RAND CORPORATION

Research Report

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How Instructional Materials Are Used and Supported in U.S. K–12 Classrooms

Findings from the 2019 American Instructional Resources Survey

As Deborah Ball and David Cohen wrote in 1996, "The design and spread of curriculum materials is one of the oldest strategies for attempting to influence classroom instruction." Unlike other educational reforms, which may depend on the talent and skills of the educators who lead them, a curriculum—textbooks or online materials composed of organized and scaffolded objectives, lesson plans, activities, and assessments constituting an entire course of study—is already written and static, seemingly ready to be scaled across whole states and school districts.

KEY FINDINGS

- Most teachers do not use a single curriculum as it is written. Instead, they reported using multiple curricula, making substantial modifications, or creating their own curriculum materials.
- Most teachers agreed that their observations and evaluations take into account their use of curricula. However, fewer teachers reported receiving coaching or professional development workshops focused on curriculum use.
- How teachers used their curriculum was connected to whether they reported receiving evaluative feedback on curriculum use or more frequent curriculum-focused professional learning (PL).
- Teachers in eight states focused on curriculum reforms were more likely to report use of standards-aligned curricula and—in some cases—more evaluative feedback and PL focused on curricula.
- Teachers in high-poverty schools reported more-frequent use of standards-aligned curricula for English language arts (ELA), digital materials, and supplementary materials. They were also more likely to report evaluative feedback and PL focused on curricula.
- The extent of teachers' curriculum-focused evaluative feedback and PL were connected with the number of standards-aligned practices in which teachers reported all their students engaging. However, whether teachers reported using a standards-aligned curriculum regularly—in itself—was not related to teachers' reports of their students' standards-aligned practices.

However, as when Ball and Cohen wrote about curriculum in the 1990s, evidence is mixed on the extent to which curricula actually influence teacher practice and student learning. A key reason is the role and work of the teacher in curriculum implementation: Using a new curriculum places considerable learning demands on teachers, and teachers make countless choices about how to use a curriculum based on their preexisting knowledge, their environment, and the constraints they experience.

Over the past two decades, research on the effects of curricula on teaching and learning has yielded mixed results. Several studies have highlighted certain reading, math, and science curricula that do appear to produce meaningful gains in achievement (Borman, Dowling, and Schneck, 2008; Koedel and Polikoff, 2017; Smith et al., 1993; Zucker et al., 2008). However, a recent multistate effort to measure textbook efficacy conducted by Blazar et al. (2019) found little evidence that different curricula—including ones more aligned with college and career-ready standards—had different effects on average fourth- and fifth-grade math achievement.

We argue that curricula—by themselves—cannot be expected to lead to student learning. Instead, as Ball and Cohen wrote decades ago, teachers' thoughtful and productive use of curricula in their lesson planning and instruction likely leads to student learning. That said, teachers are better positioned to use curricula well in their classroom lessons if they work within an instructional system in their school and district where standards, curricula, assessments, PL, and evaluation are all in alignment and working together to help teachers engage students in standards-aligned classroom practices.

The idea of aligned, or *coherent*, instructional systems is not new. As early as the 1990s, Smith and O'Day (1991) argued for the importance of providing instructional guidance around ambitious learning standards by aligning curriculum materials, professional development, and student assessments with standards. Case studies on the implementation of standards-based reform have often identified coherence as a common feature of initiatives that are successful at changing teachers' instructional practices (Coburn, Hill, and Spillane, 2016; Desimone et al., 2002; Honig and Hatch, 2004). We conceptualize a coherent instructional system as one in which main components of that system—including curricula, PL, and evaluative feedback—are aligned with one another and state academic standards (see Figure 1). This conceptualization is derived from Smith and O'Day (1991), who noted key aspects of instructional systems that should be aligned with state standards, as well as from our own work, particularly in studying aspects of state and district instructional systems in Louisiana (Kaufman, Thompson, and Opfer, 2016).

Using nationally representative survey data, we examine the myriad ways that ELA, math, and science teachers use curricula in their classroom instruction and what schools do that may influence how teachers use curricula. More important, we consider all the factors that may support students' engagement in standards-aligned classroom practices, including both teachers' use of curricula and the supports in teachers' instructional systems.

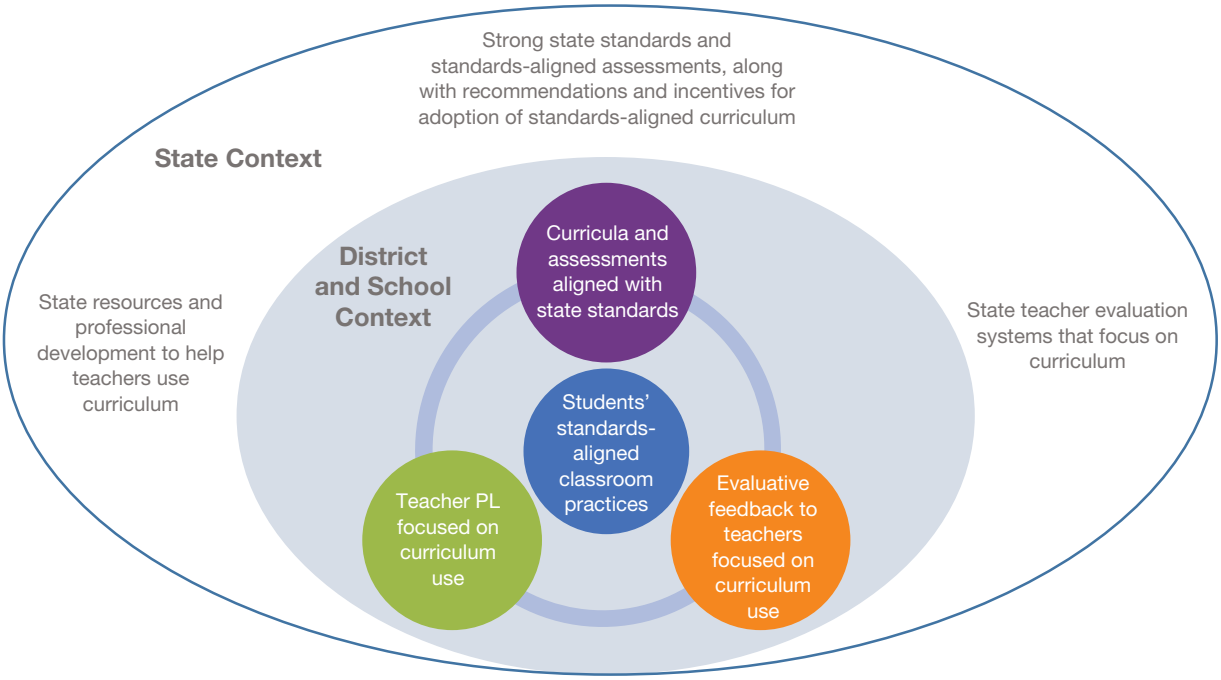
This research is timely, given recent attention on curricula as a focus of education policies and advocacy. As the Common Core and similar standards spread across states, educators and researchers noted considerable shortcomings in existing curricula intended to help students meet new standards (Heitin, 2015; Herold and Molnar, 2014; Polikoff, 2015). In response, states and organizations began developing tools so that school administrators, teachers, and other stakeholders could assess the alignment of their materials with new standards. Two examples of such tools are Achieve's EQuIP (Educators Evaluating the Quality of Instructional

Abbreviations

AIRS	American Instructional Resources Survey
ASLP	American School Leader Panel
ATP	American Teacher Panel
CCSSO	Council of Chief State School Officers
ELA	English language arts
FRPL	free or reduced-price lunch
IMPD	Instructional Materials and Professional Development
K–12	kindergarten through 12th grade
PL	professional learning

FIGURE 1

Hypothesized Aspects of a Coherent Instructional System



Definitions of Key Terms Used in This Report

A *curriculum* is a set of instructional materials intended to constitute a full, comprehensive course of study for a particular subject and grade level. A curriculum can be provided through a textbook or through an online platform.

A *standards-aligned curriculum* has met the expectations of college and career ready standards, according to reviews by EdReports, an independent organization that reviews widely used curricula.

Instructional materials are any materials that are intended to provide learning opportunities for students. These include curricula, as well as other instructional materials that do not constitute a full course of study.

Digital instructional materials are online materials that are intended to provide learning opportunities for students; they do not constitute a full course of study.

Intervention materials are materials that teachers use to help students who are performing below grade level. They may be used as part of a multitiered system of support or as part of a response to an intervention framework, but, unlike a curriculum, they are not a full course of study.

Instructional systems are the resources and supports within states, schools, and school systems that guide teaching and learning. Key components of instructional systems include curricula, PL opportunities for teachers, teacher evaluation, and student assessment. *Coherent instructional systems* are those in which all these components are aligned with one another and with standards in terms of content and focus of instruction.

Curriculum-aligned supports are guidance for curriculum implementation. They may be offered through professional development, evaluations, and observations that focus on curriculum use.

Standards-aligned classroom practices are practices in math, ELA, and science that are closely aligned with college and career-ready standards.

Products) initiative (Achieve, undated) and Student Achievement Partners' IMET (Instructional Materials Evaluation Tool).

Publishers also began developing new versions of textbooks to better align with new standards. To examine publishers' alignment claims, EdReports undertook the most comprehensive review of existing ELA and math curriculum to date. The EdReports website currently includes reviews for 41 ELA curricula and 84 math curricula, as well as a growing number of reviews of science curricula. EdReports also typically re-reviews new editions of previously reviewed curricula.

Several states have begun encouraging use of curricula aligned with their state standards and considering ways to support use of standards-aligned curricula. In 2017, the Council of Chief State School Officers (CCSSO) formed a network of eight states—the High-Quality Instructional Materials and Professional Development (IMPD) Network—dedicated to providing information and support to promote school system adoption and teachers' use of high-quality instructional materials for kindergarten through 12th grade (K–12). Before the IMPD Network was formed, some states were already active in encouraging use of standards-aligned curricula. Louisiana, in particular, has been at the forefront of efforts to identify and support use of standards-aligned curricula. Several RAND Corporation reports have outlined Louisiana's curriculum reform strategies (Kaufman, Thompson, and Opfer, 2016; Kaufman, Steiner, and Baird, 2019). Compared with the rest of the nation, more Louisiana teachers reported use of standards-aligned curricula, understanding of particular aspects of their ELA and math standards, and student engagement in standards-aligned classroom practices (Kaufman, Thompson, and Opfer, 2016). These findings suggest that states can make a difference in the materials that teachers use and that using standards-aligned curricula might improve teachers' knowledge of standards and standards-aligned teaching practices.

Despite this focus on and interest in teachers' use of standards-aligned curricula, we know very little about teachers' everyday use of standards-aligned curriculum materials and what may support them to use those materials more productively. The RAND American Teacher and School Leader Panels—which provide nationally representative survey self-reports from teachers and school leaders on education issues—have provided some insights on that question over the past several years. As of the 2017–2018 school year, most K–12 public school teachers were not yet using materials that met college and career-ready standards, particularly for ELA and at the high school level (Kaufman, Tosh, and Mattox, 2020). In addition, teachers' reports on which published textbooks and curricula they used to teach ELA and math changed little between 2015 and 2017, and—similarly—teachers' knowledge about the content of their ELA and math standards also appeared not to change during this period. RAND research has highlighted persistent relationships between use of standards-aligned instructional materials (as determined by EdReports) and teachers' knowledge about their standards, as well as between use of standards-aligned instructional materials and teacher reporting of student engagement in standards-aligned practices (Kaufman et al., 2018; Opfer et al., 2018).

Research also suggests that teachers need many aligned supports within their instructional systems to use standards-aligned curricula in a way that meets their states' standards. The mere presence of these supports is not as useful as ensuring that the supports are connected, are coherent, and provide nonconflicting guidance (Kaufman, Thompson, and Opfer, 2016). An experimental study of online math lessons for middle school grades found that teachers who received curriculum-aligned supports produced higher gains in student achievement than teachers without supports (Jackson and Makarin, 2018). In addition, a recent meta-analysis of STEM (science, technology, engineering, and math) instructional improvement programs found that professional development focused on curricula is associated with above-average student gains (Hill et al., 2020).

This report provides new evidence about supports for curriculum use from the American Instructional Resources Survey (AIRS). The AIRS was administered to a nationally representative sample of teachers and principals through the American Teacher Panel (ATP) and American School Leader Panel (ASLP), as well as to state-representative samples of teachers in 12 states, including the IMPD Network states. The AIRS digs

The IMPD Network

The eight states participating in the IMPD Network are Delaware, Massachusetts, Mississippi, Nebraska, New Mexico, Rhode Island, Tennessee, and Wisconsin (Kaufman, Tosh and Mattox, 2020). Since 2017, these states have taken several actions to design, pilot, and enact policies and initiatives that identify high-quality, standards-aligned curricula and support their uptake and effective use in schools. Louisiana has served as a model in terms of some state actions. Beginning in 2015, Louisiana posted online reviews of K–12 curricula. These reviews state whether each curriculum meets the expectations of Louisiana standards. Louisiana has also cataloged the professional development vendors in the state who offer training aligned with curricula that the state has reviewed as meeting expectations. In addition, Louisiana has incentivized use of standards-aligned curricula by providing those curricula at a discounted rate and offered state-provided professional development that addresses curricula meeting expectations.

The Delaware Department of Education does not require adoption of mandated curriculum resources in any content area; districts and charter management organizations select instructional materials, although they are expected to demonstrate that curricula are aligned with state content standards. The Delaware Department of Education promotes and encourages the use of high-quality instructional materials by supporting districts and charter management organizations with (1) selection, adoption, and implementation guidance; (2) associated PL supports and incentives; (3) high-quality PL providers; and (4) ongoing technical assistance (Delaware Department of Education, 2019).

The Massachusetts Department of Elementary and Secondary Education (DESE) has created its own curriculum review process, CURATE (CUrriculum RAtings by TEachers), which builds off of EdReports reviews but includes Massachusetts-specific components (Massachusetts Department of Elementary and Secondary Education, undated). DESE has also facilitated statewide networks of districts to collaborate on curriculum selection and implementation. It also offers a curriculum audit service and text inventory tool.

The Mississippi Department of Education (MDE) allows local selection of instructional materials. However, current state law makes it easier to procure materials that are already on the state-adopted list. In 2018, the MDE implemented a high-quality instructional materials and PL initiative to create a vetted list of high-quality instructional materials to distribute among schools in a small group of pilot districts and for eventual broad adoption and implementation by other districts across the state (Mississippi Department of Education, undated). The MDE strengthened the textbook review process in recent years, conducting a mathematics materials review in 2018–2019; it will be reviewing ELA materials during the 2020–2021 school year.

The New Mexico Public Education Department has an Instructional Materials Bureau that reviews materials to ensure that they are of high quality and consistent with New Mexico Content Standards. The bureau provides a list of approved core instructional materials for each subject. The Instructional Materials Bureau is planning to conduct a review of ELA instructional materials in summer 2020. The state has also released a manual designed to walk teachers, schools, and districts through the research on use of high-quality instructional materials, how they are selected for adoption, and how to support strong implementation of instructional materials (New Mexico Public Education Department, 2019).

The Nebraska Department of Education is promoting the use of standards-aligned instructional materials through its Nebraska Instructional Materials Collaborative (NIMC). The NIMC website uses EdReports reviews and supplements these reviews with bridge documents to ensure instructional materials' alignment to Nebraska's own content standards (Nebraska Instructional Materials Collaborative, undated). However, districts still can decide which curricula to adopt.

The Rhode Island Department of Education partnered with EdReports in an initiative to support districts in selecting high-quality instructional materials. In the first year of this initiative, almost all participating districts selected instructional materials rated as "meeting expectations" by EdReports. In

addition, in summer 2019, Rhode Island's governor signed legislation requiring all districts to adopt high-quality instructional materials—based on a state-approved list of materials—by no later than June 2023 for ELA and mathematics (Rhode Island Department of Education, undated).

The Tennessee legislature convenes a State Textbook and Instructional Materials Quality Commission, which oversees textbook reviews (Tennessee Department of Education, undated). Using these reviews, the State Board of Education approves textbooks and other instructional materials. Districts can adopt these textbooks or apply for a waiver to use an instructional material not on the state's list. The commission works in conjunction with the Tennessee Department of Education (TDOE) to develop scoring instruments and the review process, and it hires a team of Tennessee educators to review textbooks. The TDOE focuses on helping districts adopt and implement support for high-quality materials. During the recent ELA adoption, TDOE hosted four statewide session to ensure that districts had strong definitions of high-quality materials, tools and resources for local adoption, and implementation plans that supported the changes that teachers need to make to effectively implement high-quality materials.

The Wisconsin Department of Public Instruction (DPI) has utilized a continuous improvement process to further the goal of every child having access to high quality instructional materials delivered by an educator highly trained in their use. DPI has taken a regional approach to encourage use of high-quality materials, with strong leadership in each of the 12 regional service agencies. In addition, DPI provides grants, a year-long training series, and tools to support school districts to select and implement high-quality instructional materials. Wisconsin is a local control state, and it is not developing an approved list of materials; DPI is focused on ensuring that all schools and districts have the information and support to improve their adoption and implementation processes and make the best, highest-quality selection for their own local context (Wisconsin Department of Public Instruction, undated).

deeply into what curricula and other instructional materials teachers are using in the classroom for their math, ELA, and science instruction. The goal of the survey was to gain information about the curricula that schools and districts recommend or require for ELA, math, and science; determine the extent to which teachers use and modify those materials; and find out more about the supports that teachers have for the use of their instructional materials. This report examines data collected in spring 2019; the AIRS was fielded again in spring 2020 and will be fielded again in spring 2021.

We provide an overview of our methods and explore the following research questions:

1. How do teachers use standards-aligned curricula and other instructional materials in their classrooms?
2. What other elements of teachers' instructional systems support teachers' use of curricula?
3. How do elements of teachers' instructional systems—curriculum use, evaluative feedback, and PL—differ across teaching contexts?
4. How are elements of instructional systems related to the standards-aligned classroom practices in which teachers report students engaging?

Methods

In spring 2019, the RAND Corporation administered the AIRS to a nationally representative sample of ATP and ASLP participants who work in K–12 schools, as well as state-representative samples of ATP teachers in 12 states. The goal of the survey was to learn more about the curricula being used by K–12 public school teachers in ELA, math, and science; determine the extent to which teachers use and modify those materials; and identify what support teachers get to use their instructional materials.

