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Bringing the Common Core State Standards to Life Through Site-Located Teacher Learning Structures

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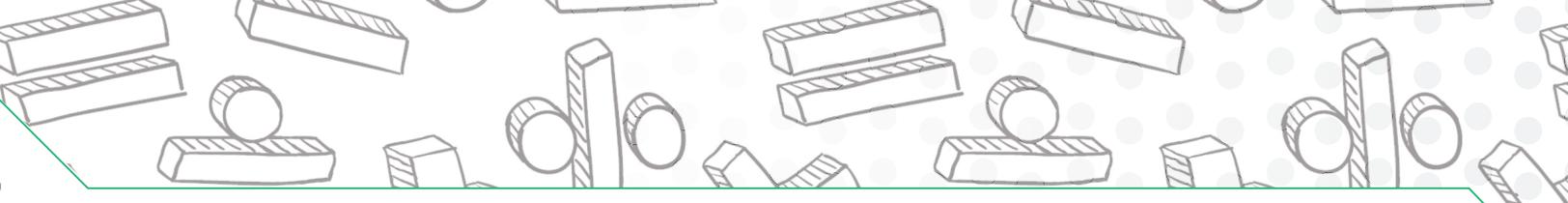
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WestEd's Evaluation of the Math in Common Initiative

Math in Common® is a five-year initiative, funded by the S.D. Bechtel, Jr. Foundation, that supports a formal network of 10 California school districts as they are implementing the Common Core State Standards in Mathematics (CCSS-M) across grades K–8. Math in Common grants have been awarded to the school districts of Dinuba, Elk Grove, Garden Grove, Long Beach, Oakland, Oceanside, Sacramento City, San Francisco, Sanger, and Santa Ana.

WestEd is providing developmental evaluation services over the course of the initiative. The evaluation plan is designed principally to provide relevant and timely information to help each of the Math in Common districts meet their implementation objectives. The overall evaluation centers around four central themes, which attempt to capture the major areas of work and focus in the districts as well as the primary indicators of change and growth. These themes are:

- » Shifts in teachers' instructional approaches related to the CCSS-M in grades K–8.
- » Changes in students' proficiency in mathematics, measured against the CCSS-M.
- » Change management processes at the school district level, including district leadership, organizational design, and management systems that specifically support and/or maintain investments in CCSS-M implementation.
- » The development and sustainability of the Math in Common Community of Practice.

Together, the Math in Common districts are part of a community of practice in which they share their progress and successes, as well as their challenges and lessons learned about supports needed for CCSS-M implementation. Learning for district representatives is supported by WestEd team members who provide technical assistance related to goal-setting and gathering evidence of implementation progress (e.g., by advising on data collection instruments, conducting independent data analyses, participating in team meetings to support leadership reflection). An additional organizational partner, California Education Partners, works with the community of practice by offering time, tools, and expertise for education leaders to work together to advance student success in mathematics. California Education Partners organizes Leadership Convenings three times per year, summer Principal Institutes, "opt-in" conferences on high-interest topics (e.g., formative assessment), and cross-district visitation opportunities.

Executive Summary

While all California school districts have invested deliberately in teacher professional learning opportunities with a common goal of improving Common Core State Standards in Mathematics (CCSS-M) implementation, evidence from WestEd's work with the 10 Math in Common (MiC) school districts shows that districts' structures and strategies for implementing professional learning vary widely. Our data (gathered from interviews, grant reports, and other project documentation) point to some interesting and telling trends across the districts in relation to providing teachers with professional learning opportunities. First, we found that a majority of districts are making a shift toward the school site as the locus for teacher professional learning. Second, our data suggest a common shift toward professional learning that is more lesson-focused for teachers.

These shifts across the MiC community toward site-located, lesson-focused professional development likely signal districts' learnings about what it takes to support teachers' understanding and implementation of the CCSS-M in the classroom. This report explores these shifts further through four case studies that detail the approaches that several districts are taking to locate teacher learning at the site, and to tie learning to the specifics of developing lessons for classroom instruction.

Key learnings

These case studies, and the interviews that we held with the six additional MiC districts, highlight several key learnings.

1. Districts are using a balance of centralized and site-located professional development (PD), and weighing the pros and cons of these structures in light of ongoing challenges.

- » Districts encounter a common set of challenges to their PD programs, whether that PD is offered centrally or at individual sites. These include:
 - Funding and substitute constraints.
 - Learning opportunities that are too broadly focused or superficial to enable teachers'

understanding and clear articulation of the districts' instructional vision and goals.

- Overreliance on a small group of district leaders to carry the load for facilitating professional development.
 - Limitations of a train-the-trainers learning model to address learning at scale.
 - Balancing site autonomy, and teachers' choice of meaningful topics for collaborative discussion, with the district's responsibility to provide guidance, structure, and appropriate focus.
- » Several Math in Common districts are still early in their shift toward site-located learning, so it is not yet consistently available for every teacher across these districts. However, several districts are looking ahead to provide additional training of site leaders (i.e., principals and teacher leaders) to support the continued development of site-located learning.
- 2. Not surprisingly, district priorities and goals for teacher professional learning are changing as the districts learn from implementation.**
- » After first working to help teachers understand the new CCSS-M, many districts are now combining information about *strategies for teaching* the CCSS-M with information about *what is*



being taught; most districts are emphasizing teachers' learning about strategies that support students' conceptual understanding and application of the Standards for Mathematical Practice (SMPs).

- » Several districts began with less-defined teacher learning goals related to CCSS-M implementation and have shifted to smaller, specific, and measurable goals for teacher learning that are aligned with the district vision, around topics such as developing teachers' number sense and their knowledge of how to support student discourse.

3. Districts are rising to the logistical and structural challenges of creating more site-based learning opportunities.

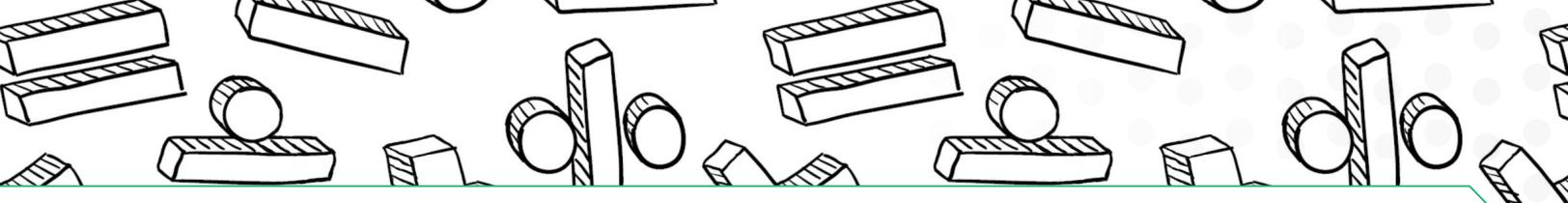
- » A comparison of the various lesson-focused efforts across districts shows that lesson-based PD programs are often carrying a heavy load because they are aiming to improve or support too many aspects of instruction at the same time. This breadth may diffuse the focus of the learning and may overwhelm teachers as they are still getting used to the worthy work of lesson-focused collaborative learning. Lesson-focused PD is likely to be most successful and transformative when practitioners concentrate on only one or two targeted elements of instruction at once, especially as practitioners are first getting used to what is likely to be a novel format of collaborative learning.
- » Several districts have begun building a lesson-based culture of learning by starting small at motivated sites or with small groups of teachers, and by using word-of-mouth to build interest and momentum across the district. Conversely, one district pushed a site-based learning structure out broadly across the district at once, and found that it did not take root in the desired way.
- » Across sites, different staff (e.g., site leaders, coaches, teachers on special assignment [TOSAs]) serve as leaders and facilitators of site-located learning opportunities. Most such opportunities

are still facilitated by district instructional coaches, with an intention to transition the facilitation role. Involving principals as collaborative learning partners with teachers can have a range of positive effects: principals understand the instructional shifts that need to happen in their schools; they know the real challenges to making these shifts; they see how collaborative learning can benefit and invigorate teachers; and they understand that it takes creativity and effort to carve out time for this type of learning to be generative. Indeed, there is an open question as to how much can be accomplished if principals are not simultaneously being brought on board to support collaborative learning at their sites.

- » Several of the lesson-focused learning events being implemented are one day or one-and-a-half days long. Sites that are getting the most out of their lesson-focused professional learning have built in additional time for teachers to engage in more consistent collaboration and follow-up throughout the year.
- » Districts have found a range of creative solutions for supporting teachers' collaborative time, including using student teachers or roving substitutes, sending students to art or gym for an afternoon, monthly Saturday planning time, and giving sites funding for substitute days.

Top 10 considerations for designing and implementing site-located, lesson-focused teacher professional learning in the Common Core era

Because of the rich variation in and across the case-study districts, as well as throughout the MiC districts, we have identified numerous implications for action on this topic, which we have condensed into our



top 10 recommendations for action, organized into three action areas.

A. Design the professional development experience for teachers carefully

- 1. Consider existing research.** When it comes to lesson-based professional learning, there is a lot of information available, but not all resources are created equal. When planning and developing lesson-based learning structures, districts may want to check in with a partner organization or with another district before implementing the professional learning, in order to share and get feedback on plans.
- 2. Understand what teachers want to learn about.** Site-located collaborative learning is typically most relevant and meaningful when teachers work together on a common problem or question of practice that they find challenging and worthy of joint work. District leaders may want to gather data that identifies specific classroom dilemmas that teachers are facing, and use site-located learning structures to explore these dilemmas in depth.
- 3. Establish clarity of purpose.** Without clear direction and specific learning goals, a structure of collaboration on lesson-focused learning will not, by itself, support the desired learning outcomes for teachers.
- 4. Choose a few high-leverage focus topics at once.** It will be hard for districts to convey all of the CCSS-M knowledge that teachers might need at once, so districts may benefit from taking a longer-term view of teacher learning, for example, by choosing a high leverage focus area per year and adding more new focus areas over time.
- 5. Carefully consider time allocation for each activity in the inquiry cycle.** While it is natural to want to devote the majority of time within the cycle of collaborative inquiry to planning the lessons, real growth occurs when teachers also have

adequate time and structure for deep discussion and reflection on classroom practice.

B. Anticipate and plan for logistical details, challenges, and solutions

- 6. Establish norms, then diversify the group membership to extend learning.** Involve individuals with diverse expertise to support group collaboration and understanding of the mathematics content and pedagogy, but also build in supports and structures for establishing trust and continuing the work across multiple years. District leaders should be especially careful in transitioning the facilitation role from a district coach to a site-based employee, given the established difficulties of a train-the-trainers model of conveying information.
- 7. Find the time.** One-day professional development events, whether held centrally or at sites, are insufficient to support ongoing learning and instructional change. District leaders may want to work with individual site leaders to (a) reconsider their master schedules to identify additional or ongoing collaborative teacher learning opportunities and/or (b) consider how the lesson-focused work could be continued and extended within existing site- or district-based professional learning communities (PLCs).

C. Capture and study the learning and site variation

- 8. Understand and discuss variation across sites in how they are using and learning from lesson-focused professional development.** Districts will need to develop standardized protocols and tools to track the content of site-located collaborative learning opportunities and to track specific teachers' areas of growth and change *relative to district learning goals* across school- and grade-level PLCs.
- 9. Consider new approaches to capturing teacher learning.** Attendance data and teacher surveys may provide insufficient information on how learning events impact teachers' thinking,



classroom practice, or subsequent student achievement, so districts will need to consider the proper mechanisms for capturing, sharing, and spreading learning about classroom instruction and the rationales for instructional decisions, for example, through reports or public lessons.

- 10. Use data from small-scale pilots to inform changes in district learning structures.** Starting smaller (fewer PLCs, fewer topics, fewer guiding resources, etc.) may be beneficial, particularly for districts with a lot of site or teacher variability.

Site-located, lesson-focused professional learning opportunities are being used more frequently across the MiC districts and many other school districts as

well. These approaches to professional learning can help mathematics teachers to make important links among several areas of their classroom practice: the mathematical content that they are responsible for teaching their students, their students' current abilities, and the instructional approaches that they put into place. However, as this report illustrates, districts will need to carefully consider the trade-offs and impacts for sustaining teachers' ongoing learning through these lesson-focused structures. We hope that districts within and outside of the Math in Common initiative can take useful information from this list of 10 recommendations for action as they continue to consider how best to support teacher professional learning in the coming school years.



