

DESE Policy Brief • October 2018

# Adoption, Implementation, and Effects

# of Curriculum Materials

A growing body of research concludes that curriculum materials can be an important resource for improving student performance. Choosing high-quality materials and supporting their implementation is a valuable investment of resources. However, district and state leaders face challenges when making adoption and implementation decisions.

In Massachusetts, curriculum choices are local decisions, and districts, schools, and teachers adopt and use a wide variety of curriculum materials. Research done nationwide indicates that district leaders can and do take steps to improve selection and implementation of high-quality materials. This policy brief summarizes recent research that may be of use to Massachusetts district leaders by addressing the following questions:

* How do teachers use curriculum materials? What do they value in those materials?
* What information is available to districts about the quality of curriculum materials?
* How can districts best support teachers in curriculum implementation?

The brief concludes by summarizing resources available from the Massachusetts Department of Elementary and Secondary Education (DESE) on curriculum materials.

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**Key Findings About Curriculum Adoption, Implementation, and Effects**

**Teacher use of curriculum materials**

* Though teachers view all materials as imperfect, they generally want an adopted curriculum and use adopted curricula regularly.
* Having an adopted curriculum may be especially important during the implementation of new standards and for newer teachers.
* Nearly all teachers supplement formally adopted materials, and teachers value this autonomy.

**District curriculum choice and implementation**

* Districts feel prepared to evaluate curriculum materials, but say they would benefit from external evidence on quality.
* Information on alignment to standards, impact on student outcomes, and cost-effectiveness is especially valuable for districts and is currently hard to gather.
* Most materials are similar to one another in cost, so choosing stronger materials is highly cost-effective.
* Districts should support teachers in implementation with a focus on improving alignment to standards and collaborating with other teachers.

## Defining curriculum and standards

This policy brief focuses on textbooks, curriculum materials, and content standards. Following our prior work (Polikoff, Campbell, & Korn, 2018), we define a “textbook” as a traditional paper volume that contains what is intended to be a comprehensive subject-specific curriculum for a single grade level. These traditional textbooks have been the focus of virtually all of the research we discuss below; research has yet to catch up to recent developments in curriculum materials.

“Curriculum materials” includes textbooks, but it also includes the ever-expanding landscape of resources that teachers call upon to implement their lessons. These materials include supplemental texts, open online educational resources (e.g., EngageNY), videos (e.g., Khan Academy), diagnostic materials, software (e.g., Google Apps for Education), and websites where teachers share lessons and resources (e.g., Pinterest, TeachersPayTeachers). Sometimes districts pull together curriculum materials into an “adopted curriculum” that is not a textbook. For instance, they might create units of study, pull lessons from some textbooks, and supplement them with online resources. We also refer to these adopted curricula throughout the paper.

Textbooks and other curriculum materials are generally written to align with “content standards,” which are documents listing what students are to know and be able to do at particular grade levels (Smith & O’Day, 1990). These are usually put forth by states, though sometimes other organizations also create content standards (e.g., the National Council of Teachers of Mathematics). For shorthand, we generally refer to these as “standards” throughout this paper.

## How do teachers use curriculum materials? What do they value in curriculum materials?

### Though teachers view all materials as imperfect, they generally want an adopted curriculum and use adopted curricula regularly.

Survey evidence makes clear that large proportions of teachers, especially in certain grades and subjects, use textbooks with some frequency. For example, data from the nationally representative American Teacher Panel (ATP) indicate that 93% of English language arts (ELA) and 83% of mathematics teachers use a textbook at least once a week.[[1]](#footnote-1) While precisely comparable data for Massachusetts are not available, ATP data indicate that Massachusetts teachers rely on textbooks at high rates. Table 1 shows that the most commonly used textbooks in mathematics are used by large proportions of teachers at least weekly. The usage rates for teachers nationally are not shown in the table, but they are of very similar magnitudes.

