Getting Down to FACTS

The California State Role in Supporting District Capacity for TK–8 Math Improvement

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Executive Summary

California stands at an inflection point for education. The state is spending more than ever before on its schools, yet student outcomes, particularly in mathematics, remain stubbornly below expectations. At the same time, a cadre of new education leaders will assume their posts in the coming year. Longstanding education governance problems and recent signs of an appetite to tackle them make this a particularly ripe time to explore how the state currently supports mathematics improvement and how those supports might be strengthened.

This study, part of the Getting Down to Facts III project, examines the state's role in supporting school districts' capacity to improve TK–8 mathematics instruction. We center districts because, in California's local-control system, they function as the primary engines of instructional improvement: interpreting state policy, making consequential local decisions, and shaping the conditions under which teaching and learning occur; they also can create the conditions under which students can have a coherent mathematics learning experience across multiple grades TK–8 and beyond. At the same time, we look up to the state level and down to classrooms, incorporating the perspectives of state leaders and teachers alongside those of district leaders. In doing so, we trace how intentions formed at the statehouse travel through districts and land in practice, and we assess whether the system, as experienced across its levels, makes it possible for teachers to provide students consistent, high-quality

TK–8 mathematics instruction. Our evidence draws on interviews with 94 district leaders from a representative statewide sample stratified by region and district size; interviews with 32 state agency leaders, county office of education leaders, external providers, and policy experts; and one-day site visits to 12 purposefully selected districts from our representative sample. We focus on TK–8 mathematics because a strong foundation in the early grades is a prerequisite to high school readiness, and because high school mathematics introduces complexities we could not do justice with the time available to us. We organize our report around four main findings.

Findings

Finding 1: Districts' priorities are diffuse, and mathematics is chronically deprioritized.

District leaders invariably recognize mathematics as important. Yet when asked an open-ended question about their top priorities, nearly two-thirds did not name mathematics in their wide-ranging responses. A cacophony of competing initiatives crowds the landscape, and recent literacy-focused legislative actions, including SB 114, AB 1454, and AB 121, have backed expectations for reading instruction with dedicated funding, screening mandates, and implementation support in ways the state has not done for mathematics. When asked to rank priorities, more than half of district leaders ranked English language arts as their top instructional priority; mathematics came in third.

District leaders most frequently cited state test scores as a major driver of their priorities. The California School Dashboard, by contrast, is not viewed as a meaningful tool for strategic improvement. Leaders attend to it reactively, responding to low color ratings rather than using it to guide long-term planning, and describe it as sometimes distorted by small subgroup volatility. Local Control Accountability Plans (LCAPs) reflect rather than drive district priorities: local priorities are set first, and the LCAP document follows. Mounting reporting requirements are seen as bureaucratic and a drain on time that could be spent on instructional improvement.

Finding 2: The state's TK–8 mathematics expectations far exceed what districts, teachers, and students currently experience.

California has a clear and ambitious vision for mathematics instruction. The Common Core State Standards: Mathematics set high expectations for student learning, and the 2023 Mathematics Framework for California Public Schools articulates a detailed pedagogical vision grounded in conceptual understanding, student discourse, and equitable access. But a large gap separates that vision from typical classroom practice.

The standards are central to most districts' expectations for TK–8 mathematics; more than three-quarters of district leaders cited them as a major driver. The Mathematics Framework, by contrast, has far less influence: only about one in four districts described it as a major driver, and roughly 30 percent said it was not a driver at all. The Framework calls for instruction that is conceptually rich, discourse-driven, and grounded in problem-solving (California Department of Education, 2023), but district leaders say that current classroom practice in most districts does not reflect that vision. Many teachers lack the content knowledge and pedagogical skills needed to teach TK–8 mathematics in the ways the Framework envisions, and they have limited access to the sustained professional learning that would help them develop those capacities. As one state leader noted, "The vision is strong, but the bridge to classrooms is weak."