Background: The Current State of Teacher Professional Learning

Implementing the Common Core State Standards (CCSS) has required concerted effort at the state and local levels, particularly for teachers responsible for interpreting the standards and helping their students master them. To help teachers develop and deliver effective standards-based lessons, schools and districts have been offering a variety of targeted professional development (PD) options. However, with so many different potential approaches to professional learning, the question now is, as a recent *Education Week* article phrased it: "Are teachers getting the right kind of Common Core PD?" (Sawchuk, 2016). Drawing from the results of a RAND Corporation survey study (Hamilton et al., 2016), the article's answer was "yes and no":

Teachers do seem to be getting a lot of professional development aligned to the Common Core in both English language arts and math. The problem is that it's not always focused on the topics that they say they need the most help on. Instead, teachers seem to be saying: "OK, we totally get that there are these new standards. We even kinda [sic] know what they want us to do differently. But we still need help digging into the pedagogy on some of the finer points." (Sawchuk, 2016)

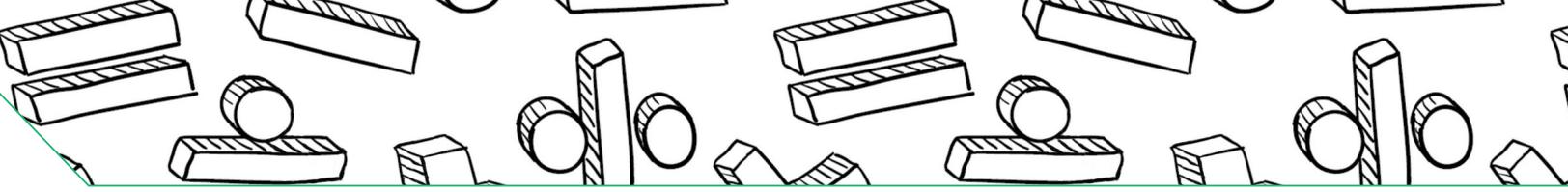
The article reports on the RAND Corporation's findings about the mismatch between the learning provided for teachers and the learning opportunities that teachers indicated they needed. For example, teachers reported that the content of the state standards was a heavy focus of professional development, and that they received more PD "on using assessment data to inform teaching than they really needed, and more on instructional strategies than they really needed." On the other hand, teachers reported receiving inadequate PD on helping students construct viable mathematical arguments, critique the work of others, and make connections among key topics and grade levels — which are major shifts required by the CCSS. These data on the mismatch between learning provided for teachers and what they report that they need are consistent with findings from our own baseline survey of teachers in 10 California

districts participating in the Math in Common initiative (Perry et al., 2015).

To offer a clearer sense of the types of professional learning that districts are offering to teachers to support their sense-making and implementation of the CCSS, this report describes various PD approaches taken by the Math in Common (MiC) districts. Specifically, the report focuses on four MiC districts that are implementing lesson-focused PD at the school-site level. But first, we begin with some brief contextual information from the research literature on effective professional learning for teachers.

Characteristics of effective teacher professional learning

In addition to the question "Are teachers getting the right kind of PD?" one could ask, "Are teachers getting enough PD?" The ultimate goal in providing teacher professional learning opportunities is to positively impact student learning. In a summary review of the effectiveness of mathematics professional development, only two approaches out of 643 showed statistically significant positive effects on student math proficiency, while a third approach showed limited positive effects on student math proficiency (Gersten, Taylor, Keys,



Rolfhus, & Newman-Gonchar, 2014). Each of these successful programs was different in nature: one consisted of intensive math content courses accompanied by follow-up workshops (Sample McMeeking, Orsi, & Cobb, 2012); one involved lesson study with content toolkit materials (Perry & Lewis, 2011); and one offered summer institutes focused on student thinking (Carpenter, Fennema, Peterson, Chiang, & Loef, 1989). However, a feature that all three successful programs shared was an "intensive" time commitment for the professional learning activities, with teachers spending from two to four weeks together, or meeting regularly over a period of months.

Data on the effectiveness of teacher professional development offerings are timely for California school districts, given the passage of State Assembly Bill 104 (2015), which gives "educator effectiveness" funding to county offices of education, school districts, and charter schools. Specifically, the funding is designated to

Provide beginning teacher and administrator support and mentoring, professional development, coaching and support services for teachers identified as needing improvement or additional support, professional development for teachers and administrators aligned to the state standards, and to promote educator quality and effectiveness. (AB-104, 2015)

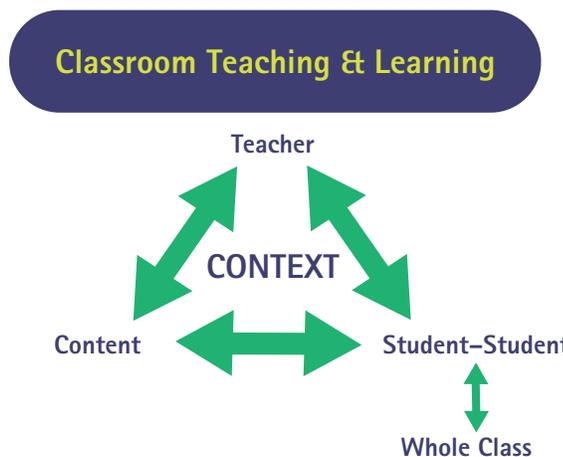
These Educator Effectiveness (2015) grants total \$490 million and, for fiscal year 2015/16, school districts will receive approximately \$1,466 per full-time teacher. Many districts in the state have not yet determined how they will spend the new funds, and are weighing the available information about best practices in professional development. For example, there is consensus in the research and practice communities about several guiding design principles for effective teacher professional learning, and these are, or should be, central considerations as districts make their decisions (Blank, de las Alas, & Smith, 2008; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001; Guskey & Yoon, 2009).

According to these design principles, teacher professional learning should:

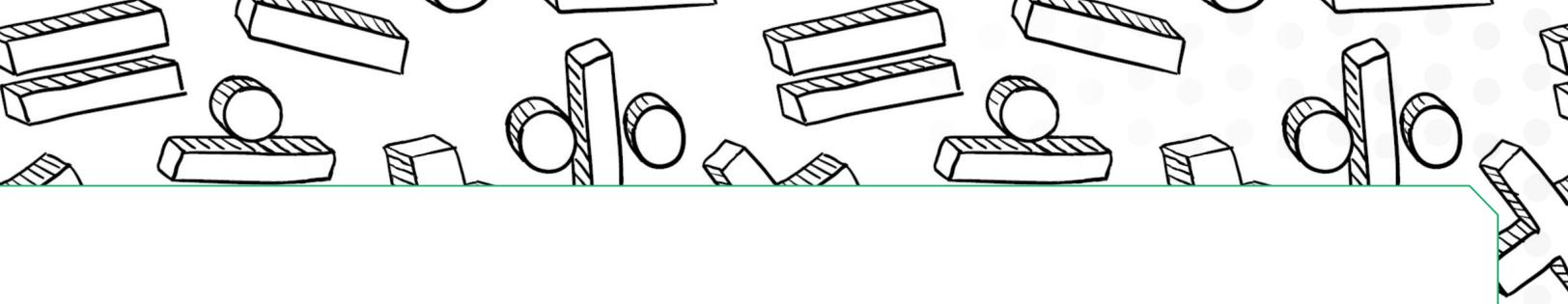
- » Be intensive, ongoing, and connected to practice.
- » Focus on student learning and address the teaching of specific content.
- » Incorporate opportunities for teachers' active learning.
- » Align with school improvement priorities and goals and with teachers' other learning opportunities.
- » Build strong working relationships among teachers via collective participation of teachers from the same school, grade level, and/or subject area.

Some of these principles seem intuitive, such as the last bullet about collective participation: PD conducted in isolation – from the classroom, from a community of peers, from teachers' own goals, and/or from other work being pursued at sites – does not work. These principles still leave much room for interpretation; professional learning experiences that utilize the principles can still miss the mark if the PD takes a fragmented approach to helping teachers improve their classroom instruction.

Figure 1. Instructional Triangle



Source: Adapted from Cohen, Raudenbush, & Ball (2003).



The instructional triangle shown in Figure 1 (Cohen, Raudenbush, & Ball, 2003) is a commonly used frame showing the elements of the classroom that must work in concert to enable successful teaching and learning. However, some PD experiences continue to focus on separate pieces of the instructional triangle – the students, the teacher, or the content – in *isolation* from one another, rather than emphasizing the *relationships* among these classroom elements.

Another concern about professional learning is that it can be so far removed from practice that it is difficult for teachers to connect what they learn with how they can apply it in practice (Garet et al., 2011; Sztajn, Marrongelle, Smith, & Melton, 2012). Powerful learning opportunities for teachers enable them to draw meaningful connections among the three elements of instruction shown in Figure 1 (Murata, Bofferding, Pothén, Taylor, & Wischnia, 2012); California district leaders will likely want to offer that kind of cohesive approach to professional learning in order to best support their teachers in implementing the Common Core State Standards for Mathematics (CCSS–M).





Learning from the Math in Common Districts' Approaches to Professional Learning

The 10 California school districts participating in the Math in Common initiative are taking a variety of approaches to providing professional learning to their teachers, to help these teachers implement the Common Core State Standards in Mathematics (CCSS-M). While the Math in Common Community of Practice is only a small subset of all the California school districts, these 10 districts can help us understand some of the considerations and challenges related to teacher professional development that districts around the state, and country, currently face.

To learn about the specifics of professional development in the Math in Common network, we conducted a broad-scale data collection effort across the 10 districts, interviewing district leaders and site principals, as well as reviewing grant reports and internal documents shared by the districts. As we reviewed the Math in Common districts' teacher professional learning programs to support CCSS-M implementation, we were struck not only by the number of different activities that the districts are engaged in, but also by the diverse content of these efforts. While all Math in Common districts have invested deliberately and frequently in supports for teachers, with a common goal of improving CCSS-M implementation, their structures and strategies for accomplishing this goal vary widely.

Shift toward professional learning located at the school site

Our data point to an interesting and telling trend across the districts, related to the supports provided for teachers' professional learning: a majority of districts are making a shift toward the school site as the locus for professional learning for teachers. Because the Math in Common districts have such diverse local contexts, we found significant variation in the reasons for this shift toward offering PD at the school site and for the ways that teacher learning is structured. We found that several districts were asked by their local

collective-bargaining units to pull teachers out of school less frequently for professional development, and, accordingly, these districts devised site-based learning to enable participants to remain at their school sites.

Perhaps a sign of the shared development within the Math in Common Community of Practice, we also saw evidence of districts moving toward the use of site-located professional learning communities (PLCs). District leaders hope that implementing PLCs will support the development of site-level leadership and problem-solving capacity and build organizational and individual learning that will outlast the Math in Common grant. Some districts had unsuccessfully tried a "train-the-trainers" approach in which they trained one or two point people at each school site, with the intention that these people would then serve as trainers and leaders at their respective sites; these districts are now creating more direct connections between district-office staff and school-site staff through site-located training opportunities. Other districts' moves to professional learning located at the school site seemed to be motivated by expedience or to be a response to other adverse circumstances in the district.

Shift toward lesson-focused professional learning

In addition, our data suggested a common shift toward toward professional learning that is more



lesson-focused for teachers. One benefit of such curriculum-focused work is that it ties teachers' learning to the content of classroom instruction — the specific units, lessons, and tasks that might be used with students — and the ways in which that content relates to instruction and student learning. Lesson-focused PD is exactly the kind of integrated learning that some researchers argue will be critical for successful implementation of the Common Core State Standards (e.g., Lewis, 2010; Sztajn et al., 2012).

Not surprisingly, we found variation in the structures that districts were using to support lesson-focused teacher learning. For example, six of the Math in Common districts reported using some form of *lesson study* (see sidebar: A Brief Primer on Lesson Study), though there were differences in the underlying purposes for its use, how districts defined what lesson-study groups do, how much time the groups spend together, how time is allocated, and who provides group facilitation. Other districts employ different structures altogether for lesson-focused teacher learning.