Regardless of whether teachers use formal textbooks, most report using adopted curricula—ATP data indicate 92% to 98% of teachers (depending on grade and subject) report using “materials developed and/or selected by [their] district.” The majority of these (51% to 74%) report using those materials at least weekly (Opfer et al., 2016). Evidence from interviews (Campbell, 2018) confirms that, while teachers generally believe their schools’ adopted textbooks are flawed, they want an adopted curriculum. Teachers in that study consistently reported wanting something to serve as a backbone for teaching, so they could reduce the work of lesson planning if they needed to.

**Table 1: Proportion of Massachusetts teachers who regularly use various textbooks at least once a week**

*(source: 2017 American Teacher Panel)*

| ELA | Mathematics |
| --- | --- |
| Reading Street | 54% | enVision 2.0 | 55% |
| Journeys | 27% | Eureka Math/EngageNY | 42% |
| Benchmark Literacy | 18% | Go Math | 34% |
| Reading Wonders | 14% | Zearn Math | 33% |
| EngageNY | 13% | Everyday Math | 31% |

No good longitudinal data exist on the question of textbook use, and it may also be that the number of teachers using traditional textbooks is declining somewhat. Two decades ago, Ball and Cohen wrote that that textbooks “dominate teaching practice in the United States” (1996, p. 6). That is clearly no longer the case given widespread supplementation of curriculum materials reported by teachers (discussed below). Still, there are many reasons why teachers continue to use textbooks and other formally adopted materials. For one, using these materials makes teachers’ jobs more manageable—they do not have to create or assemble their entire curriculum themselves. From a district or state perspective, using textbooks or other adopted materials helps improve the coherence of the enacted curriculum, whether for an individual teacher or across teachers. From an international perspective, U.S. schools rely on curriculum materials far less and have less coherent curricula when compared with most other countries—the incoherence of curricula is believed to contribute to poor U.S. performance on international assessments of student achievement (Schmidt & McKnight, 2012).

***Having an adopted curriculum may be especially important during the implementation of new standards and for newer teachers.***

Teachers may need additional curriculum support during transitions to new standards (Campbell, 2018). For instance, recent national surveys indicate that approximately three quarters of teachers made substantial changes (half or more of their materials) to their curriculum material use as a result of the Common Core State Standards (Kane et al., 2016). With the adoption of Common Core by a number of states, the timeline of selecting Common Core-aligned materials was late in many places because of state textbook adoption cycles and the slowness of publishers’ efforts to create new and well-aligned materials.

Certain teacher characteristics are associated with differences in use of textbooks or adopted curricula. For example, newer teachers may need more support as they are enacting standards and may rely more on textbooks for that reason (Remillard & Bryans, 2004; Tarr, et al., 2006). Teachers who have less subject-matter expertise or are less confident in their ability to teach a particular subject may also be more likely to use a textbook or adopted curriculum (Behm & Lloyd, 2009).

***Nearly all teachers supplement formally adopted materials, and teachers value this autonomy.***

Teachers have many reasons for not using textbooks and other adopted materials more than they do. There is a large literature on teacher use of textbooks (e.g., Remillard, 2005), and our recent interview study of California teachers (Campbell, 2018) confirms many of the reasons that others have found. For instance, teachers are skeptical that available materials are aligned to standards, and they believe that constructing curriculum is a core function of their teaching profession.

The vast majority of teachers supplement adopted curriculum materials. Teachers may draw on previously used materials, download materials from various websites (e.g., TeachersPayTeachers, Pinterest, Google), or create their own materials either alone or working with colleagues. Recent research makes clear that virtually all teachers supplement, many of them as or more often than they use adopted materials. For instance, 2017 data from the ATP, shown in Table 2, indicate that teachers use multiple websites to gather their curriculum resources. More than half of all teachers say they use the website TeachersPayTeachers at least once a week (Kaufman et al., 2018). Similar proportions report using textbooks with that frequency, as can be seen by comparing Table 2 to Table 1. Other national survey data corroborate these findings, with 72% to 80% of teachers (depending on subject) saying they use “materials created by you or staff at your school” two to three times a week or more (Kane et al., 2016).