Adopted mathematics curricula, many of which were adopted almost a decade ago, are widely viewed as imperfectly aligned with state expectations, driving widespread supplementation and fragmented instruction. Rather than wait for the state's approved materials list, released in November 2025, about one-third of districts moved ahead with their own adoption processes, citing outdated materials and the high cost to student learning from further delay. The state's curriculum approval process provides insufficient guidance: it produces a long list of options without meaningfully distinguishing quality or degree of alignment among them, pushing the burden of rigorous vetting onto districts that lack the capacity to do it well; this is particularly the case for small and mid-sized districts with few central office staff. The state also provides inadequate support for implementation once districts have adopted materials. Leaders pointed to the exclusion of transitional kindergarten from the K–8 adoption process as a gap that leaves districts without guidance at a foundational grade level. The message was

consistent: districts want clearer guidance on the strongest TK–8 mathematics instructional materials and stronger support for implementing them.

Finding 3: Districts have uneven and often limited workforce capacity for high-quality TK–8 mathematics instruction.

Almost one-fifth of district leaders described staffing as very difficult, with the challenge especially acute in rural and remote communities. Over four in ten TK–8 district leaders reported relying on underprepared teachers for one or more middle school mathematics positions, with rates far higher in central and northern regions (55 percent) than in southern regions (12 percent).

Even when districts can hire credentialed teachers, many arrive without the content knowledge and pedagogical skills needed to teach TK–8 mathematics effectively. California's dominant credential model concentrates most pedagogical coursework and clinical training into a single post-baccalaureate year, leaving newly credentialed teachers, particularly those with multiple-subject credentials, underprepared in mathematics. As one district leader explained, "Many of our elementary teachers do not have deep content knowledge in math, which makes it difficult to teach conceptually." Leaders described teachers who "revert to procedural instruction because they are not confident in their own understanding of the math" and also shared that many middle school teachers with single-subject credentials know the content, but lack pedagogical skill. Districts inherit the responsibility of filling these gaps using scarce in-service time to remediate weaknesses.

Professional development in TK–8 mathematics is scant and largely voluntary, which is problematic for districts trying to shift from idiosyncratic mathematics instruction to a coherent instructional approach shared by all teachers and aligned with the state’s instructional vision. Most teacher contracts set aside between one and five days for professional development districtwide, but about one in five districts had none; leaders reported that much of that student-free time is used for purposes other than professional learning. Districts try to supplement contracted days through substitute release time and stipends for voluntary sessions, but leaders described these efforts as piecemeal and dependent on inconsistent grant funding. One in five districts offered no consistent mathematics-specific professional learning during the 2024–25 school year, and when mathematics PD was available, it was almost always

optional. More than three-quarters of districts reported having at least one Teacher on Special Assignment (TOSA), but dedicated mathematics TOSAs are relatively uncommon, as most cover multiple subjects and schools. As one state leader summarized, "There just aren't enough people doing mathematics work at the district level."

Finding 4: The state system of TK–8 supports for district improvement is fragmented, inconsistent, and insufficient.

California's system of support for mathematics instruction operates primarily through partnership and influence rather than clear, enforceable lines of authority. The State Board of Education (SBE), the California Department of Education (CDE), the California Collaborative for Educational Excellence (CCEE), 58 county offices of education (COEs), the Commission on Teacher Credentialing (CTC), and the University of California (UC) all play roles, but the formal connections among them are few and informal relationships vary enormously across the state. As one state leader told us, "There is no clear leader in the statewide system of support." This complexity makes it difficult for district leaders to understand what support is available to them and who to turn to for what, and many leaders in our sample were unaware of initiatives that could have served them.

Six statewide mathematics initiatives operate within this structure, each with different funding streams, timelines, and organizational homes. One state agency leader estimated 50 mathematics initiatives are operating statewide "with no real cohesion around their charges." These initiatives often target small cohorts of volunteer teachers rather than whole systems, and district leaders frequently did not know their own teachers were participating; as a result, their impact on district-level capacity is diffuse. Both district and state leaders called for the state to reduce the number of initiatives and set clearer, more stable priorities.

District leaders primarily access support through their COEs and value it most when it is sustained, in-person, and customized. COEs are voluntary partners in mathematics improvement, with no formal requirement to provide instructional support, and many lack the capacity to do so regardless. COE quality varies enormously across the state's 58 counties. COE leaders often described their role in compensatory terms, meaning they were making up for weaknesses, gaps, or dysfunctions elsewhere

in the system rather than operating within a well-designed, coherent structure. They translate state signals for districts, fill capacity gaps, and stitch together fragmented guidance.