This section provides a brief overview of the development of the AIRS and the 2019 teacher and school leader samples, including who was sampled, response rates, and sample characteristics. For more-detailed information on the sample and analysis, see the AIRS 2019 Technical Documentation and Survey Results (Prado Tuma et al., 2020).

How Was the AIRS Developed?

Survey items were developed by RAND researchers to accomplish the survey goals with feedback from funders and numerous experts on standards and curricula. Many survey items were developed by the RAND team, but some items were borrowed or adapted from outside sources or previous RAND surveys. The AIRS 2019 Technical Documentation and Survey Results contains a complete list of these sources (Prado Tuma et al., 2020).

Who Completed the AIRS?

The survey was designed to generate nationally representative data on teacher and principal perspectives. It also was designed to provide data from state-representative teacher samples in 12 states, including the IMPD states.[1] Table 1 summarizes national and state-level response rates for the AIRS; Table 2 provides descriptive characteristics for both the ATP and ASLP.

How Were the AIRS Data Analyzed for This Report?

Determining Standards Alignment of Curriculum Materials

We refer to school provision and teachers' use of *fully aligned curricula* (curricula that meet college and career readiness expectations) and *partially aligned curricula*. Principals and teachers did not directly categorize curricula alignment through the survey. Instead, they were provided with a list of ELA, math, and science curricula and asked to choose which titles they used. This list was compiled through several years of American Educator Panels data collection.

We then categorized teachers' curricula as fully or partially aligned based on EdReports ratings of each curricula. (Because EdReports has reviewed very few science curricula, we did not categorize science curricula by alignment.) EdReports development teams have used research literature, existing rubrics, and feedback from teachers to develop review tools and evidence guides for ELA, math, and science curricula (EdReports, undated). EdReports' review rubrics for ELA curricula focus on text quality and knowledge building; its math review rubrics focus

TABLE 1

AIRS Completion Rates and Sample Characteristics

Respondents	Sampled	Completed	Completion Rate (%)
California teachers	648	390	60.2
Delaware teachers	654	357	54.6
Florida teachers	696	394	56.6
Louisiana teachers	699	383	54.8
Massachusetts teachers	692	405	58.5
Mississippi teachers	668	370	55.4
Nebraska teachers	602	366	60.8
New Mexico teachers	691	388	56.2
New York teachers	680	408	60.0
Rhode Island teachers	565	338	59.8
Tennessee teachers	681	386	56.7
Wisconsin teachers	564	361	64.0
All U.S. teachers	10,188	5,969	58.6
All U.S. school leaders	4,927	1,624	33.0

TABLE 2

Sample Characteristics of the ATP and ASLP

	ATP		ASLP	
	Mean	Standard Error	Mean	Standard Error
School characteristics				
Elementary school[a]	0.582	0.012	0.568	0.018
Middle school[a]	0.149	0.008	0.175	0.012
High school[a]	0.235	0.010	0.218	0.015
Other grade configuration	0.035	0.005	0.039	0.007
Percentage of Hispanic students	0.279	0.007	0.238	0.010
Percentage of Black students	0.180	0.006	0.163	0.009
Percentage of White students	0.437	0.008	0.496	0.012
High-poverty school[a] (> 75% free or reduced-priced lunch [FRPL])	0.300	0.012	0.283	0.017
Educator characteristics				
Total years in role	14.819	0.173	8.985	0.161

NOTES: THE ATP sample contains 5,969 observations. The ASLP sample contains 1,624 observations. School characteristics were obtained from the Common Core of Data and are from the 2016–2017 school year. Means and standard errors were calculated using survey weights, which are calibrated to match the national averages for teachers and school leaders. The definition for high-poverty school (more than 75 percent FRPL) follows the definition set forth by the National Center for Education Statistics (McFarland et al., 2017). Educator characteristics are self-reported by the respondent. The rate of missingness in educator characteristics is about 2 percent and 5 percent in the teacher and principal samples, respectively.

[a] Variables are expressed as dichotomous indicators of group members (1 = in group, 0 = not in group).

on grade-level topics, coherence, and rigor. These areas of focus are aligned with the Common Core State Standards and the key shifts in ELA and math standards called for by the Common Core (Common Core State Standards Initiative, undated a; Common Core State Standards Initiative, undated b). As noted by Achieve (2019), these focuses are aligned with most state standards, including those of states that do not currently have Common Core State Standards.

Using teachers' responses, we sorted curriculum alignment into the following mutually exclusive categories:

- **Using at least one fully aligned curricula:** teachers or schools that indicated regularly using, requiring, or recommending at least one comprehensive curriculum for ELA or math that EdReports rated as "meeting expectations" for standards alignment in their grade and subject.
- **Using at least one partially aligned curricula:** teachers or schools that indicated regularly using, requiring, or recommending at least one comprehensive curricula that EdReports rated as "partially meeting expectations" for standards alignment in their grade and subject but no curricula rated as "meeting expectations."
- **Using nonaligned curricula:** teachers or schools that indicated regularly using, requiring, or recommending at least one comprehensive curricula that was rated as "not meeting expectations" in their grade and subject by EdReports but no curricula rated as "meeting expectations" or "partially meeting expectations."
- **Using unrated/teacher made materials:** teachers or schools that did not indicate using any EdReports-rated comprehensive curricula.

The EdReports ratings are affected by the availability of high-quality materials for particular subjects and grade levels, as well as by whether EdReports has reviewed a material. EdReports has not reviewed some of the curricula on our survey list because those materials are not yet used by a large percentage of teachers, do not necessarily constitute comprehensive curricula for a particular subject area, or were released before 2012. At the time of this report, about one-third of our listed ELA titles and about 15 percent of our listed math titles had not been reviewed by EdReports. In total, about 28 percent of the ELA and math titles we asked about in our surveys had not been reviewed by EdReports.

Categorizing Teachers According to Profiles of Curriculum Use

In addition to examining the extent to which teachers used standards-aligned comprehensive curricula, we also categorized teachers into different profiles of curriculum use. We sorted teachers based on (1) the number of comprehensive curricula they reported using, (2) whether they reported using self-created comprehensive curricula, and (3) the extent to which they reported modifying lesson plans from comprehensive curricula. Using these criteria, we created four mutually exclusive profiles of curriculum use:

- *the By-the-Book teacher* uses a single curriculum, mostly as written
- *the Modifier* uses a single curriculum with substantial modification
- *the DIY teacher* primarily uses self-created materials
- *the Cobbler* combines multiple comprehensive curricula.

No fewer than 10 percent of teachers were sorted into any profile.[2] Comparisons of different subprofiles (e.g., Cobblers using two materials versus Cobblers using three or more materials) or the incorporation of additional criteria (e.g., whether teachers reported using at least one intervention material) are potential extensions of these profiles for future study (see the section titled "Profiles of How Teachers Use Curricula" later in this report for more information on these profiles and teachers' categorization into specific profiles).

Creating Measures of Curriculum Use, Students' Classroom Practice, and Other Components of Instructional Systems

We used AIRS responses to construct the following additional measures:

1. student engagement in standards-aligned classroom practices

2. evaluative feedback to teachers on curriculum use
3. frequency of PL on curriculum use
4. helpfulness of PL on curriculum use.

The specific items included in each measure are described in subsequent sections of this report. With the exception of standards-aligned curriculum use, all other factors are created from averaging teachers' responses on Likert-style survey items. We report the scale reliabilities for each factor by subject in Table 3.

Comparing Difference Across Subgroups

Throughout this report, we compare how the usage of instructional materials and prevalence of students' standards-aligned classroom practices and other components of instructional systems vary across several types of teacher subgroups. We define these subgroups in the following areas:

- subject area (ELA, math, science)
- grade level (elementary, middle, high)
- state (for states in the MPD Network)
- school FRPL enrollment (quartiles).

When relevant and significant, we present subgroup-specific results throughout this report. All subgroup differences referenced in the text, unless specifically noted, are different from zero at the $p < 0.05$ level.

We also examined differences across several additional subgroups (e.g., school urbanicity, school Black/Hispanic student enrollment, teacher experience). We do not discuss differences among teachers from these subgroups unless they are significant or provide clear evidence of differing patterns in responses. (School-level characteristics were obtained from the 2016–2017 National Center for Education Statistics' Common Core of Data.)

Associating Students' Classroom Practices, Curriculum Use, and Other Components of Instructional Systems

We use two types of regression models throughout this report. We use multinomial logistic regression to estimate the probability that teachers fall into one of our four curriculum use profiles (e.g., By the Book Teacher, Cobbler) as a function of evaluative feedback to teachers on curriculum use, frequency of PL on curriculum use, and helpfulness of PL on curriculum use, controlling for a series of teacher and school-level covariates (i.e., teachers' subject and grade-level assignment, school FRPL, Black and Hispanic enrollment, and teachers' race/ethnicity and years of teaching experience). Importantly, the use of multinomial logistic regression allows us to model each of the four curriculum use profiles simultaneously. We use the results from this model to present the predicted relationships between the probability that teachers fall into each of the four profiles and the extent of evaluative feedback and PL on curriculum use, highlighting relationships where the average marginal effect of a particular instructional element on the probability that a teacher belonged to a specific curriculum use profile was significant at the $p < 0.05$ level. To model the relationship between the percentage of classroom practices in which teachers report all or nearly all of their students partake and the aspects of instructional systems that we hypothesize could affect practice, we use ordinary least square regression models that control for the same teacher covariates, school-level covariates, and grade and subject fixed

TABLE 3

Scale Reliabilities for Classroom Practices and Instructional System Component Scales, by Subject

Subject	Student Engagement in Standards-Aligned Classroom Practices	Evaluative Feedback to Teachers on Curriculum Use	Frequency of PL on Curriculum Use	Helpfulness of PL on Curriculum Use
ELA	0.888	0.825	0.784	0.853
Math	0.898	0.810	0.793	0.860
Science	0.897	0.808	0.804	0.842

NOTE: Scale reliabilities (i.e., Cronbach's alphas) are a measure of the internal consistency of the items contained in each scale. Benchmark values for scale reliability vary by context; alpha values of 0.7 and above are generally considered acceptable (Nunnally, 1978).

effects that were included in the prior model, with an additional robustness check using state fixed effects (as presented in Appendix Table A.1).

Limitations

Our findings are based on self-reported perceptions and behaviors. Survey responses are subject to response biases. In particular, teachers and school leaders may overreport perceptions and behaviors that they perceive as desirable (e.g., adherence to a particular curriculum, students' engagement in practices perceived as aligned with state standards). In addition, some teachers might focus on their perceptions of certain students when responding to these questions, and teachers may interpret what is typical in varying ways.

The measure of classroom practices used in these analyses is an aggregate of all the standards-aligned classroom practices in which teachers report "all or nearly all" of their students engaging. In the past, ATP surveys have asked teachers to report on classroom practices in a variety of ways, including items regarding the frequency with which they asked students to engage in practices (Kaufman, Thompson, and Opfer, 2016) and items regarding the extent to which teachers perceive that students have engaged in practices (Kaufman et al., 2018; Opfer et al., 2018). The latter types of questions were associated with teachers' understanding of their state standards and their use of particular instructional materials. However, until this survey, we did not ask teachers about the *proportion* of students engaged in particular practices. We reasoned that—by allowing teachers to indicate that at least some students were engaged in a particular practice—we could minimize response biases to this question, as teachers tend to overreport standards-aligned practices in which they themselves engage (Kaufman, Stein, and Junker, 2016; Mayer, 1999; Spillane and Zeuli, 1999). Although students might engage in particular practices without their teacher prompting them to do so, we reasoned that if a teacher reported that "all or nearly all" students engaged in that practice, it would be highly unlikely that students would do so without teacher prompting. In future research, we hope to examine the relative merits of asking about students' classroom practices in differing ways through our surveys.

Finally, as is the case with nearly all observational studies in education, it is difficult to model the relationships among educational inputs, outputs, and factors, given the intertwined nature of educational systems and the contexts within which they operate. In estimating the relationships between elements of instructional systems and classroom practices, we used information from teachers' AIRS responses and the Common Core of Data to account for these contextual factors to better isolate the unique relationships that exist among these elements. However, other confounding factors (e.g., student academic performance, school expenditures) might be unaccounted for or partially accounted for by this additional information. Therefore, all relational analyses presented in this report should be interpreted as purely associational and intended to highlight descriptive patterns observed in the 2019 AIRS, not as causal.

Findings

We begin with key takeaways on teachers' use of standards-aligned curricula and how teachers use instructional materials—including standards-aligned curricula—on a regular basis for their classroom instruction. We then examine other elements of teachers' instructional systems that may support curriculum use, specifically focusing on evaluative feedback teachers receive on curriculum use and the frequency or helpfulness of PL focused on curriculum. Next, we consider how all these instructional system elements—curriculum use, evaluative feedback on curriculum use, frequency of PL on curriculum use, and helpfulness of PL on curriculum use—vary according to different teaching contexts. Finally, we consider the ways in which the standards-aligned practices in which students engage—according to teacher report—appear related both to teachers' use of standards-aligned curricula and to evaluative feedback and PL on curriculum use.

Use of Standards-Aligned Curricula and Other Instructional Materials

Our research points to three key takeaways regarding teachers' use of materials. First, even if standards-

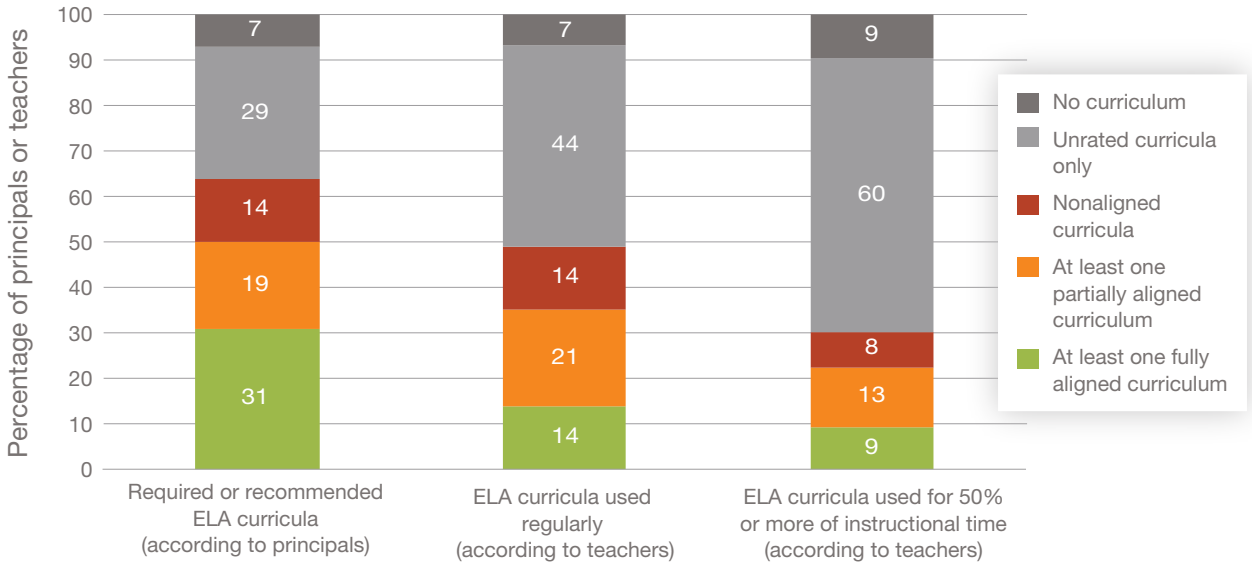
aligned curricula are provided by school districts as a recommendation or requirement, many teachers are not using those materials during instruction. Second, when teachers do use a curriculum, they do not typically use it exactly as written; instead, they may combine several curricula, modify materials, and integrate teacher-created activities. Third, use of materials beyond curricula—including digital and intervention materials—is common.

Even if a Standards-Aligned Curriculum Is Provided, Many Teachers Likely Do Not Use That Curriculum for the Bulk of Their Instructional Time

Standards-aligned curricula might be increasingly common in schools, but our research suggests that teachers might not be using those curricula for the majority of their instructional time. We examine the example of ELA curricula first, then discuss math curricula. Thirty-one percent of U.S. school principals indicated that their school or district recommended or required at least one standards-aligned ELA curriculum (see Figure 2). However, only 14 percent of ELA teachers noted using at least one standards-aligned ELA curriculum once per week or more for their instruction. When time in the classroom is considered, those numbers fall further; only 9 percent of ELA teachers noted using at least one standards-aligned curriculum for at least half of their instructional time. There is a relatively large gap—more than 20 percentage points—between the percentage of principals indicating provision of a standards-aligned curricula and the percentage of teachers who actually use that curricula for most of a lesson. Readers should keep in mind that the third bar in Figure 2 reflects teachers' estimates of the curriculum *and* digital materials that they use for 50 percent or more of their instructional time. EdReports does not review digital materials that do not constitute curricula. Therefore, any teachers who reported using digital materials that do not constitute curricula for 50 percent or more of their instructional time are using materials that have not been reviewed by EdReports. Although we have not collected data from teachers and principals at the same schools,

FIGURE 2

Differences Among Principals Indicating Requirements or Recommendations for ELA Curricula and Teachers Using Curricula



NOTES: These data were derived from one ASLP item—"Select the following ELA curricula that are provided by your school or district, either as a requirement or recommendation, this school year (2018–2019)" and two ATP items—"Which of the following ELA curricula do you use regularly (once a week or more) for your ELA instruction this school year (2018–2019)?" and "Of the ELA curricula and digital materials you indicated using regularly, please indicate approximately what percent of ELA instructional time you dedicate towards using them for a typical class of students each week." Responses were coded for extent of standards alignment based on EdReports data. The full wording of survey items is available in Prado Tuma et al., 2020. Data may not sum to 100 percent because of rounding.

these nationally representative findings imply that teachers might be using instructional materials beyond what is required or recommended by their districts for most of their instructional time.[3]

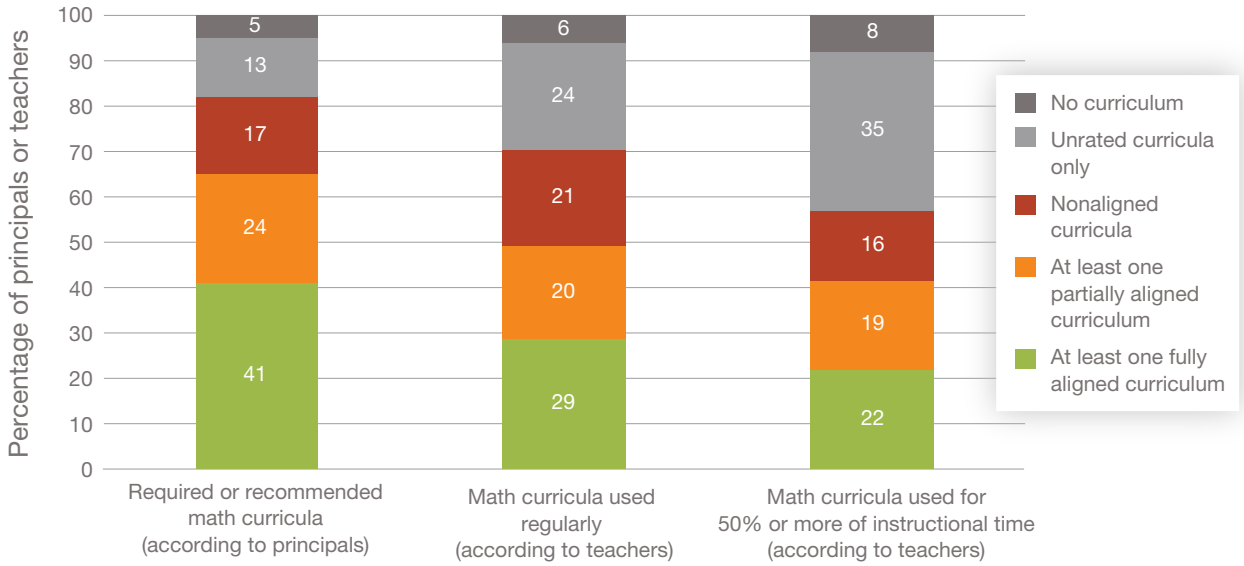
The findings are similar for math, although reported use of standards-aligned curricula is somewhat higher. Specifically, 41 percent of principals indicated that their school or district provided at least one math curriculum deemed by EdReports as meeting expectations of college and career-ready standards, but only 29 percent of U.S. math teachers reported actually using at least one standards-aligned curriculum regularly (see Figure 3). When asked what they used for 50 percent or more of their instructional time—taking into account all their curricula and digital materials—22 percent of teachers reported using at least one standards-aligned curriculum for half or more of their instructional time. Again, as with ELA, the gap between the percentage of principals who indicated that a standards-aligned math curricula is provided and the percentage of teachers using a standards-aligned curriculum for at least half of their instructional time is about 20 percentage points.

