a means to drive curricular reform, there is also a need to build a greater body of evidence for various curricula by investing in new research on instructional materials, particularly those that have been recently developed or updated to align with the Common Core. This will help ensure that ESSA's evidence requirements are not unintentionally used to discourage the development of new curricula that demonstrate strong standards-alignment and could be found to meet the evidence-based standards in the future.

To help balance evidence with innovation it may make sense to start small. For example, Louisiana piloted Eureka Math in five school systems before seeking to expand its use. Similarly, Lincoln Public Schools in Nebraska conducts evaluation trials before adopting new curriculum, matching two demographically similar schools and piloting separate curricula. Adoption decisions can then be made with extensive input from teachers and based on student results.[79]

3 *Leverage teacher expertise and **teacher leaders** in the work.*

Louisiana has developed a cohort of nearly 5,000 teacher leaders who receive regular newsletters, participate in monthly webinars, and attend quarterly convenings to receive information and training on curricula and tools. Teacher Leader Advisors serve as liaisons between LDOE and individual schools, promoting higher quality materials, leading professional development, providing aligned communication between their networks and LDOE, and engaging in the state's in-depth curricular reviews – which are promoted on the LDOE website and inform which vendors receive state contracts. This network is useful and mutually reinforcing. For instance, at first, Louisiana could not identify a Tier 1 English language arts curriculum. It could have prescribed an external curriculum but instead chose to work with teachers to develop better-aligned resources within a voluntary adoption structure.

By relying on teacher leaders and, particularly, Teacher Leader Advisors, Louisiana is able to build buy-in from educators for curricular reform, creating ambassadors for the effort who can communicate to other teachers about the instructional shifts needed to teach the new standards and the value of resources that are well-aligned to them.[80] Teachers respond more positively to such challenges when they are presented by peers rather than by district or state administrators, and when peers have

developed or vetted the instructional materials. States and districts with teacher leaders – or that are considering developing a cadre of teacher leaders – should consider how they can be involved in efforts to improve curricular choices, or to develop or deliver related training for their peers.[81] This approach could also improve teacher retention; one study found that working within a school culture that created a shared commitment to effective teaching and continual improvement seemed to have a positive effect on teacher persistence.[82] Further, federal funds under Title II-A could be tapped to support this work at the state and district levels.[83]

A state might also call upon intellectual expertise outside of K-12 classrooms. For example, Massachusetts teachers created the K-12 Curriculum Frameworks in partnership with universities to ensure alignment between systems. Duval County, Florida used tools developed by external experts that its educators could use to evaluate curriculum, creating professional unity around the criteria for determining which materials were the most rigorous and well-aligned. Finally, teachers' unions could also make strong partners, given their interest in ensuring all teachers have access to, and training on how to use, high-quality instructional materials to improve their practice. The President of New York City's UFT, Michael Mulgrew, for instance, looks favorably upon the use of high-quality curricula as a lever for student academic growth.[84] Other states and districts interested in this work should consider how teachers, principals, and other education professionals can be meaningful partners.

4 *Use the **procurement process** to expand use of the highest-quality curricula.*

Even if well-aligned instructional materials were ubiquitous in the field, procurement policies and costs would pose additional challenges to their adoption at scale. As described above, Louisiana mitigates this challenge. Once it had worked with its Teacher Leader Advisors to identify the strongest curricula, LDOE leverages the procurement process to reinforce and promote the use of the highest-quality instructional materials. As one LDOE official put it, "We don't force anybody to purchase Tier 1 [professional development], but we only fund and endorse professional development providers that work with Tier 1 instruments."[85] Statewide purchasing power renders Tier 1 materials and resources a budget-friendly option for local school systems.