Faced with gaps in the publicly funded system, most districts turned to external providers, often layering multiple organizations simultaneously. Districts valued these providers most when they offered intensive, multi-year support customized to their context, a type of support the public system largely fails to deliver. The onus of coordinating these efforts rests on district leaders, and much of the work depends on unsustainable one-time grant funding.

Conclusions and Implications

California has set high expectations for students, but students will not consistently achieve them unless they have a coherent learning experience, which we define as high-quality mathematics instruction that is vertically-aligned and enables students to access the rigor of the state's standards year after year. The organizational structure capable of ensuring students have this type of experience is the school district, but right now most lack the capacity to deliver these results. The conclusions and implications, based on our analysis of the evidence in this study and existing research, suggest what California could focus on to address this situation.

Conclusion 1: California has strong foundational assets for improving TK–8 mathematics, but those assets are not currently organized into a coherent system.

California has already developed many of the key elements needed to support high-quality mathematics instruction. The state has an ambitious instructional vision in its standards and Mathematics Framework, and multiple initiatives and organizations are committed to that vision. District leaders, county office leaders, and external providers are actively engaged in improvement efforts, and there are examples where sustained, well-resourced support has produced meaningful gains in instructional practice.

These assets, however, are unevenly connected and inconsistently available. Sustained professional learning, instructional coaching, and curriculum-aligned support often remain limited to specific

initiatives, regions, or grant cycles, so access depends more on local leadership, geography, and resources than on a reliable system. The result is a pattern of accumulation without alignment: individual programs demonstrate value in isolation but do not consistently reinforce one another or build toward shared statewide goals, producing pockets of progress rather than broad-based capacity for improvement. Strengthening the connections among existing assets, so they work together rather than in parallel, would increase their collective impact without requiring California to start over.

Conclusion 2: Governance structures limit the system's ability to translate instructional vision into consistent classroom practice.

A central theme of this report is the distance between the state's vision for mathematics instruction and what happens in classrooms. That distance reflects both competing priorities and initiative overload as well as related structural features of California's governance system in which authority, oversight, and delivery are distributed across multiple entities, each with its own mandate, funding stream, and accountability structure, and none with clear, end-to-end responsibility for whether districts get the support they need. The SBE sets policy; CDE implements; CCEE coordinates technical assistance; COEs provide regional support; the CTC governs credentialing; the UC system oversees the California Mathematics Project. Each plays a necessary role, but critical entities are often accountable to someone other than the entities that depend on their work. County superintendents are elected by voters, not accountable to the state agencies whose initiatives they carry out nor the districts they serve. The California Mathematics Project operates within the constitutionally autonomous UC system. The state has adopted a Mathematics Framework that articulates a clear instructional vision, but the Framework is guidance rather than a mandate, and there is no explicit statewide implementation strategy to bring it into classrooms.

Governance implication 1. The evidence points to a need for system-level governance reform, both for TK–8 mathematics improvement and for instructional improvement more broadly.

California is at a rare moment of leadership transition across the governorship and State Superintendent of Public Instruction (SPI), which in turn will trigger changes in appointed roles such as

the SBE presidency and leadership roles within key state agencies. What state leaders most need to prioritize is deliberate governance reform: clarifying roles across agencies, strengthening formal lines of authority, and creating mechanisms that ensure coordination rather than fragmentation.

Governance implication 2. The evidence points to reenvisioned regional support structures as critical to building district capacity for TK–8 instructional improvement.

COEs have local presence, valued relationships, and existing infrastructure that position them well to serve as regional capacity-builders for TK–8 mathematics improvement. Currently, however, they have no formal requirement to provide instructional support and many lack the capacity to do so consistently. California needs a regional support structure with an explicit charge to build TK–8 mathematics capacity across all districts, with accountability mechanisms—whether through formal lines of authority or through funding contingent on delivering desired services—that ensure districts receive support aligned to the state's instructional vision.

Conclusion 3: A diffuse policy landscape weakens signals about the importance of mathematics; system incoherence leaves many districts without the capacity to improve mathematics instruction.

California's policy environment sends multiple and often competing signals about instructional priorities. District leaders are responsible for advancing work across many domains, including literacy, social-emotional learning, multilingual learner support, and other state priorities. In this context, mathematics does not consistently receive sustained attention or resources at a level that would position it alongside literacy as a central focus of instructional improvement especially in the elementary grades. This diffusion of priorities interacts with limited capacity and fragmented supports to constrain district action. District leaders must make tradeoffs about how to allocate time, funding, and professional learning, and those decisions are shaped by the relative strength and clarity of state signals.