A Brief Primer on Lesson Study

More than half of the Math in Common districts are pursuing *lesson study* as a collaborative professional development process. Some districts use what they refer to as a more "formal" lesson-study process, while others have made conscious adaptations of particular features of lesson study, while continuing to call it lesson study or, in one case, "lesson study lite." This sidebar provides a brief introduction to lesson study. Additional details are provided in the case studies.

What is lesson study?

Lesson study is a professional learning approach that originated in Japan. In lesson study, teachers engage in cycles of inquiry in which they collaboratively plan, observe, and discuss classroom "research lessons" in order to improve their shared understanding of teaching, learning, students, and subject matter (see Figure 2). In the early phases of the lesson-study cycle, teachers study academic content — often consulting a range of instructional resources — and jointly plan a research lesson. The participants ultimately observe this lesson being

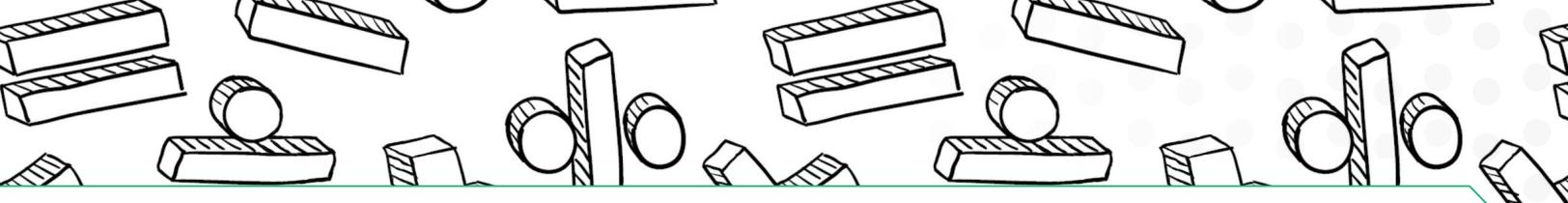
taught to a class of students to see how it plays out in live classroom instruction; during the research lesson, one member of the lesson study group teaches the lesson and other group members gather data related to the group's goals and questions about instruction. The post-lesson discussion enables participants to discuss how well the lesson achieved the instructional goals, and to draw further implications for subsequent instruction.

Lesson study features many of the elements of high-quality professional development that are positively associated with impact on teachers' knowledge, skills, and practice (Blank et al., 2008; Desimone, 2009; Garet et al., 2001; Guskey & Yoon, 2009). Teachers conduct cycles of inquiry together — making it an active, collective, ongoing form of learning. Interactions with colleagues, students, and the content during lesson study provide opportunities for teachers to build more *coherent* knowledge over the course of their work together. Additionally, since the team's ideas will be made public in the research lesson creates an authentic

Figure 2. The Lesson-Study Cycle



Source: Lewis & Hurd (2011).



need to understand content and reconcile understandings (Alston, Pedrick, Morris, & Basu, 2011; Lewis, Perry, & Hurd, 2009; Tepylo & Moss, 2011).

Lesson study can take many different forms, depending on where it is practiced (e.g., across a district, as a schoolwide collaborative effort, within a single grade level or a small group of teacher; Lewis & Takahashi, 2013), but in the United States it has most frequently been used by small groups of teachers within a school site or district. Educators in California have been implementing lesson study since 1999 (Lewis, Perry, Hurd, & O'Connell, 2006; Perry & Lewis, 2009, 2010; Perry, Lewis, & Akiba, 2002).

How effective is lesson study?

As with any innovation, depending on the particular adaptation and how it is implemented, lesson study can have varying degrees of positive impact (Perry & Lewis, 2009; Takahashi, 2006, 2014). However, instances of lesson study practiced with small groups of educators are thought to be most powerful when they include several "non-negotiable" features, including a shared long-term goal, important lesson content (e.g., a central question about mathematics), careful study of the mathematical content from multiple high-quality resources, careful study of student thinking and work, live lesson observation, commentary on the math content of the lesson by a knowledgeable other, and built-in time for reflection on the learning (Perry & Lewis, 2009; Takahashi, 2014). Other features of mathematics instruction that are frequently seen in Japan — such as carefully selected tasks, teacher questioning, extensive discussion of student solutions, careful use of a board plan (i.e., a part of the lesson plan that indicates how the whiteboard will strategically display student thinking), and the use of student mathematics journals to summarize learning — have also been found to provide valuable support for positive lesson study experiences and impact (Takahashi, 2006; Takahashi, Lewis, & Perry, 2013); U.S. educators agree that these features support student mathematical discourse (Stein & Smith, 2011).

Researchers have documented that lesson study has great potential to effect change. Lesson study was recently found to be one of two professional learning programs,

out of 643 that were reviewed by the U.S. Department of Education's Institute for Education Sciences What Works Clearinghouse, that were found to show successful impact on student achievement (Gersten et al., 2014). Additionally, researchers have documented how the activities of lesson study can lead to changes in teachers' knowledge of content (Lewis & Perry, 2016), instruction, and student thinking (Hart & Carriere, 2011; Nickerson, Fredenberg, & Kinsella Druken, 2014), as well as in professional norms (Ermeling & Graff-Ermeling, 2014) and teachers' beliefs and sense of efficacy (Lewis & Perry, 2015).

Additional resources about lesson study

Lesson study has been used successfully in the United States, and significant resources are available, including literature and tools to support the further growth and development of this form of teacher professional learning.

WEBSITES

For more information, interested readers may want to visit the website of the Lesson Study Group at Mills College (<http://www.lessonresearch.net/>) or the Chicago Lesson Study Group (<http://www.lessonstudygroup.net/index.php>). The Mills website also features video illustrating lesson study in Japan and in the United States.

BOOKS AND ARTICLES

Those who are new to lesson study and who are interested in understanding whether lesson study might be a useful form of professional learning for their school or district may also want to review the following books or articles:

- Lewis, C., Perry, R., & Hurd, J. (2004). A deeper look at lesson study. *Educational Leadership*, 18–22. February 2004.
- Takahashi, A., & Yoshida, M. (2004, February). Ideas for establishing lesson-study communities. *Teaching Children Mathematics*, 10(9), 436–443.
- Stigler, J., & Hiebert, J. (1999). *The teaching gap*. New York, NY: The Free Press. (See chapter 7.)
- Lewis, C., & Hurd, J. (2011). *Lesson study: Step by step: How teacher learning communities improve instruction*. Portsmouth, NH: Heinemann.



Case studies: Site-located, lesson-focused professional learning in four Math in Common districts

We think that the shifts across the Math in Common community toward school site-located, lesson-focused professional development signal districts' evolving understandings about what it takes to effectively support teachers' understanding and implementation of the CCSS-M in the classroom. This report explores these shifts in professional learning further by detailing the approaches that several districts are taking to locate teacher learning at school sites, and to use a lesson-focused approach to tie learning to the specifics of classroom instruction.

We chose four case-study districts to illustrate different approaches and particular professional learning structures that might be of interest to others as they consider their own professional development plans for the coming years. By selecting these cases, we do not mean to imply that what is happening in professional learning in the other Math in Common districts is not representative or educative. Additionally, the case studies do not cover the entire history of each respective district's professional-development response to the CCSS-M, nor do they cover the full breadth of what the district is currently doing to support teacher learning. This report focuses specifically on school site-located, lesson-focused teacher professional learning in four California school districts during the 2015/16 school year in order for us to share learning from these examples.

Overview of the case studies

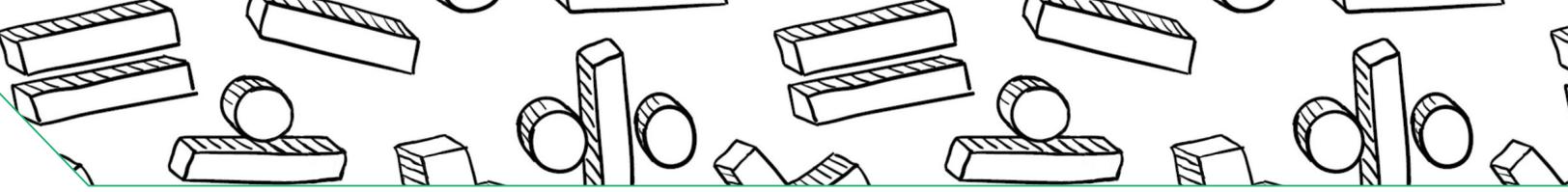
Table 1 provides a brief overview of the four case studies, summarizing features of the learning opportunities and different approaches to site-located, lesson-focused teacher professional development across the four districts. While readers will want to review the individual case studies for more specific information, the following list summarizes some of the key features of professional learning structures:

- » The districts have both similar and unique goals for adopting site-based, lesson-focused approaches to professional learning. Each of these approaches draws on the idea of collaborative work among teachers, but the districts take somewhat different approaches to organizing effective teacher collaboration.
- » One similar goal across the districts is using lesson-focused professional learning to increase teachers' familiarity with CCSS-M content (e.g., content and curricular materials in the California Mathematics Framework) and to develop teachers' understanding of curricular materials, the Standards for Mathematical Practice, rich mathematics tasks, and the cognitive demand of mathematics tasks.
- » Districts' unique goals include one district's emphasis on deepening site administrators' understanding of CCSS-M implementation.
- » Three of the four of the districts are using lesson- and site-based structures very broadly across the district; the fourth district has more limited participation.
- » Group facilitation is most frequently provided by a district math coach (i.e., a teacher on special assignment), with the intent of transferring facilitation at a later point to a school-site leader (i.e., a school principal or teacher leader). Site principals are regularly involved in the collaborative work groups in only one of the four districts.
- » The amount of time, or "dosage," dedicated to professional development through these site-located learning opportunities is relatively limited, generally occurring over one or two days during the school year. In one district, the coach-supported learning may happen more than once in the school year if school sites request this.
- » Three of the districts adapted their primary ideas from a shared source to develop their professional learning structures, and used supplemental ideas from additional relevant sources. The fourth district is drawing on other source material to develop its professional learning structures.

Table 1. Site-Located, Lesson-Focused Approaches to Teacher Professional Development in Four Math in Common Districts, 2015/16

FEATURES OF THE APPROACH	DISTRICT A: PRINCIPALS AND TEACHERS LEARNING TOGETHER THROUGH LESSON STUDY	DISTRICT B: "EMBEDDED-DAY" CYCLES OF INQUIRY FOR FORMATIVE ASSESSMENT	DISTRICT C: SCALING BACK LESSON STUDY TO STRENGTHEN PROFESSIONAL LEARNING COMMUNITIES	DISTRICT D: DESIGNING OPTIONS FOR LESSON-FOCUSED PROFESSIONAL LEARNING
Goals for site-located professional learning	<ul style="list-style-type: none"> • Deepen site administrators' understanding of effective math teaching practices • Support job-embedded, student-centered learning in a classroom context 	<ul style="list-style-type: none"> • Foster multiple aspects of CCSS-M implementation • Learn how CCSS-M implementation relates to the district vision for math instruction 	<ul style="list-style-type: none"> • Demonstrate structure for PLCs • Support teachers' understanding of the California Mathematics Framework as the primary driver for CCSS-M implementation, rather than district-adopted textbook 	<ul style="list-style-type: none"> • Shift ownership of work from teacher leaders to individual teachers • Increase familiarity with district's curriculum and teaching toolkit • Help teachers collaboratively pose questions about practice, plan instruction, observe and deprivatize classrooms, and make commitments to one another • Build independent learning capacity at sites
Main content	<ul style="list-style-type: none"> • Focal lesson selected from district-adopted curriculum, with additional selection of curriculum tasks and a Standard for Mathematical Practice. Team also considers task's cognitive demand and High-Leverage Team Actions. 	<ul style="list-style-type: none"> • Standards for Mathematical Practice, formative assessment, cognitive rigor, teacher questioning, rich tasks 	<ul style="list-style-type: none"> • California Mathematics Framework, district-adopted curriculum, Standards for Mathematical Practice, student discourse, student engagement 	<ul style="list-style-type: none"> • District's task-driven core curriculum and math teaching toolkit (with three signature strategies, multiple suggested classroom structures, and other classroom tools)
Scale of 2015/16 effort	<ul style="list-style-type: none"> • Schools participating: 43 out of 54 K-5/ K-8 schools • Teachers participating: Approximately 300 of 1,200 elementary teachers 	<ul style="list-style-type: none"> • Schools participating: All schools • Teachers participating: All middle school teachers; approximately 430 elementary teachers 	<ul style="list-style-type: none"> • Schools: 50 events scheduled across 40 elementary schools and 9 middle schools • Teachers: 450 out of 1,500 K-8 teachers 	<ul style="list-style-type: none"> • Lesson study participation: 24 schools, 170 teachers • Unit study participation: Estimate of ~28 elementary schools, ~700 teachers^a • Lab classrooms: ~8 elementary schools and ~200 teachers
How is collaboration supported?	<ul style="list-style-type: none"> • Student teachers cover classrooms during the collaborative observations 	<ul style="list-style-type: none"> • Payment for substitutes. At elementary level, teachers in two grade levels work in two-hour blocks, and "roving" substitutes provide coverage throughout the day. 	<ul style="list-style-type: none"> • Grant-supported payment for substitutes 	<ul style="list-style-type: none"> • Schools allot 0.6 substitute days for each full-time teacher during the academic year