OER is another tool policymakers might employ. As described in "**Dollars and Sense: Curriculum Reform is Cost-Effective,**" an internal audit found that, after beginning to use EngageNY district-wide, Duval County, Florida had saved more than $10 million over three years by printing materials instead of using published, printed ones.[86] Broward County, Florida offers another approach: making high-quality materials readily available on a learning management platform. As their Director of Innovative Learning put it, this helps to achieve "equity across the board: no matter which classroom a student is sitting in, no matter which school, there is equal access to rigorous content."[87]

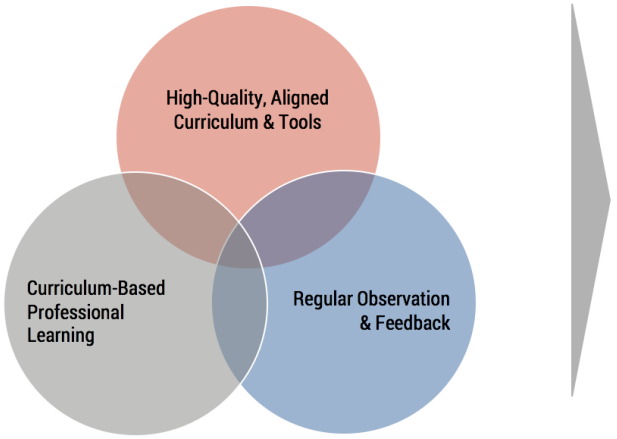
5 *Create **professional learning** focused on curricular content.*

Ongoing, high-quality professional development is the key to implementation. States and districts could consider following Massachusetts's and Louisiana's examples in this regard. For example, as Massachusetts's Curriculum Frameworks were first being implemented, the state asked districts to prioritize content knowledge above all other professional development goals. Massachusetts has also emphasized aligned content knowledge for educators at much earlier stages in their career – requiring all pre-service teachers to demonstrate content knowledge that is aligned to the state's expectations for students in the Curriculum Frameworks. And Louisiana emphasizes high-quality, aligned curriculum and instruction by promoting professional learning that prioritizes content- and curriculum-specific issues, including by publishing of a list of vendors who can demonstrate they help teachers use high-quality, Tier 1 instructional materials; build teachers' content knowledge; and provide educators opportunities to practice their skills and receive feedback. This encourages an explicit link between the trainings teachers receive and the curriculum they are expected to use on a daily basis – making professional learning more engaging and relevant for teachers, as there is a clear relationship between teacher learning and student learning. Recognizing that a primary function of all school systems is to support educators to become experts at teaching the curriculum and tailoring instruction to meet students' needs, closer linkages between curriculum and professional learning make perfect sense.[88]

Curricular reform efforts may also be maximized through increasing teachers' buy-in and teachers' sheer academic knowledge. For example, the BEE's upper-elementary reading review (covering grades 2-5) found higher positive effects from curricula and professional development together than from either alone.[89] And there is some evidence that the efficacy of at least one well-researched curriculum, Core Knowledge, increased with teachers' knowledge and fidelity of implementation.[90]

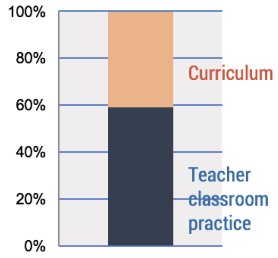
In other words, as demonstrated in the figure on the following page, enabling teachers to use a high-quality curriculum as part of an overall intervention that focuses equally on professional learning and educator feedback can greatly multiply the impact of simply replacing a low-quality curriculum with a higher-quality one.

Curriculum – as part of an integrated delivery model – drives changes in teacher behavior, which can lead to even greater effects on student outcomes.



Students in an integrated improvement model gained an estimated four months of learning over two years relative to students in the comparison group.

41% of effect attributable to the curriculum itself.



Source: Joseph A. Taylor et al., "An Efficacy Trial of Research-Based Curriculum Materials with Curriculum-Based Professional Development," *American Educational Research Journal,* 2015.

Note: Study distinguishes between "teacher effectiveness" (percentile ranking using VAM+) and "practice" (pedagogies, instructional moves, eliciting student thinking, etc.). Implementation fidelity in the study was 71%; effect size was .09.