The broader effect is that individual policy components do not consistently reinforce one another or build toward sustained improvement in mathematics instruction. Curriculum adoption processes,

teacher preparation systems, and professional learning opportunities operate with varying degrees of alignment to the state's instructional vision. Strengthening the clarity and consistency of policy signals and focusing state resources on building district capacity is necessary to enable districts to launch sustained efforts to improve mathematics instruction.

Policy implication 1. The evidence points toward the importance of stronger and more consistent priority signals for mathematics and a policy approach that builds coherence.

California is a local-control state. Yet district leaders did not tell us the state should step back; a large majority wanted clearer, fewer priorities and strong, coherent supports aligned to those priorities. Mathematics should be explicitly named as a state priority, backed by stable signals comparable to those the state has provided for literacy but with sustained funding district leaders can count on. This will necessarily mean making things other than literacy and mathematics lower priorities in TK–8, in recognition of the foundation role that both play in allowing students to access and thrive in all other content areas. It will also mean crafting policies that build coherence and sustain focus on the most important priorities over time, rather than layering new initiatives onto an already overwhelmed system.

Policy implication 2. The evidence points toward the importance of sustained, high-quality professional learning aligned to the state's instructional vision for TK–8 mathematics.

Districts need to provide teacher professional learning opportunities that allow all teachers of mathematics the opportunity to build shared knowledge and language so that students' math learning experience is high-quality and coherent across multiple years in the district. The current professional learning landscape for teachers is largely voluntary, short in duration, and disconnected from practice. As such, it builds the skills of those teachers interested in mathematics instruction who seek out more in-depth learning opportunities but largely misses those whose interests lie elsewhere. The result for most students is that they do not receive high-quality and vertically coherent mathematics instruction consistently as they progress through school. State and local leaders should develop a system of professional development that would support all teachers of mathematics in grades TK–8 to effectively

teach students to state standards; the state then needs to provide the resources to make that vision a reality statewide. Instructional coaching, which is sustained, job-embedded, and can be differentiated to support teachers' varied needs, holds promise as a central component of this professional learning system, as it has been in states like Louisiana and Mississippi, where it contributed to dramatic gains in student outcomes.

Policy implication 3. The evidence points to strengthening district-level capacity as a central mechanism for improving TK–8 mathematics instruction.

The resources the state currently makes available to all districts as "universal" supports are typically documents, toolkits, or webinars. Except through fee-for-service contracts, grants, or philanthropy, few districts receive the types of ongoing, intensive, district-level support that would help them digest and apply state-produced tools to build TK–8 mathematics instructional capacity and internal alignment. Most districts will not improve if they must rely on toolkits and a subset of teacher volunteers attending workshops. The state needs a coherent approach that redirects resources toward building district-level instructional capacity for TK–8 mathematics, helping districts braid their own resources in a more focused way. Given the vast size of California, it would be reasonable to first focus on supporting the lowest-performing districts.

Policy implication 4. The evidence points toward the importance of strengthening teacher preparation as part of a coherent system for improving TK–8 mathematics instruction.

California needs preparation models that produce TK–8 mathematics teachers with deeper training in content and pedagogy, and that function as a connected continuum with ongoing professional learning rather than as an independent, compressed, one-time activity. Shortcomings of current teacher preparation place a vast burden on districts to build teacher knowledge and skill for teaching mathematics, which most districts lack capacity to shoulder, resulting in variability in instructional quality across schools and districts.

Policy implication 5. The evidence points toward the importance of clearer signals about quality instructional materials, broader inclusion of Transitional Kindergarten (TK), and stronger support for implementation.

The state should provide transparent, criteria-based evaluations that meaningfully distinguish the quality of instructional materials, as Massachusetts and Texas have done, rather than leaving districts to vet dozens of broadly equivalent options on their own. TK materials should be brought into the K–8 adoption process.