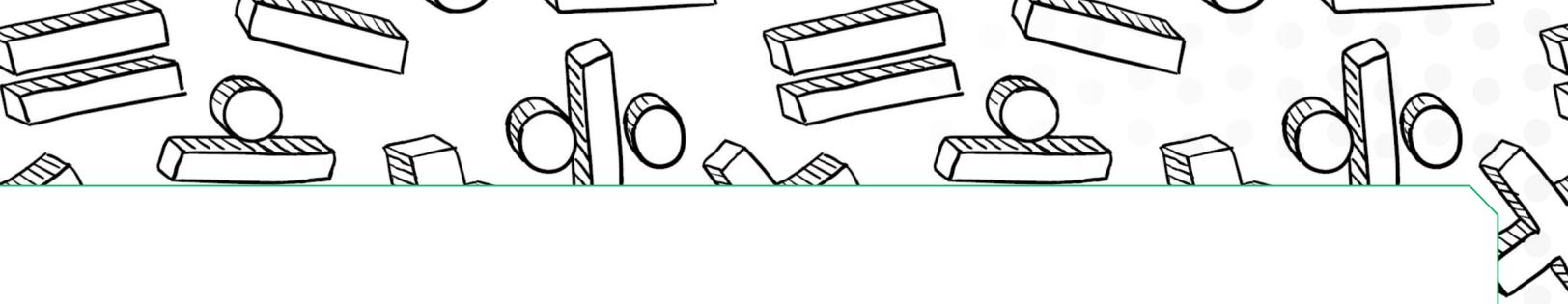
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FEATURES OF THE APPROACH	DISTRICT A: PRINCIPALS AND TEACHERS LEARNING TOGETHER THROUGH LESSON STUDY	DISTRICT B: "EMBEDDED-DAY" CYCLES OF INQUIRY FOR FORMATIVE ASSESSMENT	DISTRICT C: SCALING BACK LESSON STUDY TO STRENGTHEN PROFESSIONAL LEARNING COMMUNITIES	DISTRICT D: DESIGNING OPTIONS FOR LESSON-FOCUSED PROFESSIONAL LEARNING
Period of work/ time allocation for the professional learning	<p>~ 1.5 days</p> <ul style="list-style-type: none"> One day with lesson planning, observation, debrief, and action steps/closure Each teacher teaches the lesson in his/her own classroom Optional grade-level meeting follow-up in which the group jointly reflects on lessons and learning 	<p>1-2 days</p> <ul style="list-style-type: none"> Middle school: 1 day Elementary schools: 2 days 	<p>1 day</p> <ul style="list-style-type: none"> Two hours planning plus two 45-minute lesson observations, each followed by one-hour debriefing Additional one hour planning session added to first debriefing 	<ul style="list-style-type: none"> Lesson study: 25 hours of planning plus one public research lesson in fall and one in spring Unit study: One to two times per year Lab classrooms: Half or third of a day inquiry cycle for each grade level, one to two times per year
Group facilitator	<ul style="list-style-type: none"> District math coach 	<ul style="list-style-type: none"> District math coach 	<ul style="list-style-type: none"> District math coach, with county technical assistance provider 	<ul style="list-style-type: none"> Office of Professional Learning and Leadership staff facilitate lesson study District math coach facilitates unit study and lab classrooms
Others involved?	<ul style="list-style-type: none"> Site principal, grade-level team 	<ul style="list-style-type: none"> Grade-level team, resource teachers, principals 	<ul style="list-style-type: none"> At elementary level: site teacher (PLC) leader and at least one grade-level colleague At middle-school level: Math department. Site coach and ELD coach participate in about 30% of days 	<ul style="list-style-type: none"> Lesson study: Member of district math department, grade-level team, Instructional Reform Facilitators, parent liaisons Unit study and lab classroom: Site teacher leader, grade-level team
Source used by district to develop its approach to professional learning	<ul style="list-style-type: none"> <i>A guide to implementing lesson study for district and school leadership teams in differentiated accountability schools</i> (Haithcock, 2010) <i>Beyond the Common Core: A handbook for mathematics in a PLC at work</i> (Kanold & Larson, 2015) 5E Instructional Model (GoMath curriculum) 	<ul style="list-style-type: none"> <i>Cognitively guided instruction</i> (Carpenter, Fennema, Franke, Levi, & Empson, 1999) <i>Beyond the Common Core: A handbook for mathematics in a PLC at work</i> (Kanold & Larson, 2015) 	<ul style="list-style-type: none"> <i>Beyond the Common Core: A Handbook for Mathematics in a PLC at Work</i> (Kanold & Larson, 2015) 	<ul style="list-style-type: none"> Partnerships with Office of Professional Learning and Leadership, Mills College Lesson Study Group, DePaul University (lesson study) Teachers College Reading and Writing Workshop (lab classroom) District core curriculum

Source: Information collected from the four Math in Common case-study districts.

District D estimates for unit study schools and lab classrooms are based on the sample schools assigned to one district elementary math coach who was interviewed for this report; that figure was then multiplied by four to estimate the total participation across the four district cohorts.



To help readers understand both the similar and unique features of each district's approaches to site-located, lesson-focused professional learning, we organized the case descriptions into four common sections:

1. **Site context** describes briefly where the district leaders began in their thinking about teacher professional learning to support CCSS-M implementation, where they are now in their thinking, and what influenced their move along this trajectory.
2. **What does the professional development look like?** highlights the details of the structure, scale, resources, and content of the learning opportunities.

3. **Successes and challenges** describes specific local factors that helped and/or hindered the district's implementation of professional learning.

4. **Next steps** describes the actions the district intends to take in the coming year, based on their learning so far.

We hope these case studies will serve as useful examples for other districts of the type of ongoing decision-making involved in planning and implementing site-located, lesson-focused professional learning for teachers, and the types of challenges and successes that are possible.





District A Case Study: Principals and Teachers Learning Together Through Lesson Study

Summary: District A's leaders believe that developing principals to be instructional leaders will support continuous improvement in teachers' CCSS-M implementation, and increase the opportunity for sustainable, site-based teacher professional learning. District A chose to implement an adapted version of lesson study as a site-located, lesson-focused professional development strategy for principals and teachers to learn together in the context of their workplace. Principals report that lesson study supports development of ongoing site-located learning, especially when learning momentum is maintained over a short period and the collaboration involves groups that are enthusiastic about and volunteer for this form of collaborative learning. To help mitigate the challenge of finding substitutes for teachers while they participate in professional learning, the district scheduled student teachers to cover classrooms during collaborative observations.

Site context

In 2010, when the final CCSS-M were released, District A relied primarily on a train-the-trainers model to provide teacher professional learning; principals and lead teachers at the school sites received training, and were expected to pass on information to teachers at their respective sites. The district leaders soon realized that they had a problem with the clarity of the message that was being conveyed down the line about teaching and learning: "Information was not translated accurately," they said, "much like playing telephone." As a result, the district shifted away from the train-the-trainer approach to a centralized professional development structure, utilizing district math coaches to provide training directly to all teachers gathered together at the same time to increase fidelity of the message that was being delivered. The district leaders' plan was to gradually, over the course of three years, move away from centralized professional development and move toward site-based professional learning, deploying district math coaches to

build sustainable learning mechanisms with teachers at their schools.

Currently, district math coaches work with school-site principals and teachers to establish a community of learners at the school site, with the intention that they will "work themselves out of a job" as sites develop their own capacity for learning. In 2015/16, the district invited elementary schools to participate in a pilot lesson study effort (in which district leaders would try out their plan for implementing lesson study in elementary schools), while in middle schools, district coaches continued to spend their time supporting teacher teams and working on High Leverage Team Actions¹ that take place before, during, and after teachers' units of instruction. District A prefers to "go small before they go big; go slow before they go fast"; they wanted to try lesson study at the elementary level and, if it was a success, expand to the middle-school level. Additional district math coach staffing constraints at the middle school level also made the implementation at that level less feasible.

¹ Kanold and Larson's (2015) book *Handbook for Mathematics in a PLC at Work* and the Solution Tree consulting group provide guidance for collaborative groups to achieve a common vision for mathematics teaching and learning; they emphasize 10 High-Leverage Team Actions as a goal-setting system for teams as they work together to study and reflect on units of instruction (e.g., making sense of agreed-upon learning standards, identifying higher cognitive-demand tasks).



What does the district's site-located, lesson-focused professional development look like?

The district designed a pilot of its lesson-study approach at the elementary-school level as a job-embedded, "learning in context," student-centered professional development opportunity. The structure of the pilot lesson-study effort was adapted from *A guide to implementing lesson study for district and school leadership teams in differentiated accountability schools* (Haithcock, 2010). That guide describes lesson study as

An ongoing professional development process utilized within Professional Learning Communities (PLCs) to allow teachers the opportunity to create a model for high-quality instructional practices. It is also a method for improving a lesson through teacher collaboration...[Educators participate] in collaborative learning communities whose members use a cycle of continuous improvement to achieve goals that align with individual, school, and district goals for student achievement.

The guide identifies four phases of the collaborative lesson study cycle, which are not directly aligned with other research on lesson study: (1) scheduling and planning; (2) teaching and observing; (3) debriefing; and (4) re-teaching and reflecting. For the planning part of the cycle, the district used the 5E instructional model from the district's adopted curriculum (GoMath): engage, explore, explain, elaborate, evaluate.² The district also used Kanold and Larson's (2015) PLC handbook to develop the structure for teachers' collaborative work during lesson study.

A district leader noted that the approach the district piloted at the elementary-school level is not "real" lesson

study, but rather a version with two specific adaptations. One adaptation is that it uses lessons as a vehicle for site-located professional development for principals and teachers working together. The second adaptation is that, after initial teaching and debriefing of the lesson, *all* grade-level teachers teach the lesson and participate in an optional follow-up debriefing. (By contrast, typical lesson study efforts do not always have principal participation and they emphasize having a single group member teach the lesson in front of colleagues.)

District leaders had clear purposes in mind for their lesson study pilot: teachers and principals would experience professional development in the context of the workplace; grade-level teams would develop and use team-created lesson plans; and teachers and principals would gain the knowledge and resources to replicate the process with other grade levels at the school site.

The district math coaching team "sold" lesson study as an opportunity for "teacher professional learning that results in deep collaborative discussions about content, student learning, and mathematics instruction." The team emphasized that it promotes lesson planning from the students' point of view. While the lesson-study cycles were initially facilitated by a district math coach, the ultimate intention of the pilot program is to build sustainability of the practice so that the facilitation role moves from district coaches to trained site administrators.

The district coaches required elementary school principals to agree to the following conditions before accepting them into the pilot:

- » Sign up for a day when they will be present to participate in the lesson study (full day participation).
- » Choose a grade level to participate that would welcome this collaborative process.