6 *Messaging matters, and external partners and validators can help.*

Educators and other stakeholders are rightly sensitive to the perception – and sometimes, the reality – that reform can be more about centralized control than teacher empowerment. We believe curricular reform can respect local control, teacher leadership, and classroom autonomy, and that policies can play a critical role in improving instructional materials and, in turn, student learning. Still, policymakers should be aware of potential risks and sensitivity toward "curriculum" from stakeholders; state and local leaders considering efforts to improve curriculum and instructional materials will need to take care to avoid the political dynamics and backlash that stymied Common Core standards and assessments.[91]

What might be the most effective frame for communicating about curricular reform? Anecdotal evidence from leaders in the field – EdReports.org and TNTP, in particular – suggests that educators identify the term "curriculum" with "textbook," which can send a prescriptive, reductionist message.[92] By contrast, focusing on "instructional materials" as opposed to "textbook adoption" is more capacious and invites educators' participation around a core of curricular artifacts, which they can supplement and adapt as needed. District and state leaders may want to consider using this broader term. Districts and states might also consider a formal recognition of schools that use blue-ribbon or

first-in-class instructional materials, rather than a penalty upon schools that do not – creating a positive, rather than punitive, message.

Given such political sensitivities, it is critical for states and districts to develop a communication strategy up-front and identify external partners – not just classroom educators and teacher leaders, but also local principals, district superintendents, the business community, unions and other organizations that represent educators, and the higher education community. Their input and support will be essential to both improve the quality of the effort, but also to sustain it.

CONCLUSION

It is often said no silver bullets exist in education. Many reforms present positive results even in challenging contexts but may require major structural changes in education delivery. However, almost all of the top-performing countries, and the U.S.'s top-performing state, have long believed that the content of what is taught matters. Research backs up their argument. Now, a group of states and districts are catching on and exerting leadership to develop strategies that make high-quality curricula and instruction much more likely in their classrooms. Curriculum may not be a silver bullet, but providing educators with rigorous, aligned instructional materials is a critically important, evidence-based reform that is hiding in plain sight.