Higher percentages of principals and teachers might have reported using standards-aligned curricula for math simply because commonly used math curricula are more likely to have been reviewed by EdReports. As noted earlier, about 85 percent of the math curricula we asked about in our survey had been reviewed by EdReports, compared with only about two-thirds of the listed ELA curricula. Furthermore, somewhat higher proportions of teachers indicated using ELA curricula that they created or that were created by their school or district.

Rates of standards-aligned curriculum use differed by grade level. For example, middle school principals were more likely than elementary and high school principals to provide at least one standards-aligned curriculum for ELA (39 percent, compared with 26 percent and just 18 percent, respectively). Similarly, higher percentages of teachers reported regular use (i.e., use at least once per week) of at least one standards-aligned ELA curriculum at the middle school level (22 percent) than at the elementary and

FIGURE 3

Differences Among Principals Indicating Requirements or Recommendations for Math Curricula and Teachers Using Curricula



NOTES: These data were derived from one item in the ASLP—"Select the following mathematics curricula that are provided by your school or district, either as a requirement or recommendation, this school year (2018–2019)" along with two items from the ATP—"Which of the following mathematics curricula do you use regularly (once a week or more) for your mathematics instruction this school year (2018–2019)?" and "Of the mathematics curricula and digital materials you indicated using regularly, please indicate approximately what percent of mathematics instructional time you dedicate towards using them for a typical class of students each week." Responses were coded for extent of standards alignment based on EdReports data. The full wording of survey items is available in Prado Tuma et al., 2020.

high school levels (12 percent at both levels). That said, just 5 to 15 percent of teachers (the percentage varies by grade level) reported using standards-aligned ELA curricula for *half or more* of their instructional time.

For math, 44 percent of elementary and middle school principals indicated providing at least one standards-aligned math curriculum as a requirement or recommendation; only 25 percent of high school principals reported the same. Thirty to 40 percent of high school principals required or recommended ELA and math curricula that EdReports rated as not aligned with standards at the high school level, compared with between 10 and 20 percent of principals doing so at the elementary and middle school levels.

The somewhat higher percentages of middle school principals and teachers reporting use of standards-aligned ELA curricula—compared with principals and teachers in elementary and high schools—is explained partially by higher use of the standards-aligned EngageNY curriculum for middle school ELA. Although EngageNY did not make the list of top five ELA curricula in Table 4, about 7 percent of middle school teachers and 6 percent of high school teachers reported using it regularly for instruction. However, beyond EngageNY, few teachers reported using *any* standards-aligned curriculum for ELA; some of the most popular ELA curricula, such as Lucy Calkins and CommonLit, have not yet been rated by EdReports. In math, EngageNY and Eureka Math were the top standards-aligned curricula teachers reported using regularly for instruction.

Multiple reasons likely exist for the relatively low use of standards-aligned curricula during the 2018–2019 school year. Although the majority of states have adopted more-rigorous standards over the past decade, some states—such as California—did not officially implement those standards until 2014–2015. Publishers also need time to revamp their textbooks to ensure alignment with new standards (Monahan, 2015); most materials that EdReports has reviewed as aligned with state standards have been released in the past one to three years. Furthermore, textbook adoption cycles can be up to ten years in some states and districts (Scudella, 2013). Finally, as shown in Table 4, use of self-created, school-created, and district-created curricula is reported by particularly high percentages of teachers for ELA and science, especially at the high school level.

Most Teachers Reported Using Multiple Curricula, Making Substantial Modifications, or Creating Their Own Curriculum

As we have demonstrated, principals' recommendations and requirements for curricula do not necessarily align with what teachers actually use for instruction. Most teachers draw from several curricula, make modifications, or supplement their instruction with self-created materials. To characterize the variety of ways in which teachers reported using curricula, we developed curriculum-use profiles based on common responses teachers gave regarding what curricula they use, how frequently they use that curricula, and the extent to which they modify and create curricula.

Only about one-third of teachers are By the Book Teachers. By the Book Teachers were significantly more likely to be math teachers and also more likely to be elementary teachers.

Modifiers—who used a single curriculum regularly but reported making considerable modifications to that curriculum—made up 18 percent of our sample (see Table 5). They were more likely to be math teachers than ELA teachers, with little variation by grade level. Nearly all Modifiers (94 percent) reported skipping, modifying, or supplementing their main curriculum at least once per week to better address students' learning needs on the basis of their test scores.

The most common profile was the Cobbler, at 37 percent of our sample. Cobblers might be the most prevalent type of teacher profile because schools or districts provide multiple curricula or because teachers bring together multiple curricula on their own. The prevalence of Cobblers was significantly higher among ELA teachers (43 percent) than among teachers of other subjects. The nature of ELA instruction—which requires reading longer texts alongside foundational reading instruction and writing—might make teachers more likely to be Cobblers who combine multiple published curricula. ELA curricula might also be less likely to integrate enough support for foundational skills, such as phonics (Hanford,

TABLE 4

Top Curricula for ELA, Math, and Science, by School Level, According to Percentage of Teachers Reporting Use at Least Once per Week

	Top ELA Curricula		Top Math Curricula		Top Science Curricula	
Grade Level	**Curriculum Title**	**%**	**Curriculum Title**	**%**	**Curriculum Title**	**%**
Elementary	Self-created	19	Go Math	20	Self-created	20
	School- or district-created	16	EngageNY[a]	14	School- or district-created	14
	Lucy Calkins Units of Study	16	EnVision Math 2.0	13	STEMscopes	10
	Reading Wonders	14	Eureka Math[a]	11	FOSS Next Generation Middle School	9
	The Fountas & Pinnell Classroom	12	My Math	10	McGraw-Hill Science	7
Middle	Self-created	38	Self-created	18	Self-created	36
	School- or district-created	26	Go Math	18	School- or district-created	19
	CommonLit	18	Glencoe Math	17	McGraw-Hill Science	18
	Holt McDougal Literature	12	Curricula my school or district created	10	Pearson Science	12
	Lucy Calkins Units of Study	11	Big Ideas Math	10	Glencoe Life Science	10
High	Self-created	53	Self-created	38	Self-created	52
	School- or district-created	32	School- or district-created	20	School- or district-created	35
	Holt McDougal Literature	16	Pearson Traditional	14	Pearson Science	24
	Prentice Hall Literature	13	Holt McDougal Larson Traditional	9	McGraw-Hill Science	15
	Holt McDougal Literature	13	Glencoe Traditional	9	Glencoe Life Science	8

NOTES: This table lists the top five comprehensive curricula cited as "regularly used" (i.e., used once per week or more) by teachers in each subject area and grade level.
[a] material is standards-aligned, as indicated by EdReports reviews.

TABLE 5

Curriculum Use Profiles, by Teacher Subject Area and Grade Taught

		Percentage of Teachers in Each Curriculum Use Profile			
		By the Book	**Modifier**	**Cobbler**	**DIY**
Overall		27	18	37	19
Subject area	ELA	22	15	43	20
	Math	34	21	31	14
	Science	25	18	35	22
Grade level	Elementary	35	17	35	13
	Middle	19	20	42	18
	High	11	17	37	35

NOTE: Significant differences in the percentage of teachers classified as a certain profile across subject area or grade level are highlighted in the text.

Profiles of How Teachers Use Curricula

We grouped teachers into types of curriculum users based on the following three questions:

1. Of the ELA/math/science curricula you indicated using regularly, please indicate approximately what percentage of ELA/math/science instructional time you dedicate towards using them for a typical class of students each week.
2. Of the ELA/math/science curricula you indicated using regularly, please choose the ONE main material you use the most.
3. Please complete the following sentence:
   I typically use lesson plans from my main ELA/math/science materials . . .

   - with no or few modifications.
   - with modifications to less than half of a lesson plan.
   - with modifications to more than half of a lesson plan.
   - My main materials do not include lesson plans or I typically create my own lesson plans.

The By the Book teacher is a teacher who uses a single curriculum mostly as written. This teacher reports

- using a single curriculum that is not self-created *and*
- making modifications to less than half of their lessons.

The Modifier uses a single curriculum with substantial modification. This teacher reports

- using a single curriculum that is not self-created *and*
- making modifications to more than half of their lessons

The Cobbler stitches together multiple comprehensive curricula that are *not* self-created.

The DIY teacher primarily uses self-created materials. This teacher reports

- not using an existing curriculum and using a single, self-created curriculum *or*
- using multiple existing materials but using a self-created curriculum as a primary curriculum. (We define a teacher's *primary curriculum* as the curriculum reportedly in use for the highest proportion of instructional time, taking into account only curricula used for at least 50 percent of instructional time.)

2020), driving teachers to seek out these materials elsewhere. Middle school teachers were most likely to be Cobblers (42 percent), at a significantly higher rate than elementary (35 percent) but not high school teachers (37 percent). Twenty-two percent of Cobblers reported using at least one standards-aligned curriculum, compared with just 16 percent of By the Book teachers and 11 percent of Modifiers. However, this higher figure is largely because Cobblers use more curricula in general, so they are more likely to use a standards-aligned curriculum.

Nineteen percent of teachers were DIY teachers. As with Cobblers, DIY teachers were more likely to teach science and ELA than mathematics, and they were more likely to be high school teachers. ELA and science teachers might have more freedom to create their own curricula than math teachers, and research suggests that—at the elementary level, in particular—teachers may have less content expertise and comfort teaching math (Ma, 1999; Walker, 2007). Therefore, they might have a tendency to stick to published curricula for math. At the high school level, teachers tend to focus on one subject area, so they might feel more comfortable diverging from published curricula, given their potential greater expertise.

The prevalence of Modifiers, Cobblers, and DIY teachers is noteworthy given that modifying curricula, drawing from multiple curricula, and creating new materials is likely more time-consuming than using a single curriculum as written. At the same time, the complex work of teaching could involve modifying, supplementing, or creating materials to

meet diverse students' needs. However, according to multiple studies, teachers are more likely to decrease the cognitive demand or rigor of curriculum tasks when they modify tasks or select their own materials, which has implications for instructional rigor (Stein, Grover and Henningsen, 1996; Stein and Kaufman, 2010; TNTP, 2018).

The Majority of Teachers Use Digital and Intervention Materials as Supplements

As noted earlier, relatively high percentages of teachers do not rely primarily on one curriculum. We also found that the majority of teachers draw on many other types of instructional materials beyond curricula, including digital materials[4] and intervention materials,[5] to supplement their comprehensive curricula. For example, 85 percent of U.S. ELA, math, and science teachers in our sample indicated using digital materials to plan their instruction, with such materials and resources as Teachers Pay Teachers, online search engines, and Pinterest topping the list of digital materials used by teachers for planning. A large majority of teachers, 88 percent, also reported using digital materials for classroom instruction, with the most commonly reported digital materials including YouTube, Kahoot!, Khan Academy, BrainPOP, and ReadWorks. More than 90 percent of math and ELA teachers reported that they or their students used digital materials; this rate decreased to 80 percent among science teachers. Although most teachers reported using digital materials for their instruction, they typically did not use them as their main instructional materials. In any given subject, only 9 percent of teachers reported using any digital material for more than half of their instructional time.[6]

The use of intervention materials designed to address the needs of students who are behind grade level was also very common. Sixty-two percent of ELA teachers and 52 percent of math teachers reported using at least one intervention material. As suggested by the numbers, ELA teachers were more likely to report using an intervention material than math teachers. In addition, as noted by Stelitano et al. (2020), high school teachers were less likely than elementary and middle school teachers to use an intervention material. This might be because high schools are more likely to provide complete remedial courses for students, so intervention is less likely to take place in the classroom. (For a comprehensive list of all the most popular digital and intervention materials teachers reported using for their instruction in ELA, math, and science, see Prado Tuma et al., 2020).

Elements of Teachers' Instructional Systems Supporting Curriculum Use

Teachers' use of instructional materials is a major driver of the content teachers delivered in the classroom (Ball and Cohen, 1996). However, teachers do not decide which materials to use in a vacuum: Aspects of instructional systems likely shape the decisions teachers make about what materials to use and how to use them. In earlier sections, we discussed how district or school requirements and recommendations for instructional materials are (loosely) connected to what teachers use; teachers get signals and supports about what instructional materials to use, and how to use them, from many other sources. In this section, we specifically consider guidance from three sources: (1) evaluative feedback to teachers on curriculum use; (2) the frequency of teachers' PL opportunities focused on curriculum use; and (3) the perceived helpfulness of PL for curriculum use.

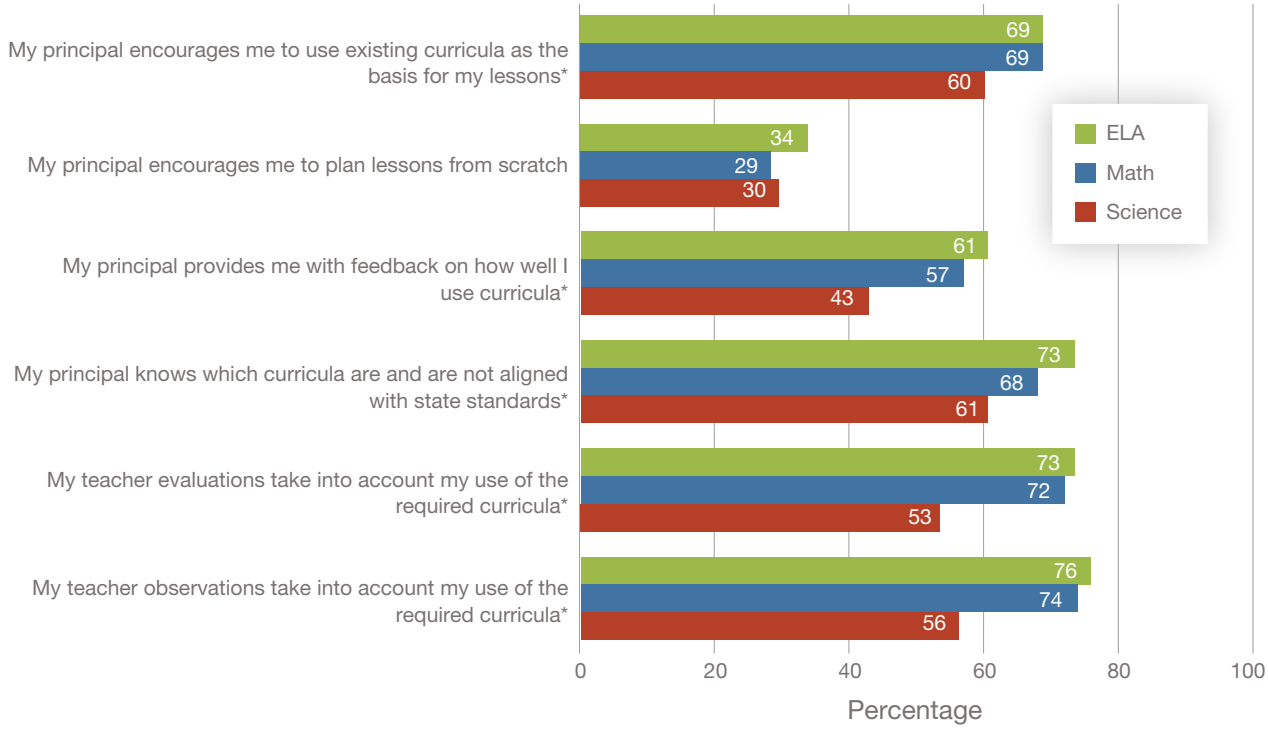
Most Teachers Agreed That Observations and Evaluations Take into Account Their Use of Curricula and That Principals Know Which Curricula Are Standards-Aligned

Using a four-point Likert scale, ranging from "strongly disagree" to "strongly agree," the AIRS asked teachers to indicate their agreement with several statements concerning evaluation, observation, and feedback processes in their schools. Figure 4 shows the percentage of respondents, by subject, agreeing with each of the statements regarding evaluative feedback that was asked in the survey.