We conclude by noting that there is a crucial difference between centralization and coherence. Centralization concentrates decision-making at the top; coherence ensures that decisions and supports at multiple levels align around shared goals, even as primary authority remains local. Similarly, local control means that LEAs have substantial decision-making authority, not that the state should not play a role leveraging collective expertise to make it easier for districts to make good decisions. Nearly all of the people we interviewed expressed a desire to move along the continuum, away from unstructured autonomy and toward greater system coherence, which will require a different state-level role in California education. Kirst (2024), the architect of LCFF, argues that state investments in capacity-building to date have produced "'islands' of high-capacity teachers surrounded by wide deserts'" of low capacity (p.2). In the area of TK–8 mathematics, we find much truth in his words. The building blocks for improvement exist. What is needed now is the coherence, sustained focus, and political will to assemble them into a system that works for every district, every school, and every student across the state.

Introduction

This report examines how California's governance structures, policies, and support systems shape school districts' capacity to improve mathematics instruction and student learning in transitional kindergarten through eighth grade (TK–8). The report is one of several studies conducted as part of Getting Down to Facts III, a research initiative designed to provide California's education leaders with an independent, evidence-based assessment of the state's education system at a critical moment of leadership transition. Drawing on interviews with 94 district leaders from a representative statewide sample, interviews with 31 state agency officials, county office leaders, external providers, and policy experts, and one-day site visits to 12 purposefully selected districts, we examine how state intentions are interpreted at the district level and, through site visits, how they appear to shape classroom practice in selected districts. We center districts because, in California's local-control system, districts function as the primary engines of instructional improvement: interpreting state policy, making consequential local decisions, and shaping the conditions under which teaching and learning occur. At the same time, we look both up to state agencies and down to classrooms, incorporating perspectives across levels of the system to assess whether California's current governance structures and policies make it possible for teachers to provide students consistent, high-quality TK–8 mathematics instruction and what it would take to do so.

Across our analyses, a consistent pattern emerges: California's challenges in improving TK–8 mathematics stem from three interacting system-level gaps rather than from a lack of vision or effort. First, a priority gap: mathematics is not consistently signaled as a central instructional priority in ways that shape district decision-making. Second, a capacity gap: districts, schools, and teachers often lack the knowledge, time, and resources needed to enact the state's instructional vision. Third, a coherence gap: the state's governance structure and array of initiatives produce fragmented, and sometimes conflicting, signals and supports, limiting their collective impact. These gaps are mutually reinforcing; weak prioritization reduces investment in capacity, limited capacity makes ambitious instructional reforms difficult to implement, and fragmentation prevents the system from aligning around shared goals. We use this framework to organize our findings and to interpret how state policies and supports translate into classroom practice.

Context

We conducted this study at an inflection point for California education. As the governor's January 2026 State of the State speech illuminated, California is spending more than ever before on education, yet outcomes are mixed (Newsom, 2026). This is especially true in mathematics education. Like all states across the country, California saw student outcomes drop during the pandemic and while our recovery is better than many states, we have yet to return to pre-pandemic levels (Center for Education Policy Research, 2025). In the most recent year (2024–25), the majority of eighth graders met or exceeded state standards in mathematics on the CAASPP in 19% of traditional public school districts (excluding County Office of Education and Charter Local Education Agencies, State Special Schools, and districts reporting data for 10 or fewer students in eighth grade); the comparable figure for English language arts is 40% (California Department of Education, 2025a). At the current rate of year-to-year improvement, it will be decades before the bare majority of California students meet state expectations for mathematics learning (Gallagher, 2025). We therefore start with the premise that while California's education system has some strengths, it must improve. We are also at a fiscal inflection point, where declining enrollment in many districts combined with the end of pandemic-relief funding is creating a fiscal cliff for many districts. As a result, improvement will need to be driven by using existing resources more effectively rather than by an influx of new resources alone.

The education governance system in the state has long been a cause for concern. As he ends his term, Governor Newsom has proposed changes that, if approved, would create greater structural alignment for education governance under the direct authority of the governor (California Legislative Analyst’s Office, 2026). This governance shift creates a unique opportunity for a new leader to focus on bringing coherence and clarity to that system and the infrastructure it supports.

This report builds on a recent PACE governance study that examined California's education system primarily at the state level (Myung et al., 2025), shifting the analytic center to school districts. We do so because, in a local-control state, districts function as the primary engines of instructional improvement. District leaders occupy the pivotal middle layer of the system: they interpret state policy, make consequential local decisions, and shape the conditions under which teaching and learning occur. Centering districts allows us to examine where governance decisions translate into operational strategy

and where improvement efforts either gain coherence or fragment. This study provides a system-level view from districts, tracing how state policy signals are interpreted, operationalized, and experienced in practice, and identifying the specific mechanisms through which fragmentation constrains instructional improvement.