**Table 2: Proportion of teachers nationally who regularly use various curriculum resources at least once a week**

*(source: 2017 American Teacher Panel)*

| ELA | Mathematics |
| --- | --- |
| TeachersPayTeachers | 55% | TeachersPayTeachers | 60% |
| Pinterest | 46% | Pinterest | 36% |
| Google | 44% | Google | 31% |
| Readworks | 39% | Khan Academy | 28% |
| ReadWriteThink | 30% | State DOE website | 22% |

The fact that teachers supplement so widely is evidence in itself that they feel supplementation is necessary. Our interviews with mathematics teachers (Campbell, 2018) also confirm that teachers value the autonomy to supplement their districts’ formally adopted curriculum. Two specific reasons that teachers frequently offer for supplementation are 1) their districts’ formally adopted curriculum materials provide inadequate engagement and enrichment opportunities, and 2) their districts’ formally adopted curriculum materials provide inadequate opportunities for practicing procedures. Research (e.g., Polikoff, 2015) and external ratings also confirm that some traditional textbooks are poorly aligned with standards. Surely supplementation is also an effort by teachers to shore up areas of misalignment in these materials.

## What information is available to districts about the quality of curriculum materials?

### Districts feel prepared to evaluate curriculum but say they would benefit from external evidence on curriculum quality.

In most states, most districts are uniform-adopting districts, meaning that the district makes curriculum adoption decisions that apply to all schools in the district. Two studies of district-level curriculum adoptions conducted outside Massachusetts found that the process can be burdensome (Campbell & Polikoff, 2017; Zeringue et al., 2010). Some states attempt to ease this burden by providing recommended lists of curriculum materials. Still, district leaders report that being familiar with the needs of their students, they are in the best position to select new materials (Reys & Reys, 2006; Stein et al., 2001).

Two studies (Campbell & Polikoff, 2017; Zeringue et al., 2010) reveal that for curriculum adoptions districts report gathering information about materials from a wide variety of sources, including other local districts, state data and recommendations, vendor fairs, professional conferences, and independent evaluations by external organizations. Among those, by far the most prominent is EdReports.org, which uses expert reviewers to conduct alignment analyses of curriculum materials in the core subjects. Districts generally begin with a broad set of possible curriculum materials, which are then winnowed down to a manageable number for deeper evaluation. Finding the time for adequate training of evaluators, and then for reviewing materials, is a significant barrier in the adoption process.

***Information on alignment to standards, impact on student outcomes, and cost-effectiveness is especially valuable for districts and is currently hard to gather.***

Districts report being particularly interested in three dimensions: alignment to standards, effects on student achievement, and cost effectiveness. Each of these presents challenges in terms of finding relevant information.

***Curriculum publishers make claims of alignment to standards, but many are overstated and districts are skeptical of them.***

Districts want to know how well materials are aligned to standards, but they doubt publishers’ claims of alignment. Teachers report feeling that publishers “slapped a new sticker on an old book” to meet alignment expectations (Campbell & Polikoff, 2018). When district leaders responded to DESE’s [annual VISTA survey](http://www.doe.mass.edu/research/vista/2018/) inviting Massachusetts superintendents and principals to share their views, fewer than a third indicated their district’s adopted textbook in mathematics (30%), ELA (24%) or science and technology/engineering (STE; 9%) was strongly aligned to state standards. This means districts must either evaluate alignment themselves (which requires extensive training and time) or trust an external source’s alignment ratings. Two possible sources for external alignment evidence are state departments of education (which districts often rely on when possible) and external organizations such as EdReports. State alignment ratings may be very influential—recent research in Louisiana confirms that large proportions of districts adopted the top-aligned materials on the state’s list (Kaufman et al., 2018). However, very few California districts reported using, or even having heard of, the alignment ratings on EdReports. Massachusetts data from the ATP reveal that just 7% of Massachusetts teachers and 12% of school leaders have heard of EdReports. There is clearly work to be done if these independent ratings are to exert widespread influence on adoption decisions.