On average, about 60 to 75 percent of all the teachers we surveyed agreed that their observations and evaluations take into account their use of curricula and that their principals know which curricula are standards-aligned. A little more than half of teachers (55 percent) indicated that their principals

FIGURE 4

Percentage of Teachers Agreeing with Statements Regarding Evaluative Feedback to Teachers Focused on Curriculum Use



NOTES: This figure depicts the percentage of respondents, by subject area, who indicated that they "somewhat agree" or "strongly agree" with each statement. Potential response options were *strongly disagree*, *somewhat disagree*, *somewhat agree*, and *strongly agree*. Significant differences across subject area are highlighted in the text.

* Item was included in the evaluative feedback scale.

give them feedback on their use of curricula. Only a little more than 30 percent of teachers indicated that their principals encouraged them to plan lessons without use of curricula. Instead, most teachers indicated that their principals encouraged them to use curricula as the basis for their lessons.

Although most teachers indicated getting input on their use of the curricula, teachers' responses varied by subject and grade level. As shown in Figure 4, science teachers were significantly less likely than ELA or math teachers to indicate that their principals encourage them to use curricula, provide feedback, or take into account their uses of curricula in evaluations or observations. In addition, elementary teachers were significantly more likely than high school teachers to indicate that their principals encourage them to use curricula and provide feedback on curricula, as well as that their evaluations and observations take into account their use of curricula. Elementary and middle school teacher responses to questions about evaluative feedback were somewhat comparable, although we did not observe significant differences between middle and high school teachers.

Collaborative Learning with Peers Was the Most Common Type of Curriculum-Related Professional Learning Opportunity Reported by Teachers

Beyond how schools address curricula in evaluations and through principal feedback, teachers can get useful input on how to use curricula through PL opportunities. We asked teachers about a variety of PL opportunities in which they participated, including workshops, coaching, and collaborative learning with other teachers. Teachers were asked, using a five-point Likert scale, to indicate the frequency of their participation in these opportunities. For opportunities in which they indicated participating at least

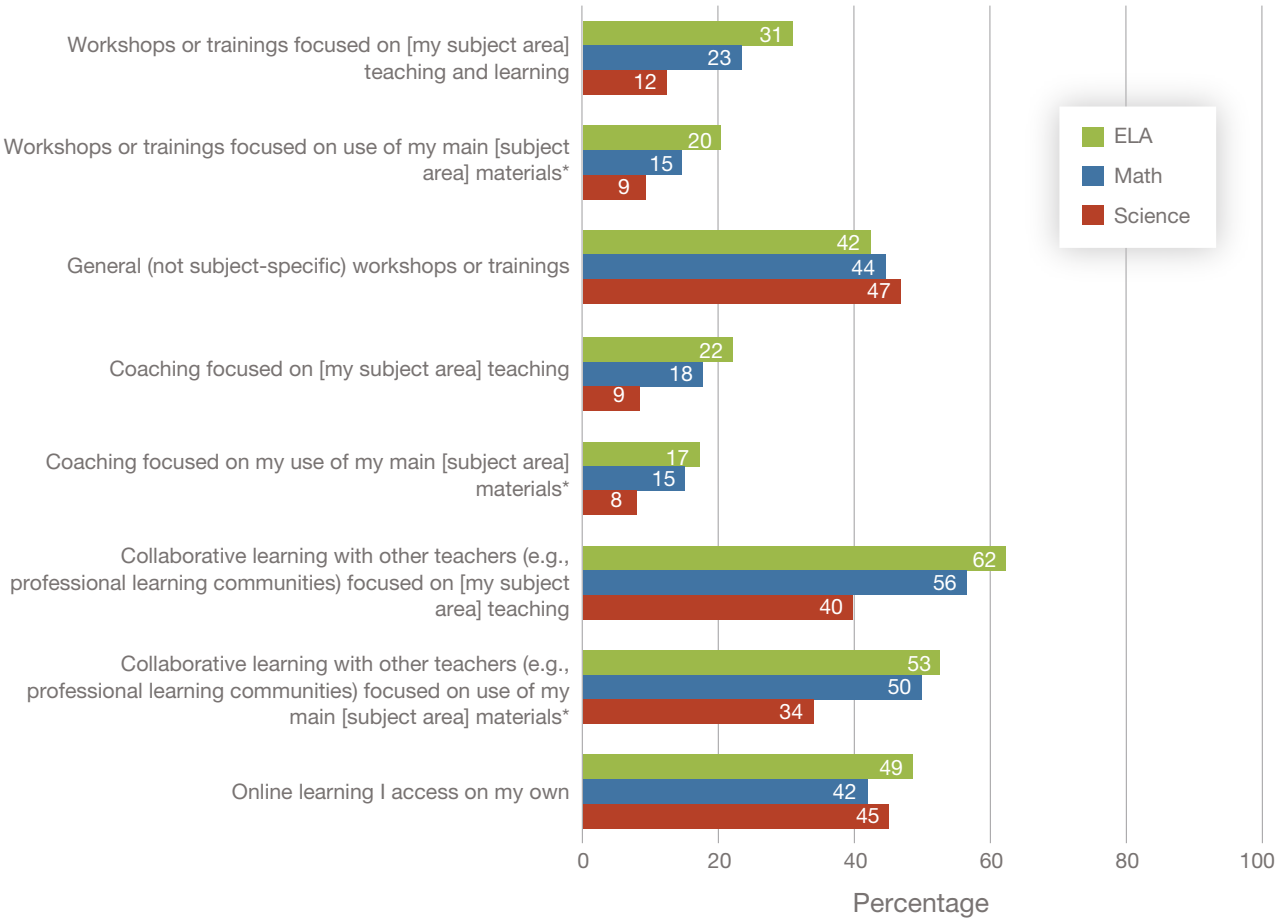
one to three times per year, teachers were also asked about the extent to which that opportunity helped improve use of main materials in their subject area.

Figure 5 shows the percentage of teachers indicating that they participated in each of the listed PL activities four or more times per year, with separate items asking whether specific activities were directed toward improving teachers' teaching and learning or their use of their main materials. Because the lowest-frequency response options were *never* and *one to three times per year*, we focus on teachers reporting at least *four to six times per year* to capture only teachers who engaged with a particular professional development activity multiple times in a given school year.

As shown in the figure, collaborative learning was the main mode through which teachers reported receiving professional development on their curriculum materials; coaching and professional development workshops were less common. In general, higher percentages of ELA teachers reported participating in PL opportunities, and science teachers were least likely to report participation in those opportunities. For workshops, coaching, and collaborative learning focused on subject area teaching and learning, significantly more ELA teachers reported participation

FIGURE 5

Percentages of Teachers Participating in Each Type of Professional Learning Four or More Times per Year



NOTES: This figure depicts the percentage of respondents, by subject area, who indicated that they participated in each PL activity at least four times per year. For each PL activity, potential frequency responses options were *never, one to three times per year*, *four to six times per year*, *one to three times per month*, and *weekly or more often*. (Patterns across subjects and items were similar when we considered the following alternative thresholds: at least one to three times per year, at least one to three times per month, and weekly or more often.) Significant differences across subject area are highlighted in the text.

* Item was included in the PL participation scale.

at least four times per year compared with math and science teachers. We did not observe significant differences in the PL opportunities reported by elementary, middle, and high school teachers with one exception: A little more than 60 percent of middle and high school teachers reported participating in collaborative learning in their subject area, while only 49 percent of elementary teachers said the same. Elementary teachers might receive more-generic PL because they tend to teach all subjects.

The types of PL opportunities in which teachers participated most tended to be the ones that they reported as the most helpful. For example, more teachers indicated frequent participation in collaborative learning opportunities compared with general workshops (shown in Figure 5), and more teachers indicated collaborative learning opportunities as helpful compared with general workshops (see Figure 6).

For all professional development opportunities but general professional development and online learning, science teachers were significantly less likely to rate their PL opportunities as helpful compared with ELA and math teachers. Teachers at different grade levels did not differ significantly in their helpfulness ratings of professional development, except that only 38 percent of high school teachers rated general workshops as helpful for their use of their main materials compared with 48 percent of elementary teachers and 46 percent of middle school teachers.

By the Book Teachers Were More Likely to Report Receiving Evaluative Feedback Focused on Curricula

We considered how teachers' average responses to items reflecting evaluative feedback and PL focused on curriculum use were related to the teacher curriculum use profiles we created, using regression models that took into account teachers' grade and subject assignments, school demographic characteristics, and teachers' years of experience and race/ethnicity. To simplify these analyses, we created scales reflecting whether teachers receive evaluative feedback focused on curriculum, the frequency of PL focused on curriculum, and the helpfulness of PL focused on curriculum. To create the scale for evaluative feedback to teachers focused on curriculum, we averaged together all the items in Figure 4 (with the exception of "My principal encourages me to plan lessons from scratch.")[7] To create scales for frequency and helpfulness of PL focused on curriculum use, we averaged teachers' responses on a subset of the items in Figures 5 and 6 that are most directly related to PL designed to improve teachers use of their main materials: (1) workshops or trainings focused on my main [subject area] materials, (2) coaching focused on my main [subject area] materials, and (3) collaborative learning with other teachers focused on use of my main [subject area] materials.

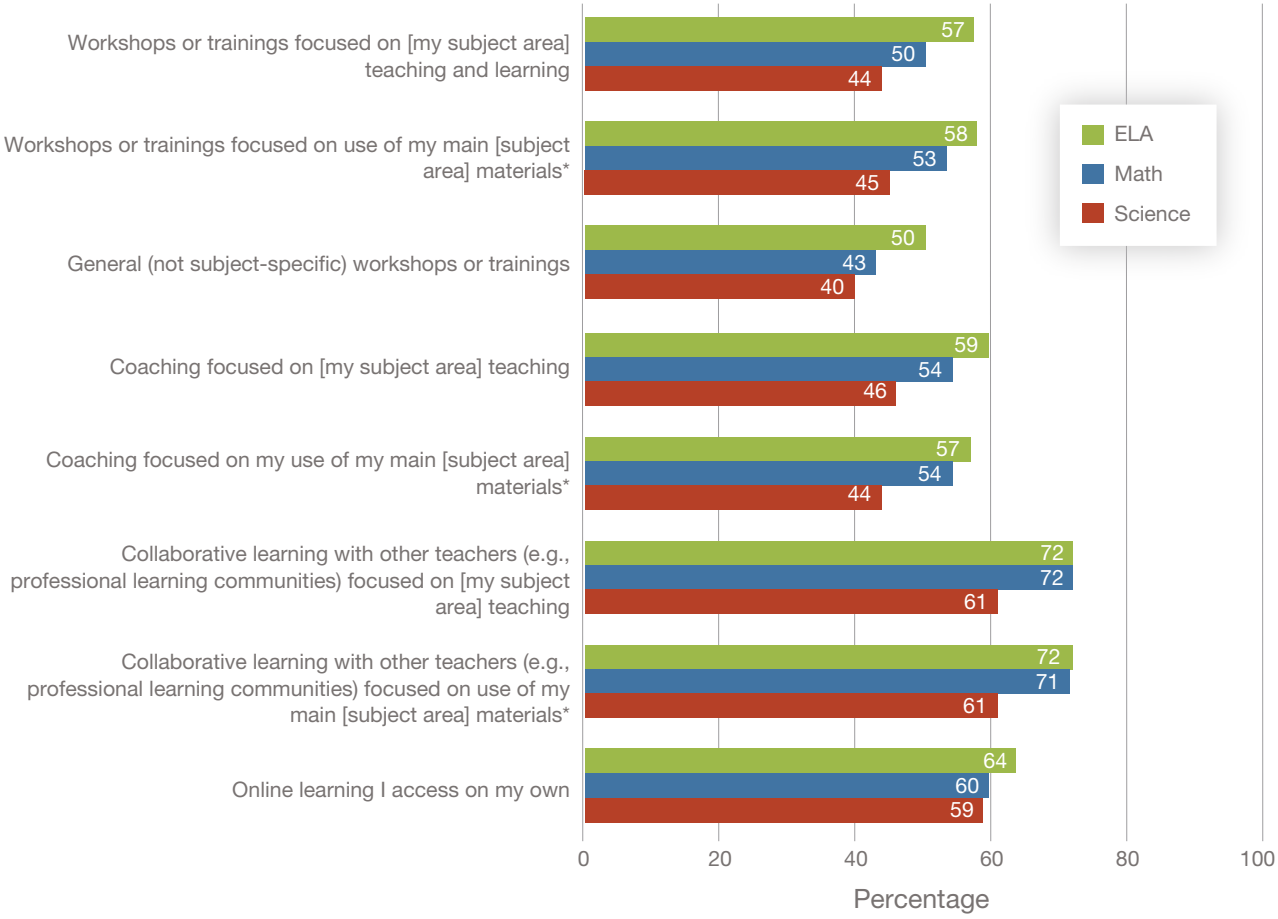
Figure 7 shows how the probability of being classified in each of the profiles shifts as the level of self-reported evaluative feedback focused on curriculum use increases, taking account additional variables in regression models. The leftmost point of each subfigure on the *x* axis in Figure 7 corresponds to the probabilities for teachers who reported that they "strongly disagreed" with each item of the evaluative feedback scale, and the rightmost point corresponds to the probabilities for teachers who reported that they "strongly agreed" with each item.

Teachers who reported more agreement that their evaluative feedback focuses on curriculum use were more likely to be By the Book teachers and less likely to be DIY teachers. Teachers who strongly agreed with each item in the evaluative feedback scale (the rightmost point in each subfigure in Figure 7) were roughly 10 percentage points more likely to be classified as By the Book teachers and 5 percentage points less likely to be classified as DIY teachers than teachers reporting average levels of evaluative feedback focused on curriculum. The probability that teachers were Modifiers or Cobblers was not significantly related to their reported levels of evaluative feedback focused on curriculum use.

These findings suggest that teachers' instructional systems—particularly how much their school provides teachers with feedback on curriculum use—might have a lot to do with how teachers use curricula. However, the findings also imply that if districts or schools want their teachers to use specific curricula with fidelity, principals' emphasis on curriculum use in the feedback they provide to teachers, as well as through teacher observations and evaluations, might be effective.

FIGURE 6

Teacher Agreement That Professional Learning Was Moderately or Greatly Helpful



NOTES: This figure depicts the percentage of respondents, by subject area, who indicated that the following PL activity helped improve their use of their main [subject area] material to a "moderate" or "great" extent. Respondents were asked to rate only activities that they participated in at least once during the 2018–2019 school year. For each PL activity, "helpfulness" response options were *not at all*, *to a small extent*, *to a moderate extent*, and *to a great extent*. Significant differences across subject are highlighted in the text.

* Item was included in the helpfulness of professional learning scale.

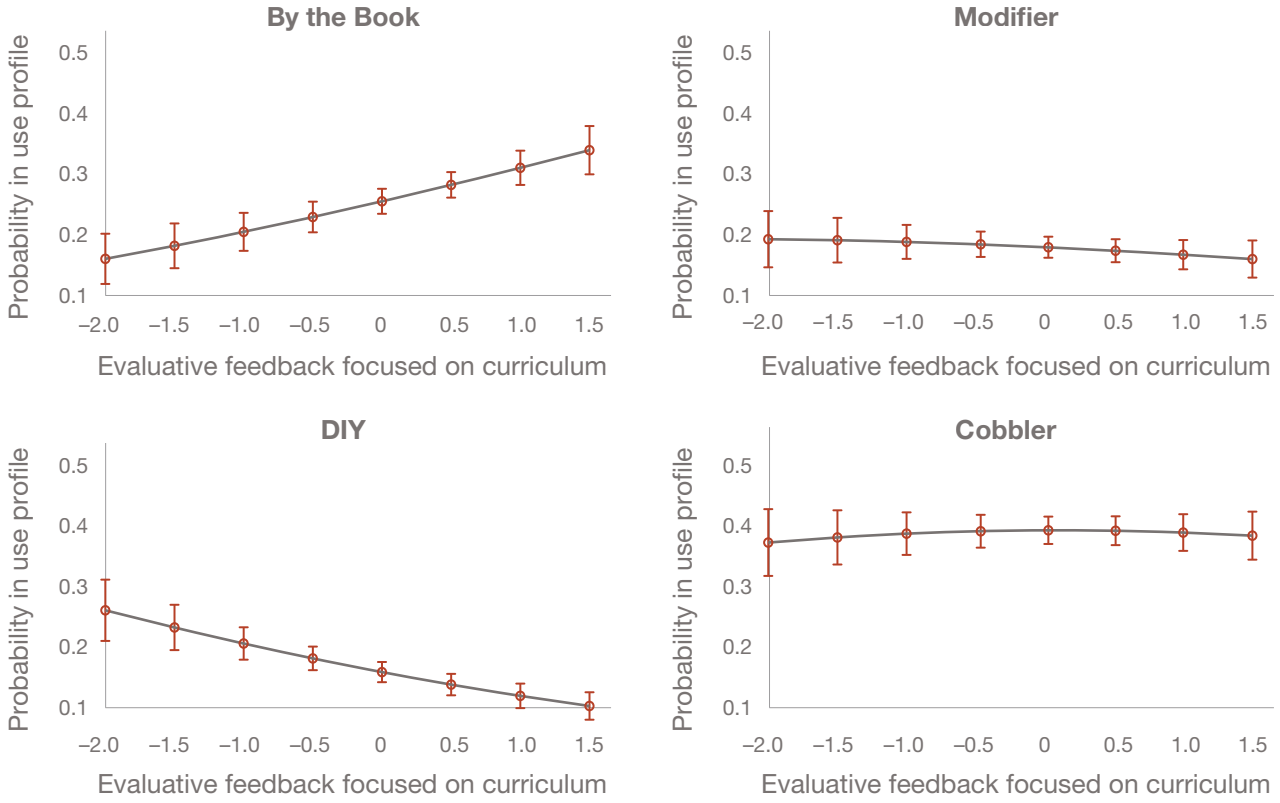
Teachers Reporting More-Frequent Professional Learning Focused on Curriculum Use Were Less Likely to Report Modifying Their Curricula, Somewhat More Likely to Bring Together Multiple Curricula

We observed significant associations between the frequency of PL focused on curriculum use and teachers' curriculum use profiles, although we did not observe any clear relationships between the helpfulness of PL and those profiles. As shown in Figure 8, increasing frequency of PL focused on curriculum use was associated with a lower likelihood that teachers would be Modifiers and a slightly greater likelihood that teachers would be Cobblers. The frequency of PL did not appear to affect teachers' likelihood of being By the Book teachers or DIY teachers.