² The Go Math lesson-planning template includes five steps that begin with the letter "E": engage, explore, explain, elaborate, and evaluate. Lessons can extend for more than one class period. Students may be given multiple opportunities to experience explore and explain before elaboration or evaluation. A lesson could look like: engage, explore/explain, explore/explain, elaborate, evaluate. (For more information: <http://www.hmhc.com/shop/education-curriculum/math/elementary-mathematics/go-math-k-8>.)

- » Update their Curriculum, Instruction, and Evaluation Plan to reflect this professional development day.
- » Arrange/request/pay for full-day substitutes for participating teachers.
- » Identify a space at the school site where the team can meet and work that day.
- » Schedule and attend a final debriefing after all of the teachers have taught the lesson. The principals lead these on their own or schedule additional lesson studies with a math coach.
- » So that the site-located learning is not a one-time event, support a second lesson study with classroom observation at least once more for the same grade level or with another grade-level team.
- » Plan coverage so the team can observe and debrief about this additional lesson.

Agenda for the lesson-study release days

Each lesson study team is made up of teachers of a selected grade level, a district math coach, and the principal. The release day schedule follows a common four-part agenda:

5. **Introduction to the process (15 minutes):** After an overview and norm setting, teachers review, reflect on, and evaluate progress on one of the High Leverage Team Actions "using a lesson design process for lesson planning and collective team inquiry."
6. **Lesson planning (3 hours):** Teachers select a content standard and a Standard for Mathematical Practice to be used for the lesson, identify how the standards may be assessed, and identify a learning target for the lesson from the curriculum. Next, they identify levels of cognitive demand for lesson tasks before using the 5E instructional model to choose one task to have students "explore" in the lesson. Teachers do the task themselves and record their various strategies, then discuss ways to "engage" the students in the start of the lesson to

"The [District A] version of the 'lesson study' was unique in the way it presented an opportunity for both teachers and principals to learn alongside each other in the context of meaningful work. The structure of the 'lesson study' ended up being very informative to the decisions I make as a school leader. Not only did it begin to change instruction in the classroom, it also has begun to change the way teachers think about planning, as well as the way I, as a principal, think of leading professional development at my site."

—Elementary school principal in District A

get them ready to "explore." Finally, the group takes a volunteer or randomly selects a teacher to teach the lesson that was collaboratively developed by the team.

7. **Teaching and observing (kindergarten: 30 minutes; grades 1–5: 60 minutes):** Team members use a standard tool to record student actions during the lesson. Each observer is assigned a group or section of the classroom to watch what students are doing.
8. **Debriefing (35 minutes):** The purpose of the debriefing is for team members to review and comment on the data collected during the observation and discuss implications for instruction more broadly, not to discuss lesson revision. Observing teachers



Thoughts on lesson study successes and challenges from a principal at a participating elementary school in District A:

- *"I can easily say that my greatest take-away from this lesson study process was the opportunity to learn within the context of the work that we do each day. It was so meaningful to learn High Leverage Team Actions, the 5E lesson plan, and what to look for in strong Common Core math instruction, alongside my teachers, all within the context of site-based professional development."*
- *"One of the challenges of this lesson study process was finding the time, both on my own calendar and with the rest of my teachers, to replicate the process with more than one grade level at my school site. For me, what worked was to combine two grade levels so that I had multiple grade levels working together in planning. In doing this, it actually provided a great resource across grade levels. As teachers listened to other grade levels plan, they were able to either take ideas, or give suggestions to colleagues that they don't typically have a chance to collaborate with."*

agree to teach the lesson in their own classrooms by an agreed-upon date for subsequent joint reflection. Team members also reflect on the High Leverage Team Actions addressed.

Additional follow up to each lesson-study cycle occurs after all of the teachers have had a chance to teach the lesson themselves. The follow-up involves:

9. **Re-teaching and reflection** (grade-level meeting: 30 minutes): Participants discuss evidence of student thinking and learning that they noticed during the re-teaching of the collaborative lesson in their

own classrooms. Teachers share what they have done or will do in the following lesson or lessons in the unit, based on evidence of student learning.

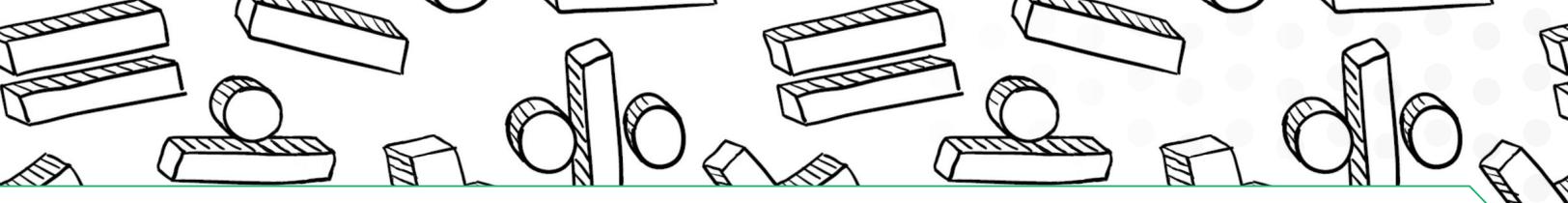
Successes and challenges

Successes of this approach

- » **Strong participation across the district:** 43 out of 54 elementary sites signed up, involving approximately 25 percent of the district's 1,200 elementary teachers.
- » Enthusiasm for lesson study grew as elementary principals shared their excitement with other site leaders.
- » Principals indicated that lesson study is effective for helping them to get to know their staff.

Challenges to implementation

- » **Finding time** for lesson study, including accessing substitute teachers.
- » **Balancing teacher motivation and need for professional learning.** Some principals originally chose the grade level that "needed the most help," but learned that it is better to pick a grade level with volunteer teacher leaders who want to participate in lesson study.
- » Site principals have differed in the degree to which they have held to their original agreement about lesson study participation (e.g., participating on the lesson study day; follow-through on next steps).
- » In order to maintain participants' learning momentum, district leaders found that all lesson study activities, including follow-up teaching and debriefing, need to take place within two weeks.



Next steps and new plans for 2016/17

- » After a successful pilot experience, the district intends to increase the scale of its effort. In 2016/17, district leaders will expand the lesson study offering to K–12 in all content areas. A question for the future will be whether increasing the scale to reach that many grade levels is feasible and whether the increased scale will provide high-impact learning opportunities to the district's K–12 teachers.
- » In the past year, lesson study was organized by grade level. Going forward, schools may combine grade levels for the lesson study work, enabling cross-grade learning.
- » In support of collaborative work time for classroom teachers, the district will explore using student teachers to substitute for classroom teachers who are in professional learning sessions more systematically in the next year.
- » The district is interested in understanding the impact of the effort, and will use data to determine effectiveness. Two data-collection efforts have already been discussed:
 - Using 2015 Smarter Balanced assessment data for grades 4 and 5 to examine if there are differences in student gains in classrooms where teachers participated in lesson study compared to those teachers who did not.
 - Using principal survey data to examine how follow-up grade-level meetings on lesson study are organized at the site level (e.g., after school collaborative meetings or release time onsite for planning).





District B Case Study: “Embedded Day” Cycles of Inquiry for Formative Assessment

Summary: District B offers what it refers to as “embedded days” to give teachers lesson-focused professional learning on building Standards for Mathematical Practice, rich mathematics tasks, and formative assessment into students’ everyday math classroom experience. By situating learning at the school site and focusing teachers’ attention on classroom activities (i.e., the elements of the instructional triangle in Figure 1), the embedded-day structure allows teachers to examine multiple aspects of CCSS-M implementation simultaneously, with a focus on what is happening for students in the classroom; student work and mathematical thinking drive teachers’ inquiry about their classroom practice.

Site context

Early in District B’s implementation of the CCSS-M, most teacher professional learning opportunities took place centrally, and the district continues to offer centralized professional learning for teachers, focused on specific instructional content or strategies (e.g., formative assessment, Standards for Mathematical Practice, rich mathematics tasks for students) and on particular math programs or research ideas (e.g., Cognitively Guided Instruction [CGI],³ and the Teaching for Robust Understanding [TRU] Framework⁴).

However, as the district increasingly emphasizes site-located learning, it is using more embedded-day and professional learning community (PLC) structures. Specifically, District B has invested in applying these structures by building principals’ capacities through administrator trainings; holding summer institutes with mathematics educator Tim Kanold; sending individual school sites’ staffs to trainings with PLC experts Rick and Rebecca DuFour; and contracting with professional development providers Solution Tree for summer training in support of

developing PLCs. Embedded days are an opportunity for teachers to join grade-level colleagues in studying formative assessment in the classroom with students, and to further develop their understanding of the Standards for Mathematical Practice and rich mathematics tasks. PLC activities, while varying by site, extend the work of the centralized and embedded-day professional learning.

What does the district’s site-located, lesson-focused professional development look like?

The embedded-day protocol focuses on task design, and is adapted from the Cognitively Guided Instruction protocol for analyzing student work and thinking. “Embedded-day” events is district leaders’ short-hand name for the five-step formative assessment cycle (see Figure 2) in which teachers engage. The cycle begins with teachers analyzing student work samples on a common task (generated by their students prior to the

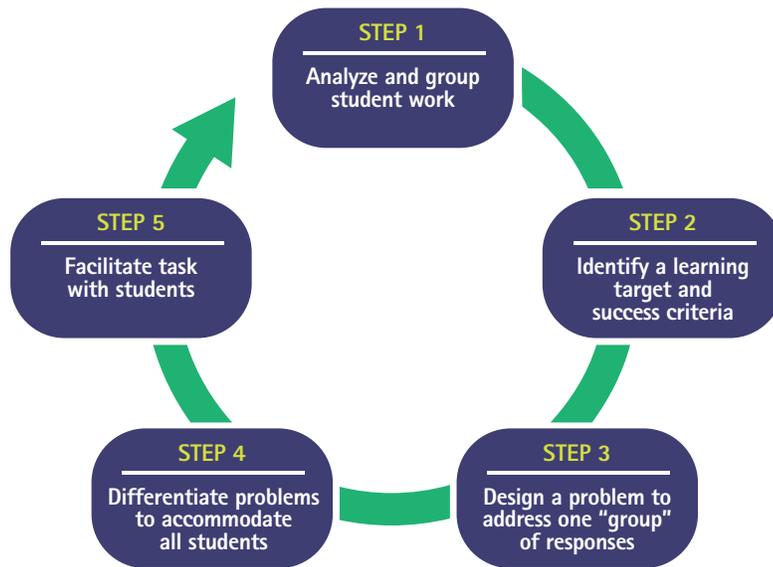
3 Cognitively Guided Instruction (Carpenter et al., 1999) is a voluntary professional learning opportunity that has a long history in the district. CGI training began in 2001 with a select group of K–3 grade teachers who worked together for six years. Additional cohorts were added in subsequent years and expanded to include grade 4 and grade 5 teachers. Training for those teachers ended in 2008, but was reintroduced in the spring of 2015. There are currently 46 teachers enrolled in the district’s CGI cohort, with plans to offer more trainings in the fall of 2016.

4 The TRU Framework (Schoenfeld, 2014) is a classroom observation protocol developed by math researchers that identified five dimensions of mathematically powerful classrooms: Content; Cognitive Demand; Equitable Access to Content; Agency, Authority, and Identity; and Uses of Assessment. The protocol includes descriptors of each element of the classroom that can be used to identify attributes of quality classroom instruction. For additional information about the TRU Framework, go to <http://map.mathshell.org/trumath.php>.



Figure 3. Embedded-Day Formative Assessment Cycle

1 Cycle of the Formative Assessment Process



embedded day) and together sorting the work into categories (e.g., common approaches students used to solve the problem, common errors students made, students whose work indicates they are ready for advancement). Next, teachers together select one of these categories on which to focus and determine a learning goal for the students whose work fits that category. They then design a task to engage those specific students in the learning goal, and consider teacher questions to differentiate instruction to increase the likelihood that all students will be successful with the task and will meet or exceed the learning goal. The next phase of the cycle involves teachers visiting a classroom together to observe students engaging with the designed task, attending to how students interact with the tasks, noting verbal interactions as well as written work.