NOTES

[1] Chiefs for Change is grateful to David Steiner, Ashley Berner, and their colleagues at the Johns Hopkins Institute for Education Policy for the research provided in this analysis.
[2] Common Core. 2009. "Why We're Behind: What Top Nations Teach Their Student but We Don't." Washington, D.C.: Common Core.
[3] There is debate on how broadly to define curriculum. Some define the term quite broadly to cover all learning experiences (see, for example, "Oates, Tim. 2015. "'So Who Says That a 12 Year-Old Should Learn That?' Confused Issues of Knowledge and Authority in Curriculum Thinking." In *Knowledge and the Curriculum: A Collection of Essays to Accompany E.D. Hirsch's Lecture at Policy Exchange*, edited by Jonathan Simons and Natasha Porter, 64–75. London, UK: Policy Exchange. https://policyexchange.org.uk/publication/knowledge-and-the-curriculum-a-collection-of-essays-to-accompany-e-d-hirschs-lecture-at-policy-exchange/.) Others -- including many teachers -- view curriculum as narrowly as a published textbook (see, for example, (Weisskirk, Lauren. 2017. "EdReports' Work on Instructional Materials and Messaging for Teachers." presented at the Instructional Partners Gathering, Johns Hopkins University, January 13.)
[4] Whitehurst, Grover. 2009. "Don't Forget Curriculum." Brown Center Letters on Education. Washington, DC: Brookings Institution. https://www.brookings.edu/research/dont-forget-curriculum/.
[5] See, for example, Gewertz, Catherine. 2015. "States Ceding Power Over Classroom Materials." *Education Week*, February 17. http://www.edweek.org/ew/articles/2015/02/18/states-ceding-power-over-classroom-materials.html.
[6] Chingos, Matthew, and Grover Whitehurst. 2012. "Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core." Washington, DC: Brookings Institution. https://www.brookings.edu/research/choosing-blindly-instructional-materials-teacher-effectiveness-and-the-common-core/.
[7] Gewertz, Catherine. 2015. "States Ceding Power Over Classroom Materials." *Education Week*, February 17. http://www.edweek.org/ew/articles/2015/02/18/states-ceding-power-over-classroom-materials.html.
[8] Kane, Thomas, Antoniya Owens, William Marinell, Daniel Thal, and Douglas Staiger. 2016. "Teaching Higher: Educators' Perspectives on Common Core Implementation." Cambridge, MA: Center for Education Policy Research, Harvard University. http://cepr.harvard.edu/files/cepr/files/teaching-higher-report.pdf?m=1454988762.
[9] See, for example, Haydel, Elizabeth and Sheila Byrd Carmichael. 2015. "Uncommonly Engaging? A Review of the EngageNY English Language Arts Common Core Curriculum." Washington, DC: Thomas B. Fordham Institute. https://edexcellence.net/publications/uncommonly-engaging-a-review-of-the-engageny-english-language-arts-common-core; Heitin, Liana. 2015. "Most Math Curricula Found to Be Out of Sync With Common Core." *Education Week*, March 4. http://www.edweek.org/ew/articles/2015/03/04/most-math-curricula-found-to-be-out.html; Herold, Benjamin. 2014. "Boasts About Textbooks Aligned to Common Core a 'Sham,' Say Researchers." *Education Week,* February 21. http://blogs.edweek.org/edweek/DigitalEducation/2014/02/claims_of_common_core-aligned_.html; Herold, Benjamin and Michele Molnar. 2014. "Research Questions Common-Core Claims by Publishers." *Education Week,* March 3. http://www.edweek.org/ew/articles/2014/03/05/23textbooks_ep.h33.html; Louisiana Department of Education. n/d. "Online Instructional Materials Reviews." Louisiana Believes. http://www.louisianabelieves.com/academics/ONLINE-INSTRUCTIONAL-MATERIALS-REVIEWS; and Polikoff, Morgan. 2015. "How Well Aligned Are Textbooks to the Common Core Standards in Mathematics?" *American Educational Research Journal* 52 (6): 1185–1211. doi: 10.3102/0002831215584435. http://journals.sagepub.com/doi/abs/10.3102/0002831215584435.
[10] Opfer, V. Darleen, Julia Kaufman, and Lindsay Thompson. 2016. "Implementation of K–12 State Standards for Mathematics and English Language Arts and Literacy: Findings from the American Teacher Panel." Santa Monica, CA: The Rand Corporation. https://www.rand.org/content/dam/rand/pubs/research_reports/RR1500/RR1529-1/RAND_RR1529-1.pdf.

[11] Kane, Thomas, Antoniya Owens, William Marinell, Daniel Thal, and Douglas Staiger. 2016. "Teaching Higher: Educators' Perspectives on Common Core Implementation." Cambridge, MA: Center for Education Policy Research, Harvard University. http://cepr.harvard.edu/files/cepr/files/teaching-higher-report.pdf?m=1454988762.

[12] This section is informed by the StandardsWork report, which offers the most current and extensive review of research on content-rich curricula available. See: Steiner, David M., Ashley Berner, Joseph Reilly, Steven M. Ross, Gary R. Morrison, Cynthia Lake, Alan J. Reid, and Alanna Bjorklund-Young. 2017. "StandardsWork: A Narrative Research Review." Center for Research and Reform in Education; Institute for Education Policy. Baltimore, MD: Johns Hopkins University.

[13] Common Core. 2009. "Why We're Behind: What Top Nations Teach Their Student but We Don't." Washington, D.C.: Common Core.

[14] For example, "Bruner's (1966) theory of instruction; Bransford, Sherwood, Hasselbring, Kinzer, and Williams' (1990) "anchored instruction;" Mayer's (1984) conditions for meaningful learning; and Posner and Strikes' (1976) optimal sequences for learning: all reflect this central concept [that background knowledge informs learning]." And: "Nagy, Anderson, and Herman (1987) found that when reading, students who understand the *content* of the passage are better able to decipher the meaning of unknown words through the use of context cues; Alexander, Kulikowich, and Schulze (1994) investigated the impact that students' prior scientific knowledge had on their ability to recall information after reading a physics text. In an experiment with more than 200 college students, the research team found that students' prior knowledge of the passage's content was a strong predictor of their ability to recall information from the passage and also of their *enjoyment* of reading the passage; Dochy, Segers, and Buehl (1999) synthesized more than '180 articles, books, papers, and research reports related to prior knowledge' (p. 145) and concluded that prior knowledge has a positive influence on student test performance across a variety of domains."