These findings imply that teachers who receive more PL focused on curriculum use may feel additional confidence in using and combining multiple curricula, rather than modifying lessons within their curricula. One important caveat in interpreting these results is that although there is evidence of relationships between curriculum use and PL, they are ambiguous with regard to the direction of these relationships. PL could be supporting teachers to use multiple curricula; it is equally plausible for this relationship to be reversed—teachers who use multiple curricula require additional PL to manage the complexity of balancing several different instructional

FIGURE 7

Relationship Between Evaluative Feedback Focused on Curriculum Use and the Four Profiles of Teacher Curriculum Use



NOTES: This figure depicts the predicted probability that a teacher is classified into each of the four profiles of curriculum use as a function of evaluative feedback focused on curriculum. Evaluative feedback focused on curriculum is presented in *z*-score form, where a score of zero represents the average level of evaluative feedback on curriculum in the sample. The range of the x axis is set such that the minimum value is set at the *z*-score corresponding to a teacher who answered that they "strongly disagree" on each item of the evaluative feedback scale and the maximum value is set at the *z*-score corresponding to a teacher who answered that they "strongly agree" on each item of the evaluative feedback scale. Predictions obtained using multinomial logistic regression that models the probability that a teacher is classified into one of the four profiles as a function of evaluative feedback on curriculum, PL frequency, PL helpfulness, teachers' grade-level and subject-area assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity.

materials. Better understanding of the causal nature of the relationships between these different components is critical for understanding how best to support the development of cohesive instructional systems.

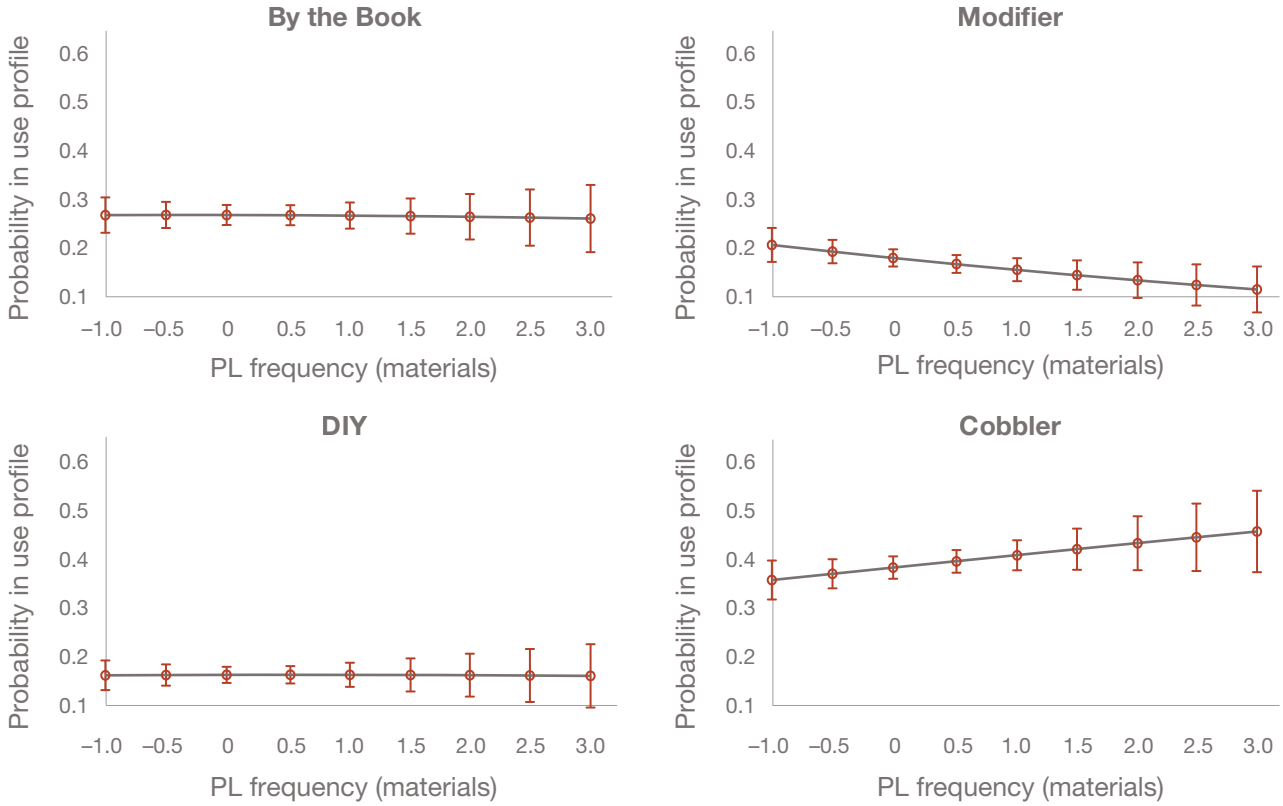
How Do Elements of Teachers' Instructional Systems—Curriculum Use, Evaluative Feedback, and Professional Learning—Differ Across Teaching Contexts?

We have described several aspects of teachers' instructional systems: curriculum use, including use of standards-aligned curricula; evaluative feedback to teachers focused on curriculum use; and frequency and helpfulness of PL focused on curriculum use. In this section, we focus on how use of standards-aligned curricula, evaluative feedback focused on curriculum, and PL focused on curriculum use might differ between states in the IMPD Network and in schools with varying levels of students eligible for FRPL.[8] These contextual factors can shape the extent to which certain elements of instructional systems are emphasized (or de-emphasized), most obviously through differences in the resources available to educators in different schools.

We hypothesized that aspects of instructional systems may vary in higher- versus lower-poverty schools because instructional materials, evaluative feedback, and PL opportunities are costly

FIGURE 8

Relationship Between Frequency of Curriculum-Focused Professional Learning and the Four Profiles of Teacher Curriculum Use



NOTES: This figure shows the predicted probability that a teacher is classified into each of the four profiles of curriculum use as a function of the frequency of curriculum-focused PL. PL frequency is presented in *z*-score form, where a score of zero represents the average level of PL frequency in the sample. The range of the *x*-axis is set so that the minimum value is set at the *z*-score corresponding to a teacher who answered "never" on each item of the frequency of the curriculum-focused PL scale and the maximum value is set at the *z*-score corresponding to a teacher who answered "weekly or more often" on each item of the curriculum-focused PL scale. Predictions were obtained using multinomial logistic regression that modeled the probability that a teacher was classified into one of the four profiles as a function of evaluative feedback on curriculum, PL frequency, PL helpfulness, grade level and subject area, demographic characteristics of a school, and a set of personal characteristics, including total years of teaching experience and race/ethnicity.

investments (Boser, Chingos, and Straus, 2015; Chambers, de los Reyes, and O'Neil, 2013; TNTP, 2015) and divides in school funding both between states and between schools within those states may constrain many schools from developing their systems (Morgan and Amerikaner, 2018). Furthermore, higher-poverty schools may be focused on adopting more standards-aligned curricula and curriculum-focused PL because they typically have higher percentages of students with lower test scores and are trying to improve students' performance on assessments. We also hypothesized that instructional system components might vary by state, given that different states and schools serving different student populations have varying goals and reform priorities. States in the CCSSO IMPD Network are focused on reforms intended to increase use of standards-aligned curricula and PL focused on curriculum use. We might expect more focus on these instructional system elements at the school level, given state focus on these elements.

Teachers in Many IMPD Network States Were More Likely to Report Use of Standards-Aligned Curricula for Math and ELA

Given that the work of the IMPD Network began in 2017, it might be unrealistic to expect that teachers in IMPD states would increase their use of standards-aligned curricula in 2018–2019. Nonetheless, as noted

in Kaufman, Tosh, and Mattox (2020), use of standards-aligned curricula for math and ELA was already a little higher in these states compared with the rest of the United States, based on survey data from the 2017–2018 school year. These states might already have been focused on use of standards-aligned curricula before they joined the IMPD Network. Figures 9 and 10 display the math and ELA curricula that teachers across the United States and in IMPD Network states reported using. Louisiana is included among these states as a point of reference, given all its work to support use of standards-aligned curricula.

Overall, relative to teachers in non-IMPD states, teachers in an IMPD state were 19 percentage points more likely to use at least one standards-aligned curriculum in either ELA or math in 2018–2019, a margin that held even after accounting for school student demographic composition and school urbanicity. For math, in particular, our data indicate that Louisiana and all IMPD Network states except Massachusetts and Nebraska reported significantly higher rates of use of fully aligned materials than teachers in the rest of the nation. Rates of fully aligned material usage were not different between Massachusetts and the rest of the country, while Nebraska teachers were significantly less likely to use fully aligned material.

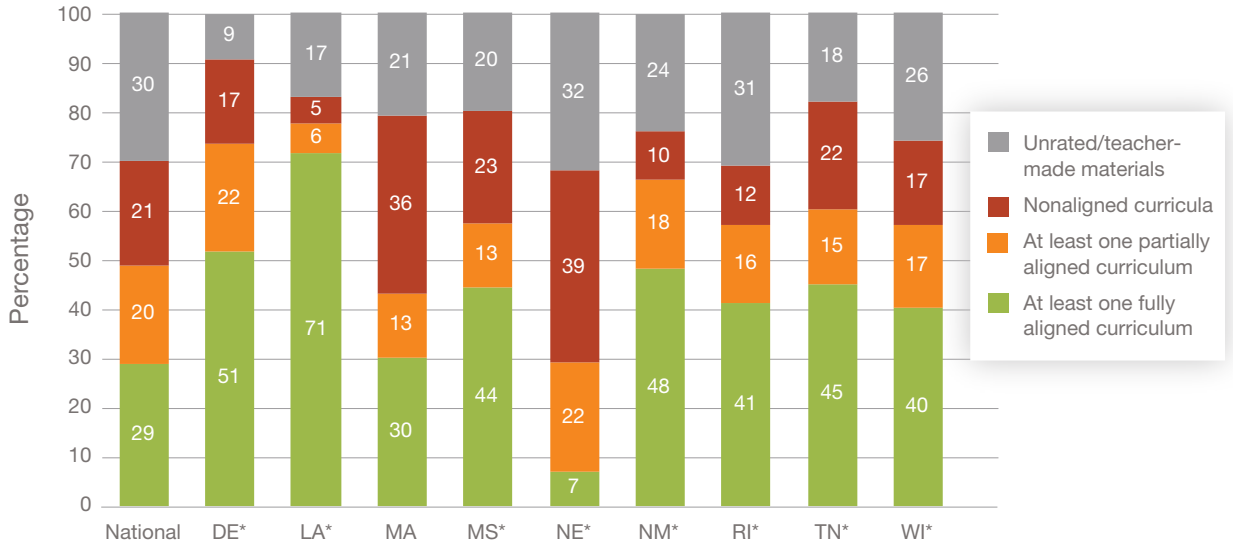
For ELA, the story was different. Louisiana, New Mexico, Rhode Island, and Tennessee reported a significantly higher percentage of teachers using standards-aligned curricula relative to teachers in the rest of the nation, but the rate of standards-aligned curricula use was significantly lower in Massachusetts, Nebraska, and Wisconsin compared with the nation. The use of nonrated or nonaligned curricula in Louisiana was particularly low, which might be related to Louisiana's focus on encouraging and supporting use of high-quality curricula since 2015.

With Some Exceptions, IMPD States Were Not Significantly Different in Terms of Evaluative Feedback and PL, As Well As Helpfulness of Focused PL

On average, most IMPD Network states did not look markedly different from the rest of the nation with regard to our measures of evaluative feedback and PL focused on curriculum use. Figure 11 displays the percentages of teachers in each IMPD state and Louisiana who agreed with the statements that their

FIGURE 9

Math Curricula Teachers Reported Using Regularly (Once per Week or More), by State

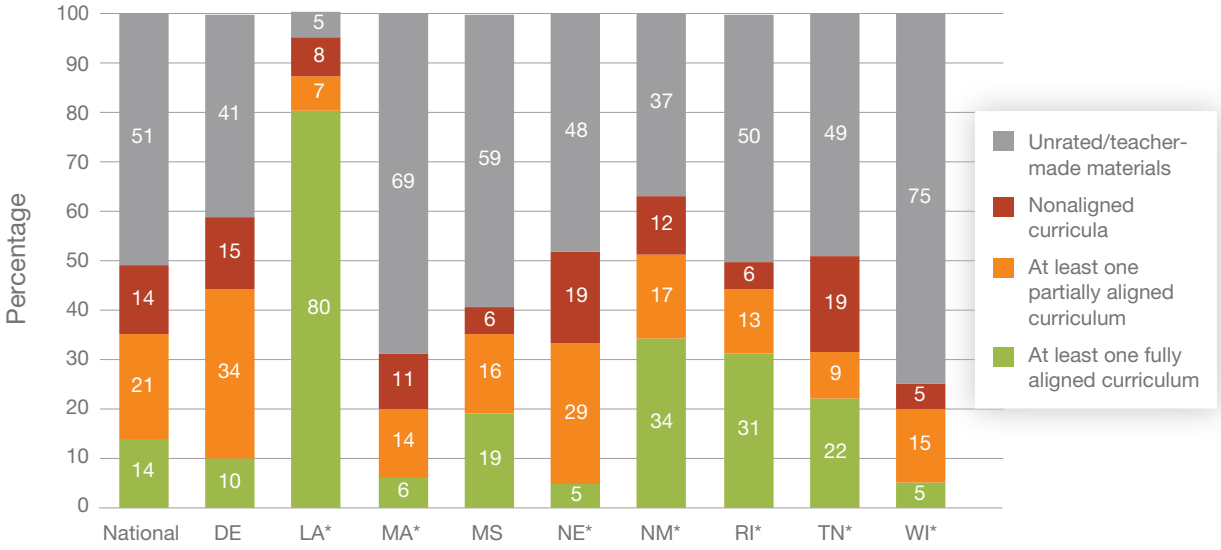


NOTES: These data were derived from one item in the ATP—"Which of the following mathematics curricula do you use regularly (once a week or more) for your mathematics instruction this school year (2018–2019)?" Responses were coded for extent of standards alignment based on EdReports data. The full wording of survey items is available in Prado Tuma et al., 2020. Data may not sum to 100 percent because of rounding.

* Indicates that the state-level proportion of teachers using at least one fully aligned curricula significantly differs from the proportion among teachers in the rest of the nation at the $p < 0.05$ level.

FIGURE 10

ELA Curricula Teachers Reported Using Regularly (Once per Week or More), by State

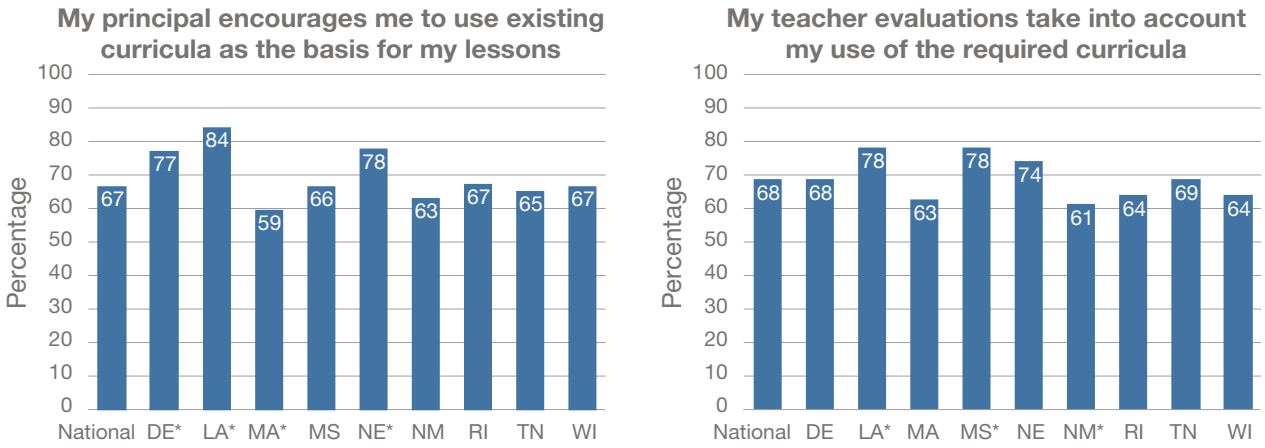


NOTES: These data were derived from one item in the ATP—"Which of the following ELA curricula do you use regularly (once a week or more) for your ELA instruction this school year (2018–2019)?" Responses were coded for extent of standards alignment based on EdReports data. The full wording of survey items is available in Prado Tuma et al., 2020. Data may not sum to 100 percent because of rounding.

* Indicates that the state-level proportion of teachers using at least one fully-aligned curricula significantly differs from the proportion among teachers in the rest of the nation at the $p < 0.05$ level.

FIGURE 11

Percentage of Teachers in IMPD Network States Agreeing with Statements About How Curricula Are Taken into Account in Principal Feedback and Teacher Evaluations



NOTES: This figure depicts the percentage of respondents, by state, who indicated that they "somewhat agree" or "strongly agree" with each statement. Potential response options were *strongly disagree*, *somewhat disagree*, *somewhat agree*, and *strongly agree*. Significant differences across states are highlighted in the text.

* Indicates that the state-level percentage significantly differs from the percentage among the rest of the nation at the $p < 0.05$ level.

principal encourages them to use existing curricula and their teacher evaluations take into account their use of required curricula. As noted in the figure, roughly 60 to 80 percent of teachers agreed with each statement across states, with significantly higher reports of agreement that principals encourage teachers to use curricula as the basis for their lessons in Delaware, Louisiana, and Nebraska.

Teachers in many IMPD Network states also looked similar to those in the rest of the United States with regard to their participation in workshops and trainings dedicated to their instructional materials at least four times per year, although teachers in Delaware, Louisiana, and Tennessee reported significantly higher rates of participation in both workshops and collaborative learning with other teachers focused on materials (see Figure 12).

We do not have enough in-depth information about reforms in most of these states to be able to link differences to specific reform efforts. That said, our research in Louisiana has tracked the ways in which that state has been incorporating curriculum use into observation tools required for struggling schools (i.e., those with high percentages of students with low test scores) and providing professional development focused on curriculum for the past several years, which might have something to do with higher percentages of teachers reporting evaluative feedback and PL focused on curriculum use (Kaufman, Steiner, and Baird, 2019).