In the early days of Common Core, there was widespread perception that textbook publishers had not adequately addressed alignment. Independent research supported those perceptions—for instance, a study by Polikoff (2015) in Florida found that pre- and post-Common Core versions of the same textbook series were very similar—much more than would be expected, given how dissimilar Florida’s previous elementary mathematics standards were from Common Core’s. However, both the Louisiana Department of Education and EdReports have recently conducted alignment investigations that find some progress in terms of publishers’ efforts to create aligned materials. Now districts can choose from many published materials that are well aligned to standards.

***Some curricula are more effective than others.***

District leaders are interested in learning which materials positively affect student achievement. Unfortunately, this is a difficult question to answer rigorously. The highest-quality evidence available reaches several conclusions.

The large majority of studies of core textbooks find that some textbooks improve student achievement more than others. Most of these studies use state tests as their outcome measures, but some use off-the-shelf tests such as the Iowa Test of Basic Skills. In a study of ELA textbooks, for instance, *Open Court Reading* was found to have positive effects on measures of reading comprehension and vocabulary, as well as on composite reading scores, relative to other books in the study (Borman et al., 2007). In mathematics, four recent studies found evidence that *Math Expressions* or *Saxon* (Agodini & Harris, 2010), *Scott Foresman Addison Wesley* or *Silver Burdett Ginn* (Bhatt & Koedel, 2012)*,* *Harcourt Math* (Bhatt et al., 2013) and *Houghton Mifflin California Math* (Koedel et al., 2017) outperformed comparison textbooks.

In terms of magnitude, the effects of curriculum materials in these studies are generally between .05 and .20 standard deviations. This is the equivalent of moving students from the 50th to between the 52nd and 58th percentiles. By comparison, .20 standard deviations is about twice as large as the effect of being assigned to an experienced teacher versus a novice, (e.g. Clotfelter, Ladd, & Vigdor, 2006; Rivkin, Hanushek, & Kain, 2005; Staiger & Rockoff, 2010). Studies sometimes find that effects are larger for certain groups than others. Koedel and colleagues (2017) find that the effect of *Houghton Mifflin California Math* is about twice as large for low-income students as non-low-income students. No study has found that a curriculum has positive effects for some groups and negative effects for others.

The effects of textbooks may also vary across content sub-domains (e.g., algebra vs. geometry vs. measurement; Bhatt et al., 2013) and/or grade levels (Koedel et al., 2017). Again, no study has found that effects were positive in one grade level or content domain and negative in another—only the magnitude has differed, not the direction.

While these studies indicate that curriculum materials have an effect on student achievement, the literature is limited in several ways. Existing studies:

* all use data that pre-date the recent adoption of college- and career-readiness standards.
* largely focus on elementary mathematics.
* do not provide information about the particular features of a curriculum that are associated with higher student achievement (e.g., pedagogical orientation, student-centeredness).
* do not use data from Massachusetts.

Further confounding research results, often the curriculum materials studied are no longer on the market. By the time researchers gain access to adoption information and analyze effects on student achievement, schools may be using new curriculum materials and/or the analyzed materials are out of print.

These limitations make it extremely difficult for states or districts to create actionable plans based on the results of the studies. In fact, a new approach might be considered to generate results more useful to states and districts. If states kept routine track of textbook adoptions and worked with researchers, it would be possible to analyze those data much closer to the time of adoptions.

***Most curriculum materials are similar in cost, so choosing a more effective textbook is highly cost-effective.***

District leaders are interested in understanding the cost-effectiveness of various textbook options. However, answering the cost-effectiveness question requires impact estimates, and is challenging in the same ways as the impact analyses described above. In general textbooks are very similar to one another in cost (Boser et al., 2015), so cost-effectiveness analyses will tend to indicate that choosing a more effective textbook offers an excellent return on the investment, even if the size of the impact is modest. The one cost-effectiveness analysis that we are aware of (Boser et al., 2015) found that textbook price and effectiveness were unrelated and that the cost-effectiveness ratios for more effective textbooks were often higher than any other intervention on which they had data.