[15] See, for example, National Research Council. 2000. *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. Washington, DC: National Academies Press; Willingham, Daniel. 2006. "How Knowledge Helps." *American Educator* 30 (1): 30. http://www.aft.org/periodical/american-educator/spring-2006/how-knowledge-helps; and Willingham, Daniel. 2007. "Critical Thinking." *American Educator* 31 (3): 8–19. https://static1.squarespace.com/static/505e7a18e4b0a01995610030/t/54cfebe6e4b0c38f7e17b132/1422912486218/Crit_Thinking.pdf.

[16] See, for example, Hirsch, E. D. 2006. *The Knowledge Deficit: Closing the Shocking Education Gap for American Children*. Boston: Houghton Mifflin; Hirsch, E.D. 2009. *The Making of Americans: Democracy and Our Schools*. New Haven: Yale University Press; Hirsch, E. D, Joseph F Kett, and James Trefil. 1987. *Cultural Literacy: What Every American Needs to Know*. Boston: Houghton Mifflin; and Hirsch, E.D. 2016. *Why Knowledge Matters: Rescuing Our Children from Failed Educational Theories*. Cambridge, MA: Harvard Education Press.

[17] Greenberg, Julie, Kate Walsh, and Arthur McKee. 2015. "2014 Teacher Prep Review: Revised Version." Washington, DC: National Council on Teacher Quality.

[18] See, for example, Campbell, David E. 2004. "The Civic Implications of Canada's Education System." In *Educating Citizens: International Perspectives on Civic Values and School Choice*, edited by Patrick Wolf, Stephen Macedo, David J. Ferrero, and Charles Venegone, 186–220. Washington, DC: Brookings Institute; Coca, Vanessa, and Consortium on Chicago School Research. 2012. *Working to My Potential: The Postsecondary Experiences of CPS Students in the International Baccalaureate Diploma Programme*. http://ccsr.uchicago.edu/sites/default/files/publications/IB%20Report1.pdf; McEwen, Nelly. 1995. "Educational Accountability in Alberta." *Canadian Journal of Education / Revue Canadienne de L'éducation* 20 (1): 27–44; and OECD. 2013. *PISA 2012 Results: Excellence through Equity (Volume II)*. Paris: Organisation for Economic Co-operation and Development. http://www.oecd-ilibrary.org/content/book/9789264201132-en.

[19] While this brief highlights specific curricula that have been shown to improve student achievement (compared to "business as usual"), in no way does either Chiefs for Change or the Johns Hopkins Institute for Education Policy intend this brief to endorse any of them. The research record is far from exhaustive; many new instructional programs are being developed and fielded; it is likely that particular curricula with great potential have yet to be researched for effect.

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[21] In this context, "business-as-usual" refers to whichever curricular materials and teaching methods happen to be used in the classrooms functioning as the control, or comparison, group of students. This methodology has limitations, however: the impact of a high-quality curriculum on student outcomes could be minimized if studied a control group that happens to be using another strong, evidence-based curriculum.

[22] Steiner, David M., Ashley Berner, Joseph Reilly, Steven M. Ross, Gary R. Morrison, Cynthia Lake, Alan J. Reid, and Alanna Bjorklund-Young. 2017. "StandardsWork: A Narrative Research Review." Center for Research and Reform in Education; Institute for Education Policy. Baltimore, MD: Johns Hopkins University.

[23] Hattie, John. 2009. *Visible Learning: A Synthesis of over 800 Meta-Analyses Relating to Achievement*. London; New York: Routledge.

[24] For example, the BEE would have ruled out an analysis of a whole-school reform model, such as Success for All, which includes a wide array of changes in school organization and teaching, but Success for All would be included in the VLP.