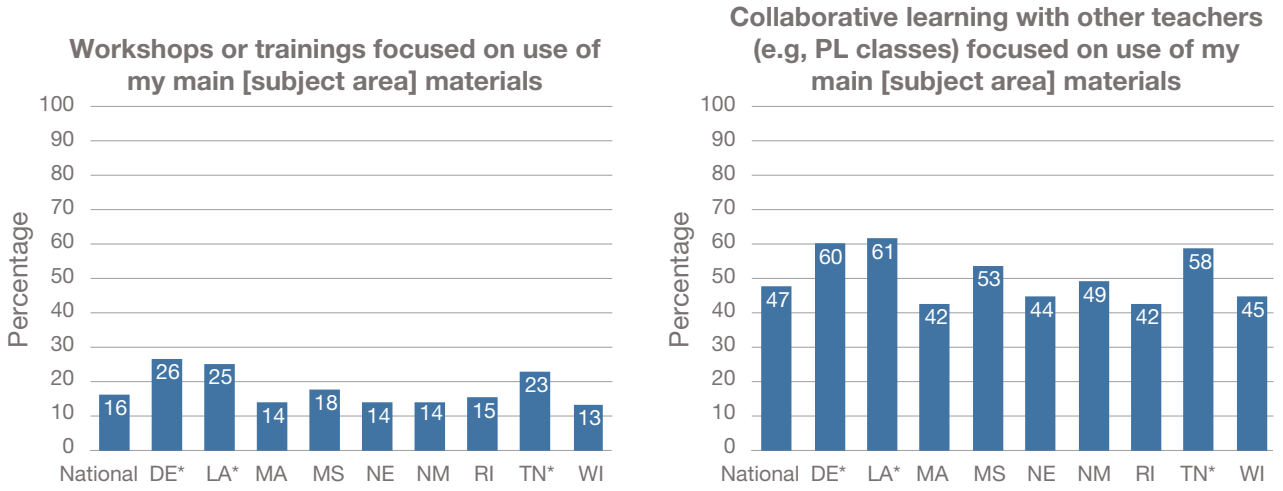
Teachers in High-Poverty Schools Reported More-Frequent Use of Many Instructional Materials, with More-Pronounced Differences for ELA Teachers

School poverty level is likely an important source of variation in all of these aspects of teaching and learning. In another report based on 2019 AIRS data, Tosh et al. (2020) found that teachers in low-income schools tend to report more use of digital and other supplementary resources for their instruction, even while those teachers noted more barriers to using digital materials. These data suggest that teachers in high-poverty schools might be using additional digital materials in an attempt to support their students, perhaps because students in higher-poverty schools may have greater learning needs.

The use of digital and intervention materials was prevalent across teachers generally, but their use varied by school context in important ways. First, as the percentage of low-income students enrolled

FIGURE 12

Percentage of Teachers in IMPD Network States Indicating That They Received Each Type of Professional Learning Four or More Times per Year



NOTES: This figure depicts the percentage of respondents, by state, who indicated that they participated in each PL activity four or more times per year. For each PL activity, potential frequency response options were *never*, *one to three times per year*, *four to six times per year*, *one to three times per month*, and *weekly or more often*. Significant differences across states are highlighted in the text.

* Indicates that state-level percentage significantly differs from the percentage among the rest of the nation at the $p < 0.05$ level.

in a school (as determined by FRPL enrollment) increased, the use of digital materials and intervention materials for ELA also increased (see Figure 13). The differences in usage rates between teachers in the top quartile of school FRPL enrollment were significantly different from teachers in the bottom two quartiles. We did not find evidence that the usage of digital and intervention materials for math differed by school FRPL enrollment.

These trends could indicate that teachers serving students in high-poverty schools may be turning to supplemental materials to support potentially larger populations of below-grade-level students, English language learners, and students with disabilities. Intervention materials are designed to provide remediation, and teachers may be turning to digital materials to support students struggling to grasp the grade-level material presented by their standards-aligned curricula, as teachers serving a greater percentage of high-poverty students are actually more likely to use at least one standards-aligned curriculum. Our research shows that the use of supplementary materials is widespread for all teachers, but especially for teachers serving students with the greatest needs.

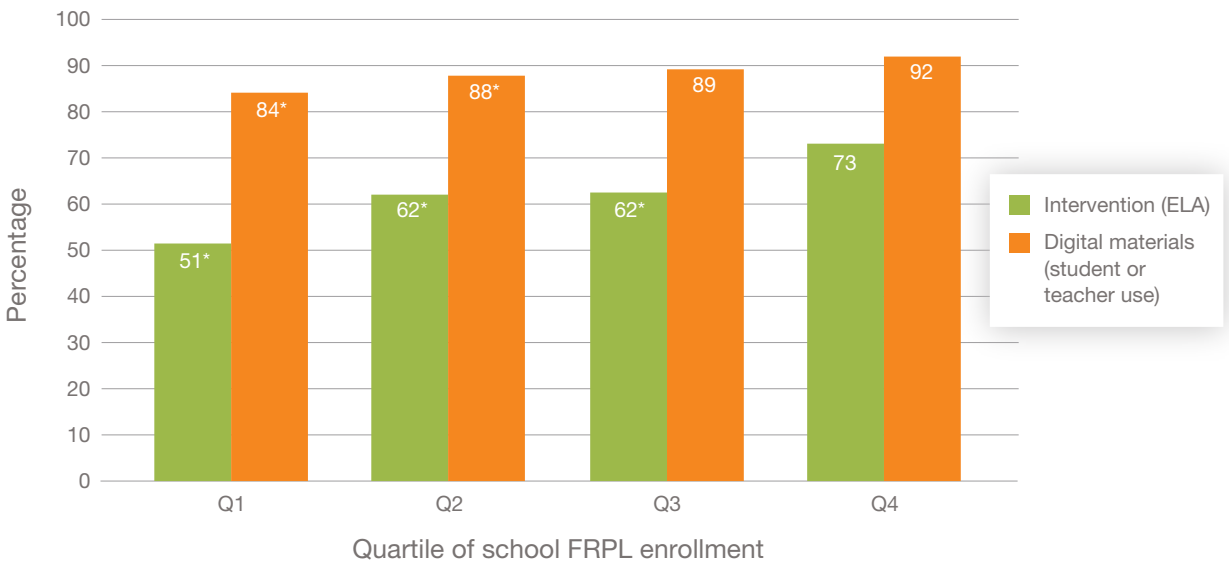
Respondents in the highest-poverty schools were also somewhat more likely to report using a standards-aligned curriculum. In Figure 14, we see that ELA teachers in the highest-income schools were least likely to report using at least one standards-aligned curriculum. Rates of standards-aligned curriculum use among math teachers were highest among teachers in the highest-poverty schools (31 percent), but this rate was not significantly different for these teachers compared with those in lower-poverty schools.

Finally, we examined how our measures of evaluative feedback, the helpfulness of PL focused on materials, and the frequency of PL focused on materials differed according to school poverty level (i.e., quartiles of school FRPL enrollment). Because the items that make up each of these measures use different scales, we standardized each measure to facilitate comparisons among the scales.[9]

As shown in Figure 15, teachers in the highest-poverty schools were both more likely to report evaluative feedback focused on curriculum use and more PL focused on curriculum use. The frequency of PL was particularly high among teachers in the highest-poverty schools. We did not find that the reported

FIGURE 13

Use of ELA Intervention Materials and Digital Materials, by FRPL Enrollment Quartiles

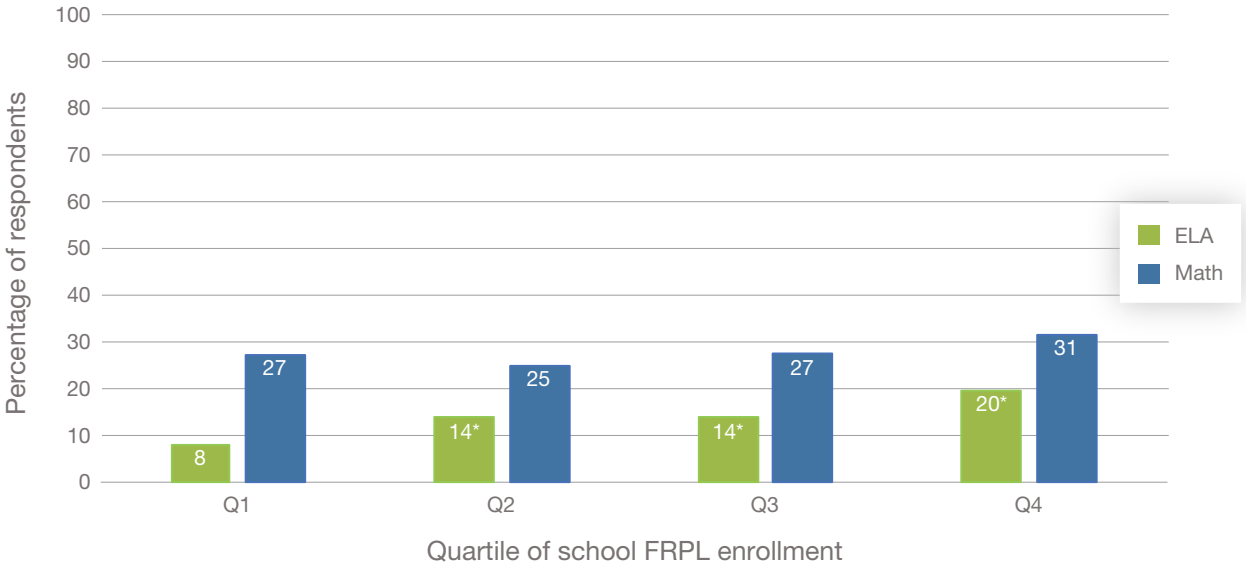


NOTES: This figure depicts the percentage of ELA teachers who indicated using at least one intervention material to "support students below grade level" or indicated that "I" or "my students" use at least one digital material once per week during classroom instructional time, by school FRPL enrollment.

* Percentage in this quartile is significantly different from the percentage in the highest-poverty schools for that material at the $p < 0.05$ level.

FIGURE 14

Associations Between Teacher Reported Standards-Aligned Practices and Teacher Curriculum Use Profiles

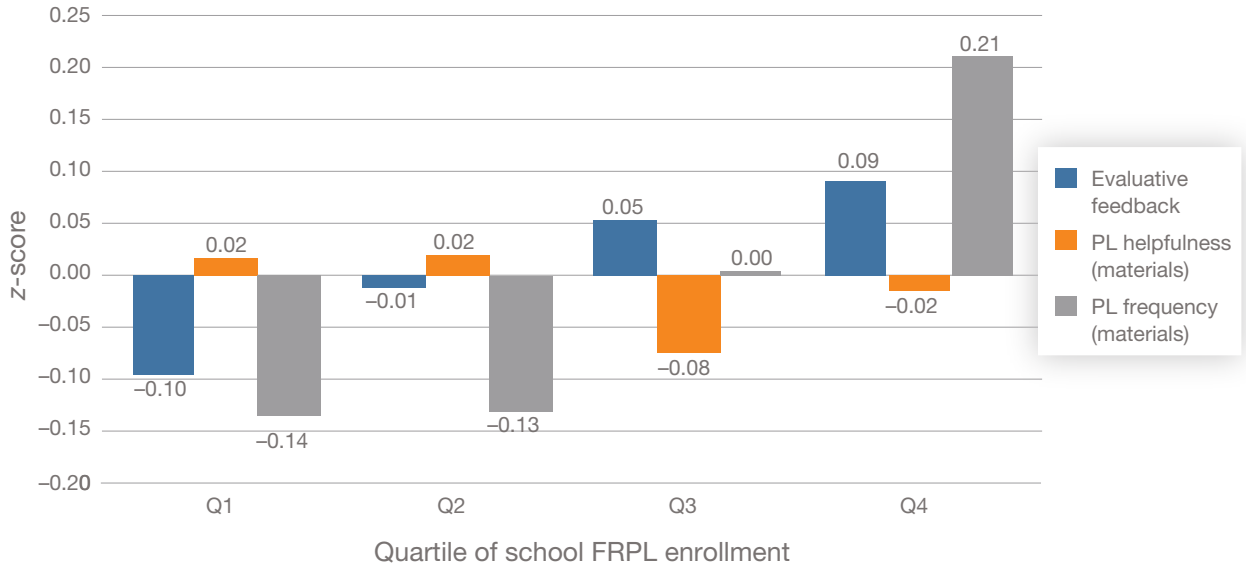


NOTES: This figure depicts the percentage of teachers who indicated regularly using at least one comprehensive curriculum that was rated as "meeting expectations" by EdReports in their grade and subject, separated by quartiles of school FRPL enrollment and subject.

* Indicates statistically significant differences at $p < 0.05$ relative to Q1 percentage in that subject.

FIGURE 15

Evaluative Feedback and Professional Learning Helpfulness or Frequency Focused on Curriculum Use, by School FRPL Quartile



NOTES: This figure depicts the average standardized scores (*z*-scores) for measures of evaluative feedback on curriculum (blue), PL helpfulness (orange), and PL frequency (gray), separated by quartiles of school FRPL enrollment. Each measure is standardized to have a mean of zero and a standard deviation of one such that a score of zero represents the average score across the sample on that measure.

helpfulness of PL significantly differed according to school poverty.

These trends suggest that teachers in higher-poverty schools are turning to several types of materials, particularly for ELA, to support their instruction. At the same time, these teachers appear to be supported more in their use of curriculum, which might be appropriate because of challenges they likely face in terms of supporting diverse student needs.

How Are Elements of Instructional Systems Related to Students' Engagement in Standards-Aligned Classroom Practices?

A key question is understanding how curriculum and the other components of cohesive instructional systems coalesce to support students' engagement in standards-aligned practices. To investigate that, we first created scales of the standards-aligned practices for ELA, math, and science in which teachers report "all or nearly all" of their students engaging. We then used regression models to examine how the percentage of standards-aligned practices in which teachers reported all or most of their students engaging related to the following instructional system components: (1) evaluative feedback focused on curriculum use, (2) the frequency of PL opportunities focused on curriculum use, (3) the helpfulness of materials-focused PL, and (4) teachers' curriculum use. In this section, we provide more information about the classroom practice measures used in our analyses and share findings on how practices were related to these instructional system components.

As we demonstrate, teachers who reported receiving more evaluative feedback and PL focused on curriculum use were also significantly more likely to report that all or nearly all of their students engage in the standards-aligned classroom practices we asked about in our survey. However, teachers who reported regular use of standards-aligned curricula were neither more nor less likely to report students' engagement in standards-aligned practices, taking into account evaluative feedback, PL, and other teacher- and school-level demographic factors. Therefore, our regression models suggest that use of standards-aligned curricula might not make a difference in engaging all students in a classroom in a particular standards-aligned practice. Instead, evaluative feedback and PL focused on curriculum support might be necessary for teachers to give all of their students an opportunity to engage in standards-aligned classroom practices.

The Majority of Teachers Reported That at Least a Few Students Regularly Engage in Standards-Aligned Practices—A Minority Reported All or Nearly All Their Students Engaging in Those Practices Regularly

In the AIRS teacher surveys, we provided teachers with a list of subject-specific student classroom practices that were standards-aligned, with input from Student Achievement Partners and others deeply familiar with standards and standards-aligned teaching and learning. We then asked teachers to indicate what proportion of students in their classroom engaged in each practice at least once per week. In total, the survey listed 12 standards-aligned ELA practices, nine math practices, and ten science practices.

As noted earlier, teachers' responses to survey self-reports on classroom practices suffer from response biases. In particular, teachers tend to over-report standards-aligned practices (Kaufman, Stein, and Junker, 2016; Mayer, 1999; Spillane and Zeuli, 1999). However, we reasoned that if a teacher reported that "all or nearly all" students engaged in a particular practice once per week or more, it would be relatively unlikely that students were doing that without teacher prompting. In addition, by asking teachers about practices in which their students are engaging rather than ones in which teachers themselves were engaging—and focusing on the proportion of students engaging in those practices—we hope to avoid at least some response bias.

Teachers were fairly uniform in reporting that most, if not all, of the standards-aligned practices asked about in our survey were present to some degree in their classroom. On average, teachers reported at least "a few students" engaging in at least 90 percent of the standards-aligned practices listed, with the modal teacher indicating that their students

engaged in every standards-aligned practice listed in the survey. This pattern held for teachers of different subjects, in different grade levels, and in different states.

Teachers did give varied reports about which practices were ones in which all their students engaged. Majorities of teachers reported "all or nearly all" of their students engaged in only six of 31 practices on a weekly basis (see Table 6), suggesting that the degree to which students are able to engage with select practices within a classroom could differ.

Similar to the components of instructional systems, we combine teachers' responses across a subset of these practice items to form a composite scale of standards-aligned classroom practice.[10] Because very few teachers selected the "no students" option for any particular practice, our aggregated measure of students' classroom practices focused only on the percentage of practices in which a teacher indicated "all or nearly all of my students" engaging.[11]

The percentage of teachers who reported that all or nearly all of their students engaged in standards-aligned classroom practices varied by school poverty level. On average, teachers in the highest-poverty schools reported that their students engaged in a significantly lower percentage of standards-aligned practices (36 percent of practices) compared with teachers in the lowest and second-lowest quartile in terms of poverty (41 and 42 percent of practices, respectively).

Our finding that teachers in higher-poverty schools reported more elements of instructional systems in their schools while reporting slightly lower student engagement in standards-aligned practices might appear to run counter to the framework provided in Figure 1, which suggests that the presence of strong instructional systems would be positively related to the use of standards-aligned practice. We should emphasize that more evaluative feedback and PL focused on curricula are connected with more standards-aligned practices in all schools, including high-poverty schools. However, the inherent challenges of teaching in high-poverty settings might also lead to more difficulty with implementing standards-aligned classroom practices, regardless of larger amounts of evaluative feedback and PL. In the next section, we use regression analyses to attempt to disentangle the influence of school poverty level on the associations between teachers' self-reports of students' classroom practices and the various components of instructional systems.