Districts are not the full picture, however. To understand mathematics education in California, we also look up to the state level and down to classrooms. State agencies and governing bodies establish standards, adopt frameworks, design accountability systems, and influence how legislatively appropriated funds flow through the system. Their priorities and administrative decisions set the parameters within which districts act. Classrooms, in turn, are where policies ultimately matter: teachers interpret guidance, use instructional materials, and create daily learning opportunities for students. By incorporating the perspectives of state leaders and teachers alongside those of district leaders, we can trace how intentions formed at the statehouse travel through districts and land in practice, and assess whether the system, as experienced across levels, makes it possible for teachers to provide students consistent, high-quality mathematics instruction.

In writing this report, we attempt to fill a structural gap in communication by bringing together a range of voices and varied perspectives of individuals who care deeply and bear great responsibility for California education. Although there are rich case studies of what a coherent and effective TK–8 system looks like, California leaders do not have a statewide picture of the current status of TK–8 mathematics improvement efforts at the local level. More specifically, they do not have a representative portrait of how district leaders experience the TK–8 system around them, nor what they think the state might do to better serve them.

Finally, to keep our study scope manageable and digestible, we chose to focus on TK–8 mathematics. We made that decision because high school mathematics introduces considerable complexity we did not feel we could do justice in the time we had. We also know that for students to enter high school ready to learn grade-level mathematics, they need the foundation of a strong TK–8 mathematics experience.

Governance in the post-LCFF era

In 2013, the Local Control Funding Formula (LCFF) reshaped how California allocates funding to local education agencies (LEAs) and holds them accountable for results. LCFF established the Local Control and Accountability Plan (LCAP) and the California School Dashboard, prioritizing district autonomy within a statewide accountability framework. At the same time, the state created the California Collaborative for Educational Excellence (CCEE) and formalized structures of collaboration to provide additional support and capacity-building for LEAs.

The LCAP was designed to align district planning, budgeting, and stakeholder engagement around local priorities while requiring progress in eight state priority areas: student achievement, student engagement, school climate, parental involvement, basic services, implementation of academic standards, course access, and other student outcomes (California Department of Education, 2026b). The California School Dashboard, released annually by the California Department of Education (CDE), publicly reports district and school performance using five color-coded ratings (blue, green, yellow, orange, and red) across state and local indicators aligned to those priority areas. Ratings reflect both current performance and year-to-year change and are reported for districts overall and for individual student subgroups; subgroup results can independently trigger identification for additional state support, including differentiated assistance, a formal status requiring a district to participate in a support process led by its county office of education (COE) to address low performance ratings (California Department of Education, 2026a; Myung et al., 2025).

Reflecting on California's education governance system, Kirst (2024), the four-term president of the State Board of Education (SBE) and an architect of the LCFF, recognized both the improvements in education governance that occurred during his tenure and the work yet to be done:

> Looking back, it was naïve to believe that these policy reforms alone would be enough to achieve the desired impact. We successfully corrected for some of the failures of prior attempts to generate educational improvement by over-focusing on accountability (embodied by policies like No Child Left Behind). I failed, however, to realize the extent to which accountability-focused approaches of the past had underinvested in building the system

> capacity necessary to support educators in developing the knowledge and skills that would enable them to teach successfully in the new ways that the new standards demanded. Our policies did not do enough to overcome this deficit…California has made significant investments, funded by the state and/or private foundations, in capacity-building projects….. However, efforts like these have created "islands" of high-capacity teachers surrounded by wide "deserts" of schools and districts lacking system capacity to provide consistently engaging, standards-aligned instruction. (p. 1–2)

In this study, we present evidence with which to examine how Kirst's assessment plays out in TK–8 mathematics.

Setting the vision for mathematics teaching and learning

As Myung and colleagues (2025) explain, one of the state's central responsibilities in education governance is setting vision and direction. In mathematics, the SBE, with support from the CDE, has exercised that role by adopting the California Common Core State Standards: Mathematics (CA CCSSM) in 2010, adopting the revised Mathematics Framework for California Public Schools, Kindergarten Through Grade Twelve in 2023 (hereafter Framework), and adopting a new list of standards-aligned instructional materials in 2025. The standards define what students should know and be able to do. The 2023 Framework more explicitly articulates the state's vision for high-quality mathematics instruction, emphasizing conceptual understanding, reasoning, problem solving, and equitable access to rigorous content. Together, these actions establish both learning expectations and instructional direction for districts and schools.