In post-lesson debriefing conversations, teachers discuss how well the task prompted students to engage in mathematics problem-solving and communicate their reasoning; teachers then make additional revisions to

the task for another classroom iteration. After two classroom observations, the group discusses what worked well and what worked less well, along with implications for task design and engaging students in rigorous tasks. The district's embedded-day structure uses an "Observe-Analyze-Plan-Execute" cycle of inquiry – which may be inspired by the more commonly known "Plan-Do-Study-Act"⁵ cycles of inquiry for continuous improvement (Langley et al., 2009).

District math specialists facilitate these embedded days, working with two grade levels at a time in two-hour blocks. Substitutes cover the teachers who are working, and then rotate to the next grade level; this requires fewer substitutes than if the work were spread out over multiple days because a single substitute can be employed for the full day. Prior to each event, the district math specialist meets with the principal and/or site lead to plan the schedule for the day. Middle school teachers each participate in two day-long embedded-day events per year, with teachers from several middle schools participating

⁵ Tony Bryk and colleagues (2015) define Plan-Do-Study-Act cycles as "a pragmatic scientific method for iterative testing of changes in complex systems. Each cycle is essentially a mini-experiment in which observed outcomes are compared to predictions, and discrepancies between the two become a major source of learning."

together at one site. Elementary teachers participate in two-day embedded-day events,⁶ with teachers at a single site working together in grade-level teams (K-1, 2-3, and 4-5). At the elementary level, the first day focuses on analyzing student work, identifying a target group of students, and planning next steps (e.g., classroom discussions, changing the task, changing the numbers in the student task to change the complexity/ cognitive demand of the problem), while the second day focuses on implementing the revised task in the classroom, observing students, reflecting, and planning next steps.

Successes and challenges

Successes of this approach

- » **The structure supports cross-grade and intra-district collaboration.** In middle school, teachers from multiple grade levels and schools work together; at elementary schools, two grade levels work together at a time.
- » Site representatives feel that the embedded-day structure models effective professional learning practices that can support PLC activities.

Challenges to implementation

- » **The logistics of scheduling within the constraints of the school day have been problematic.** At middle schools, district leaders found it difficult to find two teachers at a given site with schedules compatible with the embedded-day structure.

At elementary schools, logistical challenges included planning around recess and lunch schedules and finding a space on the campus to hold meetings, as well as maintaining teacher participation and group momentum for the second day, which in the current school year does not take place until several months later.

“When we get everyone to focus on what works and on the same goals, you can’t put yourself in a silo again. It builds a sense of community and shared learning among the teachers . . . and it has really solidified the PLCs.”

—Principal at a school in District B

- » Substitute coverage for classroom teachers has been an additional problem.

Next steps and new plans for 2016/17

- » Elementary schools' two-day embedded-day structure will be scheduled back-to-back to provide a more cohesive experience for teachers and to enhance the likelihood that they would be able to carry out additional cycles of the process in their PLCs throughout the year.
- » CGI training opportunities will be extended to include new staff and teachers that have not had the training previously, because pedagogy informed by CGI is in direct alignment with the goals of the embedded days.
- » District leaders have found that participants are likely to focus on teacher-student interactions during observations instead of on the broader questions of lesson and task design. To generalize the learning from the particular observed classes of students, in 2016/17, district leaders will emphasize task design and task implementation in the classroom even more strongly.

⁶ Elementary embedded days are scheduled over a non-consecutive two-day period to accommodate the master schedule and coordinating the cross-grade teams for planning and observation.





District C Case Study: Scaling Back Lesson Study to Strengthen Professional Learning Communities

Summary: District C chose to implement lesson study broadly across the district, and to focus on multiple aspects of instruction during its regional lesson-study days. After a year of such broad implementation, the district realized that quality professional development for its teachers may come as a result of redesigning its site-based learning structures to be more focused and effective in the coming year. For the short term, it will suspend lesson study and concentrate its efforts on providing additional training to support development and facilitation for its teacher leaders and site administrators using a menu of support topics the sites can choose from to address specific needs.

Site context

In the earliest years of CCSS-M implementation, District C provided centralized professional development on the Standards for Mathematical Practice, mathematical content, and the adopted curriculum. Inspired by classroom visits and requests from teacher professional learning community (PLC) leaders for support in integrating instructional strategies into lessons consistent with the district-adopted curriculum, district leaders decided to shift professional learning toward site-based PLCs in 2014/15. As stated in the district's MiC grant proposal, this was partially a way to address the varied needs across its sites: "Some sites struggle without content area expertise and/or pedagogical skills, while others lack a professional community of trust and support to share expertise. To build continuous learning, we need to address the three needs simultaneously (knowledge, skills, culture)."

Several district leaders and principals attended DuFour PLC training⁷ through the local county office of

education, and also attended the Summer Summit⁸ workshops offered through Math in Common during the summers of 2014 and 2015. These sessions, which were "inspirational" for district leaders, helped them to clarify their goals for PLCs — they wanted PLCs to focus teachers' thinking on "where is learning moving for students" and "making decisions based on student work."

Through their PLC training, district leaders learned about the PLC Teaching-Assessing-Learning Cycle, a cycle of inquiry that strongly overlaps with, but is not exactly the same as, lesson study. Similar to the cycle of embedded formative assessment described in the District B case study, this inquiry cycle begins with collaborative teams identifying learning standards and designing common unit tasks and assessment instruments. The second and third steps involve teachers implementing formative assessment classroom strategies, and then having students take action on in-class formative assessment feedback. In the fourth step of the inquiry cycle, students use assessment instruments from step one for motivation, reflection, and action. And in the final step, collaborative teams use

7 DuFour training on professional learning communities emphasizes collaborative work around four essential questions, commonly referred to as the DuFour Four: (1) Goals/expectations: What do we expect our students to learn? (2) Assessment: How will we know they are learning? (3) Intervention: How will we respond when they don't learn? (4) Gifted: How will we respond if they already know it? For more information, see, e.g., <http://www.dps61.org/domain/1578>.

8 Summer institutes organized by California Education Partners have enabled large groups of site leaders from each of the Math in Common districts to learn about Kanold and Larson's High-Leverage Team Actions and how they might use this goal-setting system for collaborative work within their school sites (e.g., to implement higher cognitive demand mathematical tasks).



ongoing assessment feedback to improve instruction. The Teaching-Assessing-Learning Cycle is meant to be iterative, with the cycle possibly beginning again after step five.

The district used materials adapted from Kanold and Larson's *Handbook* – including the PLC Teaching-Assessing-Learning Cycle – to develop a protocol and set of tools to support the district's adapted form of lesson study. The *Handbook* provides guidance and specific tools to support lesson design as an "informal form of collective inquiry with other team members" (p. 93). The district adopted this lesson-focused process to engage site leaders and grade-level teams to see lesson study as a model for the work of PLCs, at the grade and site levels, and to allow participants to reflect on their practice and the instructional shifts needed to align to CCSS-M. District math leadership also hoped lesson study would help teachers to emphasize conceptual over procedural student understanding, and push teachers to look critically at their curriculum materials.

What does the district's site-located, lesson-focused professional development look like?

As part of its lesson-study effort, the district organized "regional collaborative days" in each of the district's nine regions, to provide equitable lesson-study support across the district. District leaders organized these lesson-study events specifically to provide training for teacher leaders because, with the large size of the district – 40 elementary school sites and approximately 1,400 elementary school teachers – they do not have the coaching capacity or substitute capacity to include all teachers simultaneously in a coach-led lesson-study event. This year, the six-person district math coaching team organized 50 grade-level collaborative days across the district, involving participants from all 40 elementary schools and all 9 middle schools, and approximately 450 out of 1,500 K–8 teachers.

Each event at the elementary level, facilitated by at least two district math coaches, includes a teacher leader from the site and a grade-level colleague, although additional grade-level teachers are encouraged to join. Additionally, one of the district's county office technical assistant providers joins each meeting; principals and vice principals from the sites may stop by, but do not regularly participate; and site coaches and others (e.g., English language development coaches) participate in about 30 percent of the events. Elementary teacher leaders each must participate in one lesson study, which counts as one of the three PD release days required of a teacher leader. District coaches facilitate lesson study days for middle school math departments, with release time provided for all teachers through grant funding. Although middle school teacher leaders must attend one day as a requirement of their PLC responsibilities, most have joined in two or three lesson study events.

Unlike more "formal" lesson-study activities that are organized over a longer period, the district's collaborative days are organized as one-day events. Following the guidance of its source material (Kanold & Larson, 2015) the collaborative work emphasizes planning the lesson, observing its enactment, and gathering evidence on student learning. The day is structured with two hours of collaborative lesson design (which involves examining the California Mathematics Framework and the district math curriculum), and two cycles of observing 45-minute classroom lessons. After the first debriefing discussion, participants revise the lesson before teaching it a second time, and after each lesson participants discuss their observations and data, and reflect on their learning during a one-hour debriefing session. District coaches also offer follow-up visits to PLC groups or sites if they would like to continue the learning with their whole grade level.

The district's 2015/16 lesson study days involve a focus on multiple aspects of instruction, including specific content within the curriculum, the California Mathematics Framework, the Standards for Mathematical Practice, and student discourse and engagement. After organizing the regional events in

2015/16, a district leader reported that the multiple topics of instruction were difficult to address in a single day of collaborative work. The district leader we interviewed especially felt as though the participants were not fully able to discuss evidence of student learning. In 2016/17, the district intends to limit the scope of the collaborative discussions to focus more specifically on student discourse. A district math coach told us, "Instead of [training] 243 teachers in-depth on student discourse . . . we want to get a core group (two small groups of teachers) and do some more intense training with them . . . and make sure the teacher professional learning activities have got the coaches' support . . . So, we are narrowing the focus more this year."

The district's original plan for the 2016/17 school year was to scale back its lesson study effort to just a single grade level, but continued thinking has led the district to suspend its lesson study effort for the time being. Instead, district coaches will be working with teacher leaders and site administrators to provide support on a short list of topics the sites can choose from to address specific needs, and the district will offer more support for building successful PLCs.

Successes and challenges

Successes of this approach

- » District coaching teams have gained greater access to and understanding of classroom instruction across the district, informing their ongoing planning for professional development (e.g., the need to support teachers to deepen emphasis on conceptual understanding and use of manipulatives).
- » Lesson study has been perceived as a useful collaborative structure that requires participants to get specific about classroom instruction.
- » Site teacher leaders have developed a better understanding of work they can do with their PLC teams.

When asked about how well the district is doing at attaining its goals for teacher learning, one district leader responded honestly, saying:

I don't think we're doing great. The first couple of years, we had very lofty goals — so lofty, you couldn't even put your hand on what they were . . . We "wanted to see Common Core land in our classrooms. . . ." And we had some frustration from teachers [who said,] "I don't get this, I don't understand what I'm supposed to do." It's a one-on-one model of pushing a teacher along that's not working. . . . The reason we went after lesson study is because we wanted to demonstrate you don't have to follow the [textbook] page-by-page, step-by-step, and get teachers to see that that's okay.

Challenges to implementation

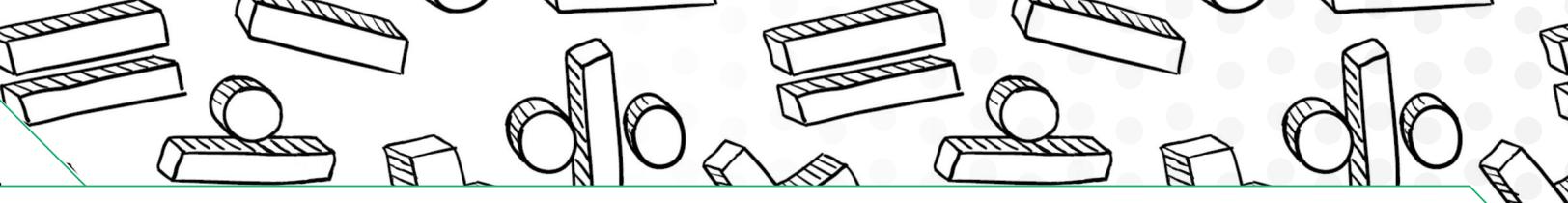
- » District math leaders are not satisfied with the quality of their lesson-focused efforts, feeling as though they are trying to do too much.
- » District coaching staff have struggled to provide support across so many events.