Evaluative Feedback and PL Focused on Curricula Were Positively Related to Use of Standards-Aligned Classroom Practice

We conducted a series of regression analyses to examine how curriculum, evaluative feedback, and the helpfulness and frequency of PL related to the percentage of standards-aligned practices that teachers reported that their students engaged with in the classroom. As noted in Table 7, ELA and math teachers reporting more evaluative feedback, more-frequent PL focused on curriculum, and higher perceived helpfulness of that PL were more likely to report all of their students being engaged in a greater percentage of the standards-aligned practices we inquired about in the survey. However, the magnitude of these relationships was modest overall, with their statistical significance varying for teachers of specific subjects. For both ELA and math teachers, a standard deviation increase in self-reported evaluative feedback focused on curriculum was associated with teachers reporting all or nearly all their students being engaged in an additional 2.7 percent of the standards-aligned practices listed in the survey (Table 7). When we compare results among teachers in different subjects, the association between evaluative feedback focused on curriculum and the percentage of classroom practices in which teachers reported all their students engaged was significant among ELA and math teachers but not among science teachers.

Among professional development components, the helpfulness of PL focused on curriculum use appeared to be more strongly linked to the use of standards-aligned practices than the frequency of PL focused on curriculum use. Specifically, a standard deviation increase in PL helpfulness and frequency was associated with a 5.7-percentage point and 2.6-percentage point increase, respectively, in the percentage of standards-aligned classroom practices in which teachers reported all their students engaged. Furthermore, although the relationship between helpfulness and practices appeared robust when

TABLE 6

Percentage of Teachers Reporting "All or Nearly All" Students Engaging in Each Standards-Aligned Classroom Practice

Classroom Practices	Overall	Elementary	Middle	High
ELA practices				
Use evidence from a text to make inferences about central ideas and key details*	62	54	72	73
Read fictional texts of sufficient grade-level complexity with the whole class*	55	53	58	54
Read nonfiction texts of sufficient grade-level complexity with the whole class*	51	51	52	48
Read or discuss texts of sufficient grade-level complexity for at least half of instructional time*	50	48	51	55
Strengthen writing by planning, revising, editing, and/or rewriting	49	45	50	59
Participate in a variety of conversations and collaborations with diverse partners	49	48	50	51
Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of text relate to each other and the whole	45	37	56	55
Analyze how two or more texts address similar themes or topics*	45	40	51	52
Learn and use a variety of general academic and domain-specific vocabulary	42	39	48	45
Build volume of independent reading on conceptually coherent topics to build knowledge about topics*	36	37	39	32
Write arguments to support claims in an analysis of substantive topics*	35	23	47	57
Conduct short or sustained research projects	31	26	35	39
Math practices				
Spend at least half of instructional time on grade-level math topics addressed by the state math standards at my grade level*	50	51	51	48
Use repeated practice to improve computational skills	44	48	34	38
Apply math to solve problems in real-world contexts*	32	32	36	28
Choose and use appropriate tools when solving a problem*	31	34	29	28
Look for and make use of structure*	29	31	27	25
Explain thinking and build on other students' thinking*	25	29	19	20
Pursue conceptual understanding, procedural skill and fluency, and application with equal intensity*	24	26	20	22
Relate new math content to other math content within and across grade levels*	23	23	24	24
Make sense of problems that do not include clear procedures for solving and persevere in solving them*	20	24	13	15

Table 6—Continued

Classroom Practices	Overall	Elementary	Middle	High
Science practices				
Participate in a hands-on scientific experience*	65	66	61	64
Write in a science journal*	48	53	51	34
Analyze or interpret data*	47	42	52	59
Plan and carry out a scientific investigation*	41	41	41	40
Develop or use scientific models*	37	33	42	46
Construct own explanations and arguments using evidence and reasoning*	33	30	39	38
Use math or computational thinking in science*	32	25	33	49
Discuss different ways to approach a problem*	30	32	26	27
Justify scientific reasoning in writing*	27	23	35	32
Develop own questions about a scientific topic*	22	22	24	20

NOTES: Data are based on the following ATP item: "In this school year (2018–2019), what proportion of your students typically engage in each of the following activities at least once a week for the [ELA/math/science] classes you teach?" Response choices were *no students*, *a few of my students*, *less than half of my students*, *more than half of my students*, and *all or nearly all of my students*.
* Item was included in the measure of classroom practices used in the regression analyses.

TABLE 7

Associations Between Teacher-Reported Standards-Aligned Classroom Practices and Components of Coherent Instructional Systems

	Regression Model			
	Model 1	Model 2	Model 3	Model 4
Evaluative feedback focused on curriculum	0.0272** (0.0100)	0.0269* (0.0135)	0.0302* (0.0144)	–0.0110 (0.0164)
Helpfulness of PL focused on curriculum use	0.0565*** (0.00942)	0.0509*** (0.0133)	0.0639*** (0.0127)	0.0556*** (0.0137)
Frequency of PL focused on curriculum use	0.0263* (0.0114)	0.0279 (0.0157)	0.0211 (0.0155)	0.0748*** (0.0184)
Uses standards-aligned curricula	–0.0188 (0.0202)	–0.0325 (0.0303)	–0.0263 (0.0260)	N/A
N	2,941	1,634	1,307	845
R-squared	0.111	0.091	0.120	0.149
Teacher grade-level and subject-area assignment	x	x	x	x
School characteristics	x	x	x	x
Teacher characteristics	x	x	x	x
Subject	ELA and math	ELA	Math	Science

NOTES: Evaluative feedback on curriculum, PL helpfulness, and PL frequency have been standardized; results in these rows reflect the expected association between a standard deviation increase in each component and the percentage of standards-aligned practices in which teachers report students engaging. "X" notes that the model accounts for teachers' grade-level and subject-area assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

looking separately at ELA and math teachers, the lower sample size likely led to fewer significant differences for the subject-specific samples. Interestingly, the frequency with which science teachers received PL focused on curriculum use had a more substantial relationship with standards-aligned practices than among math and ELA teachers.[12]

Using Standards-Aligned Curriculum Once per Week or More Was Not Related to Reporting the Use of Standards-Aligned Classroom Practices

The use of a standards-aligned curriculum did not appear significantly related to standards-aligned practices. Furthermore, teachers who reported use of standards-aligned curricula, on average, also reported that all or nearly all of their students engaged in *fewer* standards-aligned practices than teachers who did not use standards-aligned curricula, taking into account evaluative feedback and PL focused on curricula—as well as several demographic school- and teacher-level variables—although this relationship was not statistically significant. This finding implies that in schools where teachers report similar levels of evaluative feedback and PL focused on curriculum use, teachers' reports that they use standards-aligned curricula did not appear to be closely related to the practices in which they report students engaging. Put another way, teachers who report receiving evaluative feedback and PL focused on curriculum use were significantly more likely to report all or nearly all their students engaging in a higher proportion of standards-aligned practices, regardless of which curricula they used.

DIY Teachers Were Significantly More Likely to Report All or Almost All Their Students Engaging in Higher Proportions of Standards-Aligned Practices

Whether teachers use standards-aligned curricula is simply one dimension along which teachers can vary in what curricula they use and how they use it. We reran the regression models we conducted in Table 7 but replaced standards-aligned curriculum use with indicators for teachers' *profile* of curriculum use (i.e., By the Book, Modifier, DIY, Cobbler). Figure 16 shows the estimated percentage of classroom practices in which teachers reported all or nearly all students engaged for each profile, controlling for the other components of instructional systems in addition to teachers' subject and grade level, school, and teacher demographic characteristics.[13]

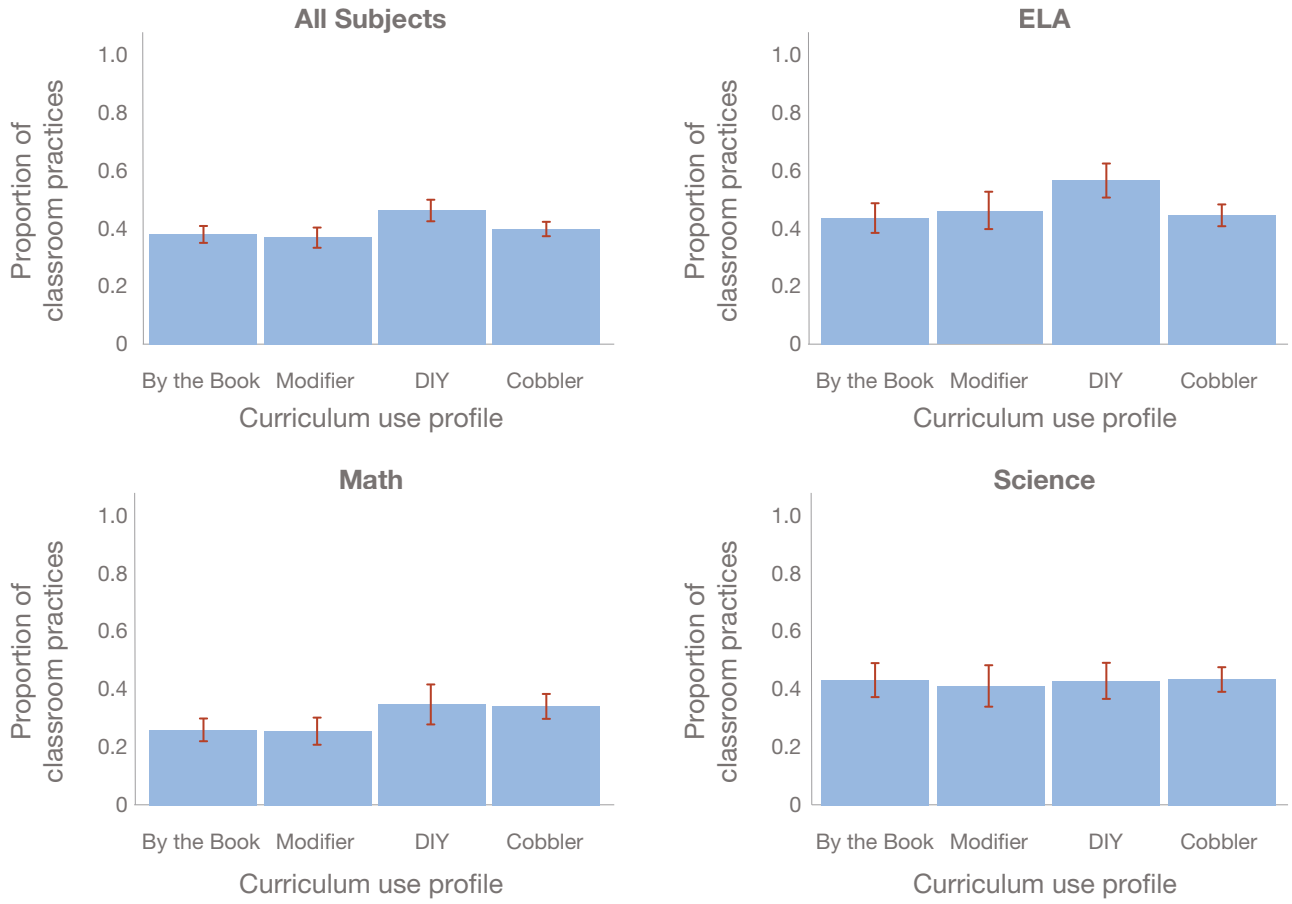
According to our analyses, DIY teachers across subject areas were significantly more likely than both By the Book teachers and Modifiers to report their students engaging in standards-aligned practices. DIY ELA teachers, in particular, were more likely to report a higher percentage of standards-aligned practices than ELA teachers with other curriculum use profiles. In contrast, DIY math teachers were on par with Cobblers in their reports of their students' standards-aligned practices. Teacher profiles did not appear to make a difference for teachers' reports of classroom practices in science. (See Table A.2 in the Appendix for specific estimates in the regression models.)

It is possible that the use of DIY materials that are well-tailored for students allows for more engagement in standards-aligned practice. An alternative explanation for this finding is that DIY teachers work in contexts that are more conducive to student engagement. The ability for teachers to rely on self-created materials or use multiple curricula is conditional on teachers having both the time and financial resources to create lesson plans. In underresourced or high-needs schools, both of these factors might be at a premium. High-income schools were more likely to have a higher concentration of DIY teachers than lower-income schools. We did control for schools' FRPL enrollment in our regression models, but the positive association between being a DIY teacher and standards-aligned practices might be influenced by other resource advantages enjoyed by DIY teachers not captured by our basic statistical controls.

A natural extension to exploring how curriculum use is linked to classroom practice is to consider whether the association between standards alignment and students' classroom practices differs depending on teachers' profiles of curriculum use. Because teachers often modify and combine multiple comprehensive curricula, the relationship between any single standards-aligned curriculum and classroom practices may be tenuous. It might be logical to expect By the Book teachers—who, by definition,

FIGURE 16.

Associations Between Teacher-Reported Standards-Aligned Classroom Practices and Teacher Curriculum Use Profiles



NOTES: This figure depicts the predicted percentage of standards-aligned classroom practices in which teachers report "all or nearly all" students engage for each curriculum use profile. Predictions are formed using an OLS model regressing percentage of practices on binary indicators for each curriculum use profile, measures of evaluative feedback on curriculum, PL helpfulness, PL frequency, and controls for teachers' grade-level assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity. The "all subjects" model includes controls for teachers' subject-area assignment.

use a single comprehensive curricula and minimally modify their lessons—to report tighter linkages between the standards alignment of their materials and their classroom practice.

Table 8 examines the relationship between standards alignment (and the other components of instructional systems) separately for teachers in each of the four curriculum use profiles. We find largely the same relationships that we observed for teachers overall. By the Book teachers reporting higher levels of evaluative feedback and helpfulness of PL focused on curriculum use—but not higher frequency of PL focused on curriculum use—were more likely to report their students engaging in higher percentages of the listed standards-aligned practices. However, the same was true of teachers with any other curriculum use profiles. Importantly, whether teachers in different profiles reported using a standards-aligned curriculum was not significantly related to teachers' reports of student engagement in standards-aligned classroom practices; the use of standards-aligned curricula was actually significantly negatively related to the use of classroom practices among Modifiers. These models thus suggest that although teachers' curriculum use profiles were significantly related to reported student engagement standards-aligned practices, these profiles do not appear to meaningfully moderate the relationships we noted previously

TABLE 8

Associations Between Teacher-Reported Standards-Aligned Classroom Practices and Components of Coherent Instructional Systems, by Teacher Curriculum Use Profile

	Regression Model			
	Model Run 1	Model Run 2	Model Run 3	Model Run 4
Evaluative feedback focused on curriculum	0.0571** (0.0192)	–0.0178 (0.0199)	0.0358 (0.0220)	0.0405* (0.0173)
Helpfulness of PL focused on curriculum use	0.0875*** (0.0174)	0.0517** (0.0178)	0.0457* (0.0230)	0.0441** (0.0160)
Frequency of PL focused on curriculum use	–0.00176 (0.0219)	0.0332 (0.0246)	0.0230 (0.0256)	0.0341 (0.0179)
Uses standards-aligned curricula	–0.00334 (0.0347)	–0.00657 (0.0472)	–0.115* (0.0561)	–0.0213 (0.0319)
N	843	502	421	1175
R-squared	0.165	0.184	0.249	0.082
Teacher grade/subject assignment	x	x	x	x
School characteristics	x	x	x	x
Teacher characteristics	x	x	x	x
Subject	ELA and math	ELA and math	ELA and math	ELA and math
Profile	By the Book	DIY	Modifier	Cobbler

NOTES: Evaluative feedback on curriculum, PL helpfulness, and PL frequency have been standardized so results in these rows reflect the expected association between a standard deviation increase in each component and the percentage of standards-aligned practices in which teachers report students engaging. "X" notes that the model accounts for teachers' grade-level and subject-area assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

between (1) evaluative feedback and PL frequency and helpfulness and (2) their reports of students' standards-aligned practices.

Other robustness checks included examining the association between standards-aligned curriculum use and classroom practices within other teacher subgroups (e.g., grade level, school urbanicity, state), modifying the definition of standards-aligned curriculum use to include only teachers who use a standards-aligned material for more than 50 percent of their instructional time, and interacting the indicator of standards-aligned curriculum use with measures of evaluative feedback and PL on curriculum use to see whether the association of standards alignment is conditional on the levels of the other components of school instructional systems. These analyses, in sum, do not provide any consistent evidence that the usage of standards-aligned curriculum is linked to our measure of standards-aligned practice.

Finally, we examined whether these relationships were different in IMPD Network states compared with other states. One might hypothesize that—in states with greater commitment to encouraging use of standards-aligned resources and supports—use and supports could matter more. However, we did not see any clear differences in these patterns for specific states or for IMPD Network states as a collective, and the average percentage of standards-aligned practices reported did not differ between IMPD and non-IMPD Network states. It will be important to study these relationships among curricula, school supports, and practices over time, particularly in IMPD Network states that are just beginning to focus on supporting use of standards-aligned curricula.

Conclusions and Implications

Our key findings documented the variety of ways in which teachers used curricula and curricula supports during the 2018–2019 school year, as well as how curriculum use and supports varied among

teachers in states and schools with varying poverty levels. Importantly, we identified no clear relationship between teachers' reports that they used a standards-aligned curriculum once per week or more for their instruction and their reports of students' standards-aligned classroom practices. Teachers' reports that they received evaluative feedback and helpful PL on curriculum use *did* appear to be significantly related to more student engagement in standards-aligned practices.

There are many potential reasons why teachers' access to and use of standards-aligned curricula—in itself—is not connected to our measure of students' standards-aligned practice. Lack of prior training or readiness to use standards-aligned curricula is one possibility. As has been documented in numerous studies, use of rigorous, standards-aligned curricula is challenging for teachers and for students, which might result in more-variable use of standards-aligned curricula, even compared with other curricula. In addition, states and school systems might have been focused primarily on *adopting* standards-aligned curricula over the past several decades. Our data suggest that states and districts must now work to *support* teachers' use of that curricula.

Key Findings

Teachers tended to use curricula and other instructional materials in a wide variety of ways; the curricula provided to teachers likely have a loose relationship with which curricula teachers use for the majority of their instruction. Teachers used curriculum materials in a wide variety of ways in the classroom, and relatively low percentages of teachers (only 9 percent of ELA teachers and 22 percent of math teachers) reported using any standards-aligned curricula for the majority of their instructional time. The percentage of principals in our national sample who reported providing teachers with standards-aligned curricula (as determined independently by EdReports reviews) was much higher than the percentage of teachers who reported using any standards-aligned curricula for the majority of their instructional time, by margins of about 20 percentage points. Even when teachers reported using standards-aligned curricula, they did so in different ways, often modifying their materials and bringing together multiple curricula with digital and intervention materials. We created the following four teacher curriculum use profiles based on teachers' reports of how they used curricula:

- *By the Book* teachers used a single curriculum mostly as written.
- *Modifiers* used a single curriculum but reported making substantial modifications.
- *DIY* teachers primarily reported using self-created or self-curated materials.
- *Cobblers* reported stitching together multiple comprehensive curricula.