Increasingly, there are free, open-source resources available to use as curriculum materials. Some of these are among the best-rated materials on EdReports in terms of alignment to standards. Though these materials have not yet been evaluated for efficacy, they would be extremely cost-effective if they were found to improve student achievement.

## How can districts best support teachers in curriculum implementation?

***Districts should support teachers in implementation with a focus on improving alignment to standards and collaborating with other teachers.***

Research indicates that teachers find it challenging to implement standards that represent a significant departure from previous standards. Specifically, recent national surveys indicate that many teachers do not feel adequately supported by just the adoption of curriculum materials or the professional development opportunities provided by their schools. Teachers may be struggling to understand and implement new college- and career- readiness standards as intended (Bugler et al., 2017; Chen-Gaddini et al., 2017; Marple et al., 2017).

This research suggests that teachers need access to clear and consistent messaging from inputs aligned to the standards such as adopted materials, professional development, pacing guidelines, and assessments. During times of transition to new standards, teachers find it particularly important to work from an adopted set of curriculum materials (Campbell, 2018).

We collected interviews with over 60 teachers regarding the adoption and implementation of new curriculum materials. We collected these interviews in California[[2]](#footnote-2), in districts that conduct adoptions internally in a similar fashion to Massachusetts districts. Teachers indicated several district-level factors that helped them to feel more supported during the evaluation, adoption, and implementation of new standards and materials.

The teachers reported needing ongoing training about the standards themselves, not just the curriculum materials. Because most teachers supplement, they must understand the standards in order to see where their adopted materials come up short.

They also reported that most training on curriculum materials focuses unhelpfully on superficial features of the curriculum (e.g., how to use the teacher’s guide or website). Teachers said they prefer training from other teachers who have experience using the materials, and they prefer that training be focused on the pedagogical expectations of the curriculum.

Teachers reported that they needed structured time to collaborate with their peers (e.g., through professional learning communities) around implementation and supplementation of the new curriculum materials.

Research makes clear that alignment of instruction to standards is easier to claim than it is to achieve. Certainly, educators are interested in alignment and are capable of achieving it, but there are many systematic barriers to achieving aligned instruction, including misaligned messages from curriculum materials or professional development; language in the standards that may be subject to multiple interpretations; and the multiple layers (e.g., state, district, school department, publisher) through which content messages are filtered.

Both our teacher and district leader interviews in California revealed that educators are often interested in learning from others in similar situations. Leaders of small districts especially reported that they struggled to find the capacity to do serious evaluations of the available curriculum materials. They valued the opportunities provided by intermediary organizations (in California, these are County Offices of Education) to collaborate on making textbook adoption decisions with similar nearby districts. In some counties there were even county-wide adoptions, which district leaders said were also helpful because of high levels of student mobility in these areas. In other cases, district leaders sought out ideas from districts that had already made adoption decisions. These idea-sharing opportunities would be facilitated if districts had an easy way of finding out who was using what materials—the state could play this role.

As mentioned above, teachers expressed a desire for structured opportunities to collaborate with others around curriculum implementation and supplementation. Specifically, teachers report being interested in working with others to identify weaknesses in adopted materials and to identify or create supplemental materials to fill those weaknesses. They also stated a desire to collaborate on the best ways to differentiate adopted materials for diverse student needs.

The 2017 Massachusetts Curriculum Frameworks for mathematics and ELA/literacy represent a shift from the 2011 ones, which incorporated the Common Core, and teachers will benefit from aligned and consistent messaging about the changes in the standards. District leaders in Massachusetts recognize that available materials have alignment issues. Results from the statewide VISTA surveys of superintendents highlight that fewer than half of district leaders believe their mathematics and ELA curricula are “strongly aligned” (45% and 43%, respectively). For “textbooks” only 30% and 24%, respectively, believe they are strongly aligned. District leaders believe that alignment issues are much greater in science and technology/engineering. For these subjects, just 20% say the curriculum and 9% say the textbooks are strongly aligned. It is likely the case that other subjects have even greater alignment issues that may need attention or supplementation.