Next steps and new plans for 2016/17

- » One of the primary emphases for the 2016/17 school year will be continuing to develop PLCs. The district will use Teacher Effectiveness grant funding (i.e., block grants recently allocated by the state legislature to support teacher professional development) to train PLC leaders on facilitation skills and to offer more training follow-up:
 - To support development of its PLCs, the district has contracted with a professional development provider called Solution Tree.



- » Provide three release days for teacher leaders next year:
 - Two of the release days will be focused on professional development on math content, student discourse, and PLC facilitation skills.
 - The third day will be a release day at the site with all of the teacher leaders from the site along with a site administrator. This day will emphasize the district's key instructional strategies and content, and each site's respective classroom-implementation needs.



District D Case Study: Designing Options for Lesson-Focused Professional Learning

Summary: How do you improve CCSS-M implementation in a large, urban district in which the schools have a high degree of site autonomy? After an attempt to expand a train-the-trainers math professional development model met with mixed results, District D's Curriculum and Instruction (C & I) Office decided to "push out" its coaching resources directly into the school sites, rather than "pulling in" teachers for large-scale, centralized professional development facilitated by the district coaching team. The C & I Office offers schools support, in the form of coaching and release days, to implement several forms of site-based teacher learning, including formal lesson study and "lesson study lite." Sites can choose one of these formats, and each of the learning structures is guided by a common focus on the district's core curriculum and the associated teaching toolkit of instructional strategies. As one district administrator reported, this shift toward site-based learning is really about "who owns the work" of shifting toward instruction aligned with the CCSS-M. Offering support for multiple PD structures comes with its own challenges, but has also given district math coaches new relationships and more information about the district's school sites.

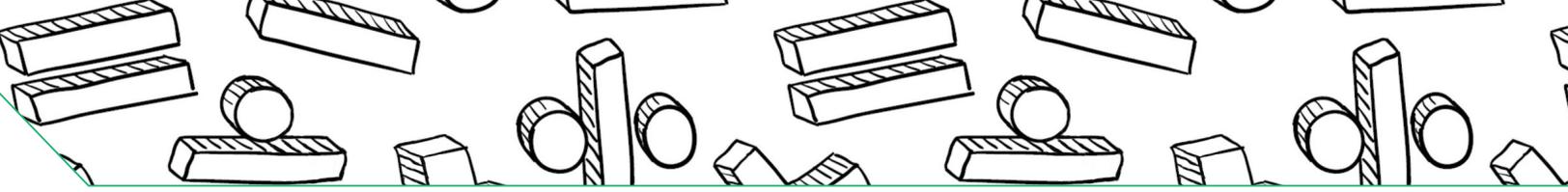
Site context

District D has a culture of school-site independence and individuality extending across its more than 100 schools. Because of the district's size, it is impossible — both because of extensive cost and substitute constraints — to get all district teachers, or even all teachers from a single grade level, together in a room at the same time for professional development. Early in its CCSS-M implementation, like District A, the district tried a train-the-trainers model, in which teacher leaders from each school met for central training followed by release days at their respective sites to disseminate information directly to teachers. When this model was expanded beyond the opt-in pilot, it did not work as well as district leaders had hoped; for a variety of reasons, the "right information" wasn't making it back to individual teachers.

These challenges led district leaders to change their model of professional learning, from pulling teachers in to centralized professional development experiences, to "pushing out" math coaching supports into sites — with an aim to provide learning directly to all teachers. The district's focus on site-based learning is based on a belief that if teachers are active participants in selecting the structures and vision for instructional reform, the changes will be deeper and more powerful for both teachers and students.

Sites are now asked to choose between different models for their site-based professional learning communities, and they are offered release days and district math-coach support to facilitate the learning. At the elementary level, there are three primary structures for site-based collaborative work: lesson study, lab classrooms, and unit study. Middle schools offer lesson study, unit study, Complex Instruction, and Problem-Solving Cycle.⁹ As the learning

⁹ These PLC supports and structures differ between the elementary- and middle-school levels because of differences in staffing (e.g., each middle school has an instructional coach); structure of the school day; long-standing opt-in professional development activities at the different levels; and opportunities with partner researchers working with district schools. Complex Instruction is a mathematics program focusing on pedagogical strategies that promote equity and student mathematics identity (more at this link: <http://www.sfusdmath.org/complex-instruction.html>). The Problem Solving Cycle is a lesson- and video-based professional learning program from Stanford (more at this link: <https://cset.stanford.edu/research/teaching-practices/math-tools>).



structures at the middle school level are more varied and difficult to describe in a short case, we focus this case study on the three elementary-level options.

What does the district's site-located, lesson-focused professional development look like?

The district mitigates some of its variation across sites by grounding all site-based teacher professional learning in the district's core math curriculum and teaching "toolkit" of instructional strategies (which includes participation quizzes, Math Talks, and the Three-Read Protocol). The curriculum units feature high-quality tasks that create a baseline for teacher practice. Studying these tasks and units allows different sites to engage in collaborative sense-making of the curriculum's common content and pedagogical ideas.

For each of the three site-based PD options, the district offers a substitute allocation of 0.6 days per teacher, allowing teachers at each grade level to be released for several hours of supported planning one to two times per year. Sites commit at least one hour per month for site-based learning for all teachers, organized in whatever way works best for the school. Sites can also choose to use this money for extended pay after school or school-day release time for teachers to engage in one of the three district-supported formats. The three structures available to elementary sites are detailed below.

Lesson study

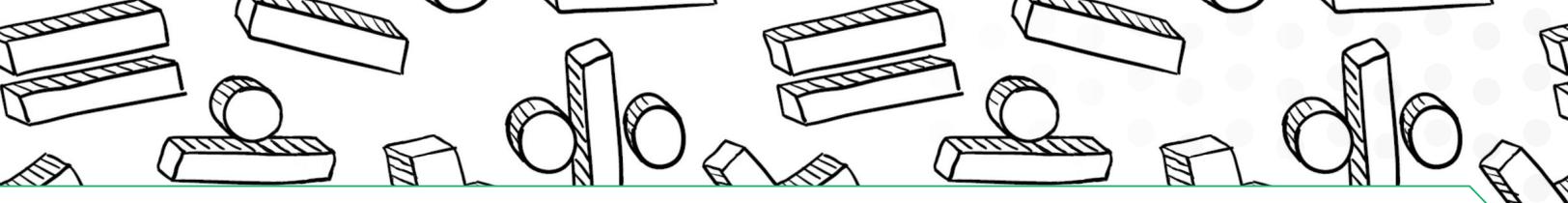
Lesson study has been an option for professional development for teachers in District D since 2009. Currently, the district's Office of Professional Learning and Leadership (OPLL) oversees much of the lesson study work, although over the past year and a half leaders

from the OPLL and C & I (math) offices have begun to collaborate on site-based professional learning in mathematics. Because OPLL's lesson-study structure was well established and successful, the C & I Office chose to integrate some of the existing protocols from that structure into the lesson-study work it supports.

Lesson study typically begins at a site through the efforts of one or more individuals interested in taking on site leadership for the lesson-study effort; they begin by achieving certification from the district's Master Teacher Program.¹⁰ In 2015/16, 27 Master Teachers at 24 school sites were involved in lesson study, and along with their site colleagues who are also participating in the lesson study professional learning, this totals approximately 170 teachers districtwide.

Each Master Teacher recruits up to four colleagues (within or across grade levels) to work together to choose a research question and focal students, and organize research lessons (i.e., opportunities for collaborative observation and data collection during a live classroom lesson). The research lesson days typically involve two cycles of lesson observation and discussion. The expectation for returning Master Teachers is to support two public lesson days, one in the fall and one in the spring; new Master Teachers often organize only one public lesson in their first year. Research lessons are attended by the teaching team and instructional coaching staff from OPLL; site administrators are always invited and may attend if possible, as may the site Instructional Reform Facilitators and parent liaisons. Others may be invited, depending on whom the team thinks may benefit. A team member from the district C & I Office currently also supports the research lessons in mathematics – comprising approximately 20 percent of the district's lesson-study efforts – to align the work more closely with the core curriculum and ensure high quality mathematics.

¹⁰The program involves a three-part selection process, including a paper application, classroom observation, and interview. Teachers who are accepted to the program receive a \$2,500 stipend, pay for 25 extended hours beyond their contract, \$75 for instructional materials of their choosing, and 21 hours of professional development within the Master Teacher PLC designed to support their facilitation and leadership competencies. In addition, each Master Teacher receives sub days for public research lessons in the fall and spring, and the colleagues they recruit also receive extended hours.



To support the other teachers in the school who are not engaged in the lesson-study cycle with OPLL staff, the C & I Office point person provides coaching to lead inquiry around the same math theme that was chosen by the Master Teacher's lesson study group (e.g., academic conversations) and the C & I Office provides funding for additional teachers who are not part of the Master Teacher team to join in observing the Master Teachers' research lessons.

In collaboration with researchers from a local university and through foundation funding, a subset of schools (four elementary schools and one middle school) are using lesson study with the intention of engaging not just a small group led by a Master Teacher, but the entire school staff. In this program, each site has two Master Teachers, support from partner researchers, and a shared schoolwide research theme. In typical implementation of lesson study, the research lesson is taught twice in a day – with a period of reflection, discussion, and revision in between. However, the schoolwide lesson-study sites are finding that participants get more value from skipping the second enactment of the lesson and instead spending more time reflecting deeply about the lesson and its implications.

It is important to note that the school sites choosing to implement lesson study are not alone in their work, but are part of a districtwide lesson-study network. OPLL hosts two meetings per year for the full network of lesson-study participants to enable sharing of lesson-study research topics and findings. In the last meeting, approximately 75–80 teachers were involved in discussions about their vision for student success, their rationale for the selected research themes, and their indicators of success. They also discussed gathering student evidence; addressing challenges; giving and receiving collegial feedback; gathering data; and making specific changes to their original lessons.

While district leaders are pleased overall with the work of the various lesson-study efforts, they say math is not yet the driver of lesson-study professional learning, and so lesson study is not yet a powerful way to create instructional shifts in math classrooms. However,

with staff from the district math department increasingly involved in lesson study, there is hope for further strengthening this work.

Unit study

Unit study is a form of professional learning that uses the district's core curriculum as a means to improve teacher understanding of CCSS-M content. Teachers are asked to select a unit from the core curriculum and use the curriculum unit overview and standards to make sense of and plan out essential learning and instructional approaches within the unit. Typically, sites choose to study the unit they will teach next (i.e., after the unit-study professional learning session). The district offers a basic protocol for unit planning, which includes doing a math task collaboratively, making sense of the math involved, and then adjusting or refining the lesson related to that math task to meet the needs of a range of learners.

The work is designed and led by a district coach until the site teacher leader is ready to take over, after which the district continues to provide resources and tools as needed. District leaders estimate that the majority of middle schools are organizing unit-study activities, and that it is occurring somewhat less frequently at elementary schools; one district math coach was aware of unit-study activities in only half of her assigned elementary schools. There is indication that teachers find unit study a bit dry – as one math coach put it, "let's get out our [curriculum] binders" – so district staff are planning to make a stronger push to implement lab classrooms in sites that were successful with unit study in order to look more deeply at instruction in these sites.

Lab classrooms

Lab classrooms offer the opportunity for inquiry and observation cycles shortened to a few hours in a single day, striking a balance between the rigor of formal lesson study and the constraints of schools' limited time for collaborative learning. One district administrator called the lab-classrooms approach "lesson study lite." The



goals of lab classrooms are both to improve teachers' pedagogical decisions and to publicize teacher practice within a site.

District D's lab classrooms are based on a model from Columbia University Teachers College's Reading and Writing Project (TCRWP). Some teachers have received formal training through TCRWP, and schools that are opting to use lab classrooms may have some history of using this structure in the past. Districtwide, only about six schools (approximately 200 teachers) have chosen to use lab classrooms.¹¹

The lab classroom process begins with an inquiry question about pedagogy and the district's teaching toolkit strategies, such as, "Can we improve our math talks?"¹² With a district coach, teachers collaboratively discuss the inquiry question, plan how to address it, and commit to enacting their plan in the classroom. The group then observes together as a teacher leader or district math coach demonstrates (e.g., how to conduct a math talk), and then the group debriefs. In one or two full days at a site, the district can support two to three grade levels through these very short inquiry cycles. The district offers tools to support sites in this work (e.g., protocols, reflection forms), although with their own collaboration systems in place, schools are free to choose whatever system works best for their school culture.