Elementary teachers and math teachers were more likely to be By the Book teachers and less likely to be DIY teachers, compared with secondary teachers and ELA teachers. Readers should keep in mind that these profiles do not necessarily imply anything about the quality of teachers' instruction; teachers in any profile might deliver strong or weak instruction.

Teachers more commonly reported receiving evaluative feedback—as opposed to PL—focused on curriculum use, although both evaluative feedback and PL were related to teachers' curriculum use profiles. Most teachers reported receiving at least some evaluative feedback focused on curriculum use in terms of observations, evaluations, and principal feedback that took into account how teachers use curriculum. Lower percentages of teachers reported receiving regular PL (whether through collaborative PL communities, coaching, or trainings) focused on curricula compared with those who reported receiving evaluative feedback. Science teachers were less likely to receive evaluative feedback and PL focused on curriculum use than ELA and math teachers.

Teachers who reported receiving evaluative feedback focused on curriculum use were more likely to be By the Book teachers and less likely to be DIY teachers. Teachers reporting more-frequent PL focused on curriculum use were less likely to report modifying their curricula and somewhat more likely to be Cobblers who bring together multiple curricula.

State context and school poverty both appeared to be related to variation in teachers' use of standards-aligned curriculum, as well as the evaluative feedback and PL focused on curriculum that teachers

reported receiving. Beyond variance in curriculum use and supports for curriculum among teachers of different subjects and grade levels, we found that use of standards-aligned curricula and supports for curriculum use varied based on school poverty level and were also somewhat related to the state in which a teacher was located. For example, teachers in many states that were part of the IMPD Network were more likely to report use of standards-aligned curricula for math and ELA, and teachers in some of those states were also significantly more likely to report receiving evaluative feedback and regular PL focused on their curriculum materials. In addition, teachers in higher-poverty schools reported significantly more use of standards-aligned curricula, intervention materials, and digital materials for ELA instruction—and more overall evaluative feedback and PL focused on curriculum use—than their counterparts in lower-poverty schools. We did not identify differences in use of standards-aligned curricula, intervention materials, or digital materials for math instruction. These findings suggest that teachers in higher-poverty schools, which typically include higher proportions of students with lower test scores, are using a wide variety of instructional materials in hopes of improving student learning in ELA, including both standards-aligned curricula and other types of materials. Teachers—and the schools in which they teach—might be turning to such a wide variety of materials because no single material is meeting all their students' needs. At the same time, teachers in high-poverty schools reported receiving both more evaluative feedback and PL than their counterparts in lower-poverty schools, which suggests that school systems may recognize the need to provide teachers in higher-poverty environments with more supports.

Teachers who reported a higher number of standards-aligned practices in which all their students engaged were more likely to report more curriculum-focused evaluative feedback, report helpful curriculum-focused PL, and be DIY teachers. We identified the following key factors—some of which are potentially in conflict—that appeared to be related to engagement in standards-aligned ELA, math, and science classroom practices among all students within a teacher's classroom:

- receiving more evaluative feedback from principals, observations, and teacher evaluations
- receiving PL (including coaching, training, and PL communities) that was helpful for improving teachers' use of their main materials
- being a DIY teacher, particularly in ELA and somewhat for math (but not for science).

Teachers' use of standards-aligned curricula once per week or more did not appear to be related to engagement in standards-aligned practices among all or nearly all their students.

At first glance, these findings seem paradoxical: Evaluative feedback focused on curriculum appears to be more frequent for By the Book teachers and less frequent for DIY teachers. Why is both receiving evaluative feedback focused on curriculum and being a DIY teacher related to more use of standards-aligned practices? The answer is that, although DIY teachers might report receiving less evaluative feedback focused on curriculum, being a DIY teacher is still related to teachers' reports of students' standards-aligned practices. It is also the case that a DIY teacher who reports receiving more evaluative feedback focused on curriculum is even more likely to report more standards-aligned classroom practices than a DIY teacher who does not receive that feedback.

The relationship between standards-aligned practices and evaluative feedback and PL focused on curriculum makes some sense, given research suggesting that feedback and support grounded in tools teachers use every day for their instruction is likely more helpful than generic feedback and PL. The relationship between being a DIY teacher and more standards-aligned practices is less clear. As previously noted, we find that higher-income schools were more likely to have a higher concentration of DIY teachers, which suggests that the positive association between being a DIY teacher and standards-aligned practices might also be influenced by other resource advantages enjoyed by DIY teachers we could not capture. It might also be that DIY teachers report their students engaging in more standards-aligned practices simply because they believe their self-created curricula address those practices, whereas teachers who rely more on published curricula do not.

All of our data are based on survey self-reports from principals and teachers. These self-reports can illustrate educators' experiences, including what they find helpful and challenging about curriculum use and supports for that use, and how curriculum use and supports are connected to the classroom practices teachers indicate that their students undertake. There is likely some response bias associated with these items; teachers might feel pressured to report that their students are engaging in standards-aligned practices. In addition, teachers could be overestimating or underestimating the extent to which their students are engaging in a given practice depending on how they compare their students' standards-aligned classroom practices to that of their teaching peers. Furthermore, the survey items on student practices asked teachers to note what proportion of their students were engaged in a practice "at least once a week." If we asked about daily practices or practices that were less frequent than once per week, we might have captured additional information.

Although survey self-reports have limitations, our analyses did uncover significant relationships among evaluative feedback, PL focused on curriculum use, and the extent to which teachers reported student engagement in standards-aligned practice. These findings suggest that supports that help teachers use curricula may help them better engage all their students in classroom practices that help them master their state academic standards.

Implications

First, states, districts, and schools should consider how to provide clear signals regarding curriculum use through both evaluative feedback and PL opportunities. Given our findings that evaluative feedback and PL are both connected with teachers' curriculum use and standards-aligned practices, states and school systems might consider increasing both evaluative feedback and PL that encourage and support use of curriculum so that teachers can become as adept as possible at using those resources thoughtfully. Many research studies specifically suggest that teachers need ample support to use standards and standards-aligned curricula (Cohen and Ball, 1990; Coburn, Pearson, and Woulfin, 2011; Mayer, 1999; Spillane and Zeuli, 1999; Weiss et al., 2003), which are typically more rigorous than previous standards and curricula. Our findings might indicate no clear relationship between use of standards-aligned curricula and teachers' reports of student practices because states have been focused more on *adopting* standards-aligned curricula. Now that curricula have been adopted, the time is ripe to provide more supports for those curricula.

Our finding that DIY teachers report more standards-aligned classroom practices has less clear implications for education policy and practice. We need to know which aspects of creating one's own curriculum matter for students' engagement in standards-aligned practices. Teachers who reported more self-created materials might not have materials that they feel are aligned with standards and are therefore creating material that integrates more standards-aligned practices. DIY teachers—who are more common at the high school level—might be more expert in a particular subject area and feel more comfortable integrating standards with instruction. DIY teachers might simply *feel* that their self-created material does a better job of addressing standards than do teachers who use published curricula. We suggest more research to understand where and how being a DIY teacher matters for instruction before suggesting policies or approaches to support DIY teaching.

Second, states and districts should especially consider how to best support science teachers' use of curricula in the coming years. Our results indicate that science teachers are not getting as much school or PL support to use their curricula compared with ELA and math teachers. Science standards and standards-aligned curricula are newer than those for math and ELA. Our results indicate that science teachers' reports of student engagement in standards-aligned practices are particularly responsive to the frequency of curriculum-specific PL opportunities, suggesting that increasing the availability of PL might be especially useful for changing classroom practice among science teachers. As more standards-aligned science curricula are developed and adopted, states and districts should ensure that science teachers are receiving curriculum supports, particularly given the effort necessary for all teachers to understand and address new science standards thoughtfully.

Third, states and school systems should consider which types of PL are regarded by teachers as most helpful and why, particularly in terms of what helps teachers use multiple instructional materials thoughtfully and coherently. When teachers find PL helpful, they are more likely to report all or nearly all their students engaging in more standards-aligned practices. Most PL workshops involve asking teachers what they found most helpful, but states, school systems, and providers might not be capturing the variety of opportunities that are most helpful to teachers, including collaborative PL with other teachers through PL communities. By regularly investigating the kinds of PL that are most helpful to teachers, states and school systems could better provide the PL teachers need. Furthermore, results from the 2019 AIRS indicate that the modal teacher uses multiple comprehensive curricula in addition to digital and intervention materials that further supplement their instruction. Given that the different curricula that teachers are bringing together might not be well aligned, district and school leaders should consider what kinds of PL will help teachers coherently combine material.

Finally, teachers in high-poverty schools likely need much more support to implement standards-aligned curricula. Teachers in high-poverty schools are less likely to report engaging all their students in standards-aligned practices, despite receiving more evaluative feedback and PL on curriculum use than their counterparts in lower-poverty schools. ELA teachers in higher-poverty schools also report that they are using more standards-aligned curricula, as well as more digital materials and more intervention materials. Taken together, these data suggest that teachers in higher-poverty populations—and their school systems—are striving to support the diverse needs of their students through improved curriculum and supports for curriculum use, even more so than teachers in lower-poverty environments. However, what teachers are doing and getting from their schools does not appear to be enough.

ELA teachers, in particular, might need more-coherent curricula that are standards-aligned but designed to deliver targeted remediation and intervention when needed, so that teachers feel that they do not have to reinvent the wheel to support their students by seeking materials from a variety of sources. Developers of standards-aligned curricula could consider more consultation with teachers who serve diverse student populations and students who are performing below grade level on assessments to determine what additional supports could meet the needs of those teachers. In addition, states, school systems, and PL providers might need to think more deeply about the types of evaluative feedback and PL that will specifically support teachers of students in high-poverty settings. A one-size-fits-all approach across schools with varying levels of poverty and student needs is not the answer. As our nation and individual states raise the bar for student learning with more-rigorous academic standards, we need to build in more scaffolds and supports that can enable all students to reach that bar.

Our work also has multiple implications for further research. As mentioned earlier, this survey research cannot point us toward which curriculum uses and supports lead to student learning gains. By examining some of our measures alongside student achievement data and conducting more in-depth investigations of specific contexts, researchers could identify what combinations of supports within teachers' instructional systems lead to positive changes in student learning. On a related note, we have pointed out several limitations with our measure of classroom practice. By examining survey measures of teaching practice in relation to student learning data, as well as other kinds of outcomes (e.g., teachers' knowledge, observations of their teaching), researchers could identify the most useful and accurate ways of surveying teachers about standards-aligned practices. In addition, given that teachers seek such a wide variety of digital and intervention materials and often create their own materials, the field could benefit from more investigation of the quality of those materials and the extent to which they are aligned with state standards. As mentioned earlier, further research could also shed light on how DIY teaching is related to standards-aligned classroom practice. Finally, our research suggests the need to learn much more about the nature of the supports—including evaluative feedback and PL—that most help teachers use their curricula productively to meet the needs of their students and enable all students to master state standards, particularly in high-poverty schools.

Appendix: Supplemental Regression Tables

TABLE A.1

Associations Between Teacher-Reported Standards-Aligned Classroom Practices and Components of Coherent Instructional Systems (State Fixed Effects Models)

	Regression Model			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Evaluative feedback focused on curriculum	0.0265** (0.0101)	0.0266 (0.0136)	0.0305* (0.0145)	–0.00753 (0.0165)
Helpfulness of PL focused on curriculum use	0.0569*** (0.00944)	0.0513*** (0.0134)	0.0642*** (0.0128)	0.0559*** (0.0136)
Frequency of PL focused on curriculum use	0.0254* (0.0115)	0.0255 (0.0158)	0.0209 (0.0156)	0.0778*** (0.0182)
Uses standards-aligned curricula	–0.0219* (0.0212)	–0.0401 (0.0323)	–0.0260 (0.0269)	N/A
Number	2,941	1,634	1,307	845
R-squared	0.112	0.094	0.122	0.162
Teacher grade-level and subject-area assignment	x	x	x	x
School characteristics	x	x	x	x
Teacher characteristics	x	x	x	x
State fixed effect	x	x	x	x
Subject	ELA and math	ELA	Math	Science

NOTES: Evaluative feedback on curriculum, PL helpfulness, and PL frequency have been standardized so results in these rows reflect the expected association between a standard-deviation increase in each component and the percentage of standards-aligned practices in which teachers report students engaging. "X" notes that the model accounts for teachers' grade-level and subject-area assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE A.2

Associations Between Teacher-Reported Standards-Aligned Classroom Practices and Components of Coherent Instructional Systems Alongside Teacher Curriculum Use Profiles

	Model 1	Model 2	Model 3	Model 4
Evaluative feedback focused on curriculum	0.0323** (0.0101)	0.0340* (0.0136)	0.0336* (0.0145)	–0.0111 (0.0167)
Helpfulness of PL focused on curriculum use	0.0575*** (0.00935)	0.0544*** (0.0133)	0.0630*** (0.0125)	0.0553*** (0.0138)
Frequency of PL focused on curriculum use	0.0251* (0.0113)	0.0272 (0.0156)	0.0191 (0.0151)	0.0736*** (0.0185)
Modifier	0.000490 (0.0252)	0.0405 (0.0397)	–0.00780 (0.0314)	–0.0204 (0.0488)
DIY	0.106*** (0.0275)	0.136*** (0.0380)	0.0754 (0.0398)	–0.00258 (0.0457)
Cobbler	0.0328 (0.0219)	0.0150 (0.0309)	0.0812** (0.0301)	0.00210 (0.0382)
N	2,945	1,636	1,309	845
R-squared	0.122	0.106	0.135	0.149
Teacher grade-level and subject-area assignment	x	x	x	x
School characteristics	x	x	x	x
Teacher characteristics	x	x	x	x
Subject	ELA and math	ELA	Math	Science

NOTES: Evaluative feedback on curriculum, PL helpfulness, and PL frequency have been standardized so results in these rows reflect the expected association between a standard-deviation increase in each component and the percentage of standards-aligned practices in which teachers report students engaging. "X" notes that the model accounts for teachers' grade-level and subject-area assignment, demographic characteristics of a teacher's school, and a set of teachers' personal characteristics, including total years of teaching experience and race/ethnicity. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Notes

[1] State oversamples were funded by the Bill & Melinda Gates Foundation to track their investments in these states.

[2] For thresholds on a given criterion (e.g., using self-created materials for at least 50 percent of instructional time), alternative thresholds (e.g., 25 percent of instructional time) were tested, leading to qualitatively similar results for our univariate, subgroup, and relational analyses.

[3] The ATP and ASLP are nationally representative samples, but their samples are drawn independently from one another. Figures 2 and 3 provide nationally representative estimates of standards alignment of the curricula used or required or recommended by teachers and schools, respectively; the principals responding to the ASLP are highly unlikely to be serving in the same schools as the teachers responding to the ATP.

[4] In our survey, we defined *digital materials* as instructional materials that are available online for students and teachers but that do not constitute a full course of study. We exclude comprehensive curricula that are available in an online form.

[5] *Intervention materials* are meant to accelerate the achievement of students who are below grade level. They may be used as part of a multitiered system of support or as a response to an intervention framework.

[6] For more-detailed analyses of the use of digital materials, see Tosh et al. (2020).

[7] This item was omitted because of a drop in scale reliability with its inclusion when it was reverse scored. In addition, we removed it from the scale because we also asked teachers if their principal encourages them "to use existing curricula as the basis for my lesson," which is also intended to capture whether principals encourage use of existing curricula versus planning lessons from scratch.

[8] We also explored subgroup comparisons between schools enrolling different percentages of Black and Hispanic students. Broadly, these patterns were similar to, albeit less pronounced than, those presented when grouping schools by the percentage of students eligible for FRPL. For parsimony, we focus on presenting subgroup comparisons by state and the percentage of FRPL students in the report.

[9] Standardization involved setting the average score across all teachers in the sample as equal to zero and a one-unit increase to correspond to a one-standard-deviation increase on that measure.

[10] For the set of ELA and math practices, we chose to use a subset of the available practices to construct the summative measure of classroom practices. For ELA, we excluded practices that we reasoned would have a low chance of happening once per week or more (e.g., some writing tasks), as well as some practice items that will not be included in subsequent AIRS surveys (to keep the scales constant across the years of our survey analysis). For math, we excluded "use repeated practice" because that item is not part of the Standards of Mathematical Practice from which the other items are drawn.

[11] We tested the robustness of our decision to consider only the practices that teachers reported that "all or nearly all of my students" engaged in a version of the classroom practices measure that included information across all scale points of the original classroom practices scale. Univariate and relational results using this alternative measure were substantively similar to those that we present in this report.

[12] The subject-specific models are not analogous between ELA/math and science teachers because we cannot include an indicator for standards-aligned material use for science teachers. We find that estimating variations of the models in Table 7 that incorporate state fixed effects to account for unobserved state-level differences in the sample also yield coefficients with the same sign and significance as those presented in Table 7, albeit with slightly attenuated coefficients (see Appendix Table A.1).

[13] Although we do not include controls for the use of a standards-aligned curriculum for our models examining the relationship between classroom practices and use profiles (and vice versa), results for Table 7, Figure 16, and Appendix Table A.2 are robust to include both standards-aligned material use and use profiles as regressors.

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About This Report

If a *curriculum*—a set of instructional materials that is intended to be a full, comprehensive course of study for a particular subject and grade level—is well-aligned with state standards for kindergarten through 12th grade (K–12) subjects, it can help teachers deliver instruction that helps students master those standards. However, most research suggests that curricula, in themselves, are not likely to change teachers' instruction because teachers use curricula in a variety of ways. Teachers likely need considerable supports to use curricula in ways that best support student learning.

In this report, we present new results on teachers' curriculum use and factors that may support that use from the RAND American Instructional Resources Survey (AIRS), which was fielded to a national sample of teachers and school leaders in spring 2019. AIRS specifically focused on the curricula and other instructional materials used by K–12 teachers in English language arts, math, and science, along with the supports that are provided to teachers to support their curriculum use. Based on our findings, each curriculum likely needs to be accompanied by thoughtful, aligned accountability mechanisms and professional learning supports within schools in order for that curriculum to support improvements to teaching and learning. One major implication of these findings is that states and school systems should consider increasing curriculum-focused supports for teachers.

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More information about RAND can be found at www.rand.org. Questions about this report should be directed to jkaufman@rand.org and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.

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