[25] The Visible Learning Project (VLP) was coordinated by education scholar John Hattie at the University of New Zealand/Auckland between 1994 and 2009. The project sought to evaluate the average effects of educational interventions, such as class-size reduction, teacher evaluations, and peer tutoring. Because the VLP synthesized across a wide range of methods, its reported effect sizes tend to be on the large side. In general, the effect sizes reported in the Best Evidence Encyclopedia (BEE) are lower than those in What Works Clearinghouse. One reason for this is that the latter used a broader definition of "curriculum" to include what the BEE would have ruled out as a whole-school reform model, such as Success for All, which includes a wide array of changes in school organization and teaching.

[26] Because students in the United States learn less year-on-year as they advance through the grade levels, an intervention with a given effect size will have less impact on lower grades (in terms of days of learning). Education research periodically revises the translation of effect sizes into days of learning.

[27] Steiner, David M., Ashley Berner, Joseph Reilly, Steven M. Ross, Gary R. Morrison, Cynthia Lake, Alan J. Reid, and Alanna Bjorklund-Young. 2017. "StandardsWork: A Narrative Research Review." Center for Research and Reform in Education; Institute for Education Policy. Baltimore, MD: Johns Hopkins University.

[28] Kane, Thomas J. 2016. "Never Judge a Book by Its Cover—use Student Achievement Instead." *The Brookings Institution*. March 3. http://www.brookings.edu/research/papers/2016/03/03-dont-judge-book-cover-use-student-achievement-kane.

[29] Bhatt, Rachana, and Cory Koedel. 2012. "Large-Scale Evaluations of Curricular Effectiveness: The Case of Elementary Mathematics in Indiana." *Educational Evaluation and Policy Analysis* 34 (4): 391–412.

[30] Bjorklund-Young, Alanna. 2016. "High-Quality Curricula: A Cost-Effective Way to Boost Student Learning." *Johns Hopkins Institute for Education Policy*. April 11. http://edpolicy.education.jhu.edu/?p=48.

[31] Polikoff, Morgan, and Corey Koedel. 2017. "Big Bang for Just a Few Bucks: The Impact of Math Textbooks in California | Brookings Institution." Evidence Speaks #5. Washington, DC: Brookings Institution. https://www.brookings.edu/research/big-bang-for-just-a-few-bucks-the-impact-of-math-textbooks-in-california/.

[32] See, for example, Benson, John T., John Fortier, Lawrence Allen, and Dennis Wicklund. 2000. "Wisconsin Charter Schools, 2000." https://eric.ed.gov/?id=ED453585; Datnow, Amanda, Geoffrey D. Borman, Sam Stringfield, Laura T. Overman, and Marisa Castellano. 2003. "Comprehensive School Reform in Culturally and Linguistically Diverse Contexts: Implementation and Outcomes from a Four-Year Study." *Educational Evaluation and Policy Analysis* 25 (2): 143–70. doi:10.3102/01623737025002143; Ross, Steven, L. Weiping Wang, Marty Alberg, William L. Sanders, S. Paul Wright, and Sam Stringfield. 2001. "Fourth-Year Achievement Results on the Tennessee Value-Added Assessment System for Restructuring Schools in Memphis." American Educational Research Association, April. http://files.eric.ed.gov/fulltext/ED471364.pdf; Stringfield, S., A. Datnow, G. Borman, and L.T. Rachuba. 2000. "National Evaluation of Core Knowledge Sequence Implementation: Final Report." Baltimore, MD: Johns Hopkins University Center for Research on the Education of Students Placed at Risk. https://eric.ed.gov/?id=ED451282; Taylor, J.G. 2000. "Core Knowledge: Its Impact on the Curricular and Instructional Practices of Teachers and on Student Learning in an Urban School District." Fort Lauderdale, FL: Nova Southeastern University; and Weinbaum, Alexandra, Lynn Gregory, Alex Wilkie, Lesley Hirsch, and Cheri Fancsali. 1996. "Expeditionary Learning Outward Bound. Summary Report." https://eric.ed.gov/?id=ED462456.

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[36] Whitehurst, Grover. 2009. "Don't Forget Curriculum." Brown Center Letters on Education. Washington, DC: Brookings Institution. https://www.brookings.edu/research/dont-forget-curriculum/.

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