Schools pursuing this structure report higher levels of excitement and engagement with their work than unit-study schools do, though district staff say that schools who initially chose lab classrooms may have had cultures of collaboration and interest in improving practice, which predated the lab classrooms. District staff will encourage more sites to take on lab classroom work next year.

Successes and challenges

Successes of this approach

- » Rather than relying on a train-the-trainers approach to teacher PD that is centralized at the district level, **site-based structures enable district coaches to get to know each of the schools and their staff better**; the district coaches feel that this will **enable them to better target and scaffold the support they provide**.
- » The district has organized a Master Teacher application and certification process to cultivate site-level leadership for lesson study. District leaders feel that rather than making the work exclusive, the Master Teacher process strengthens lesson study **by ensuring teacher leaders are committed to lesson study, have a sense of responsibility for the work, and are given adequate district support to sustain their motivation**.

Challenges to implementation

- » Even after moving away from costly centralized release days, **substitute shortages** (and/or a history of substitutes not showing up in certain neighborhood schools) **continue to hamper planning and implementation for professional learning**.
- » With a workload of 7–14 schools each, district coaches struggle to create new relationships and provide deep support at each site, while simultaneously engaging with teachers in major curriculum revisions. Also, some sites have been slow to reach out for help or have not contacted the district for support yet. Thus, **coaches are not able to work intensively with all of their assigned schools at once, and must scaffold support as they deem**

¹¹ Elementary sites in the district organize one professional development day every other month for math and a grade-level meeting every month. Lab classrooms occur outside of these structured collaborative times.

¹² Math talks are an instructional routine intended to provide students an opportunity for deeper understanding through communication about mathematics. Typically, students are given a mathematics problem and asked to articulate and defend their ideas and analyze the reasoning of others.

appropriate across the year and across each site's perceived level of need.

- » Because the role of the principal in each of the district's site-based learning structures has not yet been fully defined, there is a **disconnect between the structures in place to support teacher learning in the district and those in place to support learning for site administrators**. C & I administrators feel that **site administrators will struggle to lead the work of CCSS-M implementation** at the site if they are not trained alongside their teachers, at least in some aspects of the work.
- » **Planning support for site-based professional learning in the 2016/17 academic year is complicated** by the fact that the district school board will not adopt a proposed budget until the middle of summer 2016 and information about funding availability will not be available until around August 2016.

Next steps and new plans for 2016/17

- » Next year at the sites that are doing only unit-study professional learning, coaches will encourage them to take on lab classrooms— which are “the next step in their evolution.”
- » One goal for site-based learning has been to build sites' capacity to learn, collaborate, and improve teacher practice on their own. Next year, district leaders will “ramp up” certain sites' independence by identifying teacher leaders who are ready to lead unit study (with the continued support of substitute days and resources). These teacher leaders will take charge of their own planning and learning, meeting with district coaches every other month to plan the site-based work that they will then lead on their own the following month.
- » The district is also considering offering “learning strands” for sites to choose from; the strands will be focused on teaching strategies, differentiation, technology, formative assessment, and leadership. The learning strands will be introduced during a summer institute at which sites will choose which strand to opt into for ongoing study during the year.





Top 10 Considerations for Designing and Implementing Site-Located, Lesson-Focused Teacher Professional Learning in the Common Core Era

Because of the rich variation in approaches to professional learning within and across our case study districts, as well as throughout all the Math in Common districts, we identified numerous implications for planning and implementing districtwide teacher professional development. We hope this report will spark helpful conversations among educators and administrators about professional learning for teachers at the district and school-site levels.

In the interest of brevity, we have identified our top 10 recommendations for action, organized into three action areas: carefully design the professional development experience for teachers; anticipate and plan for logistical details, challenges, and solutions; and capture and study teacher learning and site variation.

Carefully design the professional development experience for teachers

- 1. Consider existing research.** When it comes to lesson-based professional learning, there is a lot of information available, but not all resources are created equal. When planning and developing lesson-based learning structures, districts may want to check in with a partner organization or another district before implementing the professional learning, in order to share and get feedback on plans.
- 2. Understand what teachers want to learn about.** Site-located collaborative learning is typically most relevant and meaningful when teachers work together on a common problem or question of practice that they find challenging and worthy of joint work. Teachers' problems and questions about teaching and learning are generally related to their own classroom dilemmas (Boston Learning Group,

2015). District leaders may want to gather data that identify specific classroom dilemmas that teachers are facing, and use site-located learning structures to explore these ideas in depth.

- 3. Establish clarity of purpose.** The specificity of the learning goals for teachers is critical: it should be clear what "problem" any learning opportunity is aiming to solve. Without clear direction, a structure of collaboration or lesson-focused learning will not, by itself, support the desired learning outcomes for teachers.
- 4. Narrow the focus and choose high-leverage topics.** Most teachers will need to build significant content and pedagogical knowledge to be successful in implementing the CCSS-M, but having them try to focus on too many new things can be overwhelming. It will be hard for districts to convey all the knowledge teachers might need at once. Accordingly, districts may benefit from taking a longer-term view of teacher learning — for example, by choosing one high-leverage focus area per year and adding more new ideas over time. Districts may find that taking a "less is more" approach and identifying specific, focused learning goals for each teacher learning opportunity can simplify the focus and clarify the impact of the learning events.
- 5. Carefully consider time allocation for each activity in the inquiry cycle.** The imbalance of time



within the cycle of collaborative inquiry that over-emphasizes planning and under-emphasizes reflection and discussion of learning at the end of the cycle is typical of the early stages of development for organizations starting to do lesson-focused work. Having time for collaborative groups to reflect on broader implications for instruction of specific observations during a one- or two-day event may provide the most value for sustaining teachers' inquiry stance and sustained learning.

Anticipate and plan for logistical details, challenges, and solutions

6. Establish norms and diversify the group membership to extend learning.

Who is involved in the site-located learning opportunities matters, as it affects the level of group learning and how the group's collaborative work can be more broadly shared. Districts should involve individuals with diverse expertise to support effective group collaboration and understanding of the mathematics content and pedagogy. Also, districts should build in supports and structures to establish trust within the group and to continue the work across multiple years. District leaders should be especially careful in transitioning the facilitation role from a district coach to a site-based employee, given the established difficulties of a train-the-trainers model of conveying information.

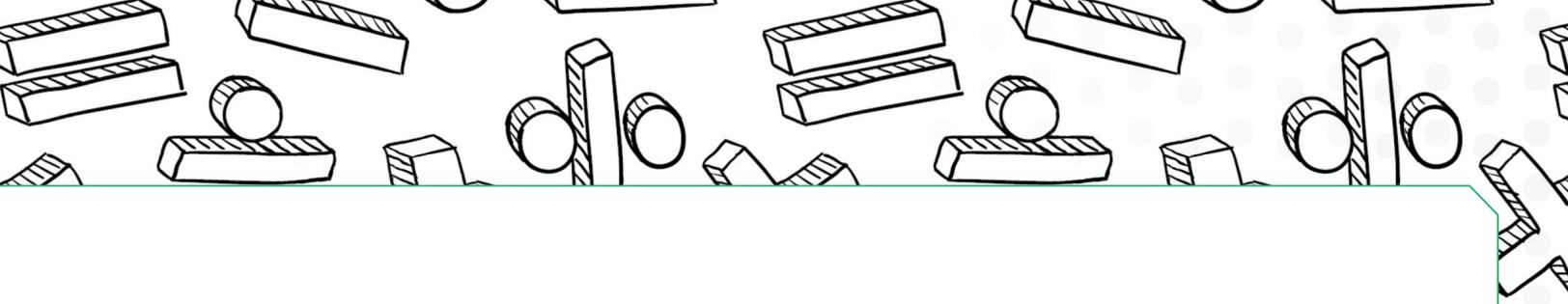
7. Find the time. One-day professional development events, whether held centrally or at sites, are generally insufficient to support ongoing learning. Districts need to increase the "dosage" of professional development opportunities for teachers in order to make the learning more effective and sustained. District leaders may want to work with individual site leaders to (1) reconsider their master schedules to identify additional or ongoing collaborative teacher learning opportunities and/or to (2) consider how the lesson-focused work could be continued and extended

within existing site- or district-based professional learning communities (PLCs).

Capture and study teacher learning and site variation

8. Understand and discuss variation across sites in how they are using and learning from lesson-focused professional development. Variation across sites is to be expected, but can become a concern when the locus of learning shifts to the site level. Districts will need to develop standardized protocols and tools to track the content of site-located collaborative learning opportunities and specific teachers' areas of growth and change *relative to district learning goals* across school- and grade-level PLCs. With these data in hand, district leaders must build in time to understand whether their site-based efforts are moving the district forward as a whole, and what supports need to be put in place (e.g., additional training for teacher leaders) to help achieve the desired instructional shifts.

9. Consider new approaches to capturing teacher learning. The real value of site-located, lesson-focused approaches comes not just from having a "polished" final product (e.g., a clear and effective lesson plan, a shared understanding of how students might respond to an exemplar problem), but also from having participants gain instructional decision-making skills to help them generalize their learning to other situations. Districts beginning lesson-focused work will need to consider the proper mechanisms for capturing, sharing, and spreading learning about the rationales for making pedagogical decisions (e.g., capturing this information in reports or public lessons). Relying on attendance data and/or teacher surveys may provide insufficient information on how lesson-focused learning events impact teachers' thinking, classroom practice, and subsequent student achievement. Additionally, reflection instruments distributed

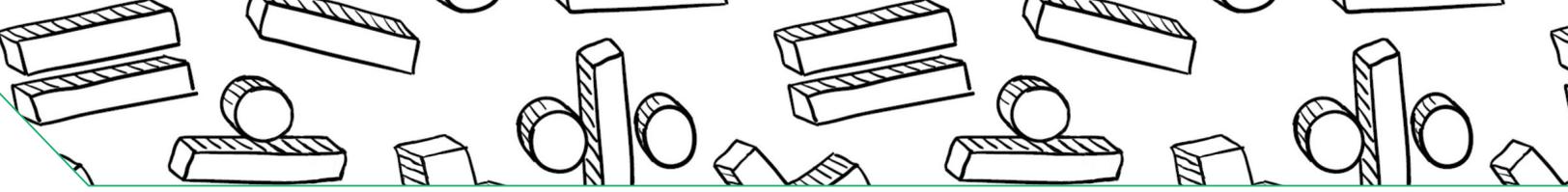


on the event day will probably not enable district leaders to understand the depth or sustainability of the learning; district leaders will need to consider how to measure learning that might happen over a longer period, as teachers continue to grapple with instructional ideas related to their learning from their lesson-focused collaboration.

10. Use small-scale pilot data to inform changes in district learning structures. Starting smaller (e.g., fewer PLCs, fewer topics, fewer guiding resources) may be beneficial, particularly for districts with a lot of site or teacher variability. District leaders may want to work with and gather data regularly from receptive sites and staff to learn from their successes and challenges. For example, some districts are reconsidering how to deploy district instructional coaches to support site collaboration; it would be wise for these efforts to “start small” so district leaders can learn more about the nature of coaching activity and collaboration and the ways in

which these supports provide different impacts on teacher learning.

Site-located, lesson-focused professional learning opportunities are now being used more frequently across the MiC districts and many other school districts as well. These approaches to professional learning hold significant potential for enabling math teachers to make important links between several areas related to their classroom practice: the mathematical content they are responsible for teaching their students, their students' current abilities, and the instructional approaches they put into place. However, as this report shows, districts will need to carefully consider the trade-offs and impacts for sustaining teachers' ongoing learning through these lesson-focused structures. We hope that districts within and outside of the Math in Common initiative can take useful information from this list of 10 recommendations for action as they continue to consider how best to support teacher professional learning in the coming school years.



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