## What additional resources are available from DESE on curriculum materials?

Curriculum materials are widely used and hold the potential to be a powerful instrument to help implement standards, improve instruction, and boost student learning. Getting the best materials into teachers’ hands and improving the quality of materials, however, remain challenges.

The Department has no plans to curb local control over curriculum, but in response to issues raised in the literature and by Massachusetts educators, the Department has begun to expand optional state-level supports for school and district decision-makers in Massachusetts. New resources in 2018 include quick reference guides on topics like [assessing curriculum](https://urldefense.proofpoint.com/v2/url?u=http-3A__www.doe.mass.edu_candi_impd_qrg-2Dassessing-2Dcurriculum.pdf&d=DwMFAg&c=clK7kQUTWtAVEOVIgvi0NU5BOUHhpN0H8p7CSfnc_gI&r=DqmTZLYGvZpkqEuW9_tC7A&m=hZfjwYhzF56kfwYMT8Z-smcm71OoFNlqmBPlKRnG83U&s=A6nzr2tNZNpdg6eD9PEUxpTCL84XAHWV37CFOWj1ed4&e=) and [aligning to state standards](https://urldefense.proofpoint.com/v2/url?u=http-3A__www.doe.mass.edu_candi_impd_qrg-2Daligning-2Dcurriculum.pdf&d=DwMFAg&c=clK7kQUTWtAVEOVIgvi0NU5BOUHhpN0H8p7CSfnc_gI&r=DqmTZLYGvZpkqEuW9_tC7A&m=hZfjwYhzF56kfwYMT8Z-smcm71OoFNlqmBPlKRnG83U&s=5F4q6nfKacLypEVEV5VxqFmHzJUT0_6yrtQUhOM1aHg&e=); [maps showing where specific materials are used](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.google.com_maps_d_viewer-3Fmid-3D1Pk-2DD6LGs2yTFLTqShirBzc1ER0pjiO8A-26ll-3D42.03676236427567-252C-2D71.67761895000001-26z-3D8&d=DwMFAg&c=clK7kQUTWtAVEOVIgvi0NU5BOUHhpN0H8p7CSfnc_gI&r=DqmTZLYGvZpkqEuW9_tC7A&m=hZfjwYhzF56kfwYMT8Z-smcm71OoFNlqmBPlKRnG83U&s=LAfEICO09iORzdaM2c_M49r7qXMn0iJfrIbLe_SGelA&e=) across the state; and a [web page](https://urldefense.proofpoint.com/v2/url?u=http-3A__www.doe.mass.edu_candi_impd_&d=DwMFAg&c=clK7kQUTWtAVEOVIgvi0NU5BOUHhpN0H8p7CSfnc_gI&r=DqmTZLYGvZpkqEuW9_tC7A&m=hZfjwYhzF56kfwYMT8Z-smcm71OoFNlqmBPlKRnG83U&s=XNH6esrOy0znFsARlJ61viHw2FKgxeSAZ0COQPYauTY&e=) housing curriculum-related information. In fall 2018, DESE is also convening panels of Massachusetts teachers to review available evidence on the quality and alignment of certain curricular materials. This initiative—called CURATE, for CUrriculum RAtings by TEachers—will result in a series of brief, user-friendly evaluations of materials reviewed. Eventually, DESE will establish a master service agreement designed to streamline procurement for districts that choose to use highly rated materials. Through these and other supports for local decision-making about curriculum, DESE hopes to increase access to high-quality curriculum materials for teachers and students across Massachusetts.

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1. Calculated by RAND researchers at the author’s request. [↑](#footnote-ref-1)
2. Unpublished work currently being conducted under a grant from the WT Grant Foundation. [↑](#footnote-ref-2)