Following the Framework's adoption, CDE supported SBE in adopting K–8 instructional materials aligned to the standards and consistent with the Framework's evaluation criteria. Districts then select curriculum according to local policy; some require instructional materials selection from the state adoption list, while others permit additional options.

Research suggests that the instruction envisioned by CA CCSSM represents a substantial shift for many teachers, requiring deeper mathematical knowledge and more sophisticated pedagogical skill (McLaughlin et al., 2014). National efforts to improve mathematics instruction in line with these

expectations have yielded mixed results (Hill, 2021). California's framework development and curriculum adoption processes aim to support districts in this work by offering guidance on effective instruction and identifying instructional materials aligned to state standards. The Framework provides guidance rather than a mandate. As it states, "While this approach to mathematics education may be a tall order, research shows that it is the means to both provide access for all students and teach mathematics effectively" (California Department of Education, 2023, Summary p. 4). To advance this vision, the Framework outlines coherent approaches to curriculum, assessment, differentiation, and acceleration across grade spans and offers implementation guidance to help districts align materials, professional learning, and local systems.

We focus on TK–8 mathematics both because it is a critical area of student learning and because we were in a period of active state policy development: data collection began approximately 18 months after the Framework's release, as the state's instructional materials review process was underway and before the State Board of Education (SBE) adopted the instructional materials list. As a result, the state's role in shaping and supporting mathematics instruction was particularly salient for education leaders at the time of our interviews.

Selected Research

The features of California's education governance and policy context, along with the existing research base, shaped our research questions and analyses. The existing research base was most influential in a few key areas:

District role in instructional improvement

Districts are the largest organizational unit that has direct and meaningful impacts on classroom instruction. Over the past two decades, research has shown that districts set instructional vision, allocate and align resources, adopt curriculum, organize professional learning, and build the systems that connect standards, materials, assessment, and leadership into a coherent whole (Blazar & Schueler, 2023; Cobb et al., 2018; Rorrer et al., 2008). The district role is even more important in California than elsewhere because the state delegates substantial authority to districts under LCFF.

Instructional materials and high-quality instruction

Instructional materials are a powerful lever for supporting effective instruction, but teachers often supplement adopted materials heavily, which can weaken curricular coherence and guidance. Instructional materials shape both what teachers teach and how they teach it. As Polikoff (2022) explained, "these materials shape teachers' instruction and, through it, student learning... [M]aterials often represent a bridge between the 'intended curriculum' (i.e., state or other content standards) and the 'enacted curriculum' (i.e., what actually gets taught...)" (p. 2). Teachers are therefore more likely to align instruction with the state's vision when their curriculum reflects CA CCSSM and the pedagogical approaches emphasized in the Framework. Although thoughtful supplementation can strengthen instruction, research finds that teachers often select supplemental materials to provide additional practice or simplify content. While these may address immediate classroom needs, heavy supplementation can undermine coherence and weaken alignment to standards, particularly without clear guidance (Doan et al., 2024).

Localized staffing challenges

Staffing shortages vary considerably by subject and region and can undermine student learning. National research shows that teacher shortages in the United States vary by subject, region, and local labor market conditions (CALDER Center, 2025; Learning Policy Institute, 2025). Even when overall supply appears adequate, vacancies, underqualified teachers, and high turnover in certain contexts limit students' access to stable, well-qualified educators. Because having a stable, qualified teaching staff is associated with stronger student achievement and growth, staffing challenges can undermine student learning (Carver-Thomas et al., 2024; Nguyen et al., 2022).

Most teachers in California complete an undergraduate major followed by a one-year post-baccalaureate credential program, meaning that pedagogical coursework and clinical preparation typically occur within a single year. As a result, candidates often have less time than peers in states with multi-year undergraduate teacher education programs to build classroom experience and develop pedagogical expertise (Grossman & Kaul 2026).

Effective teacher professional development

Effective teacher professional development can improve instruction and student learning, but not all professional development is effective. Research consistently finds that effective professional development is content-focused, sustained over time, incorporates active learning, aligns with curriculum and standards, and includes opportunities for collaboration and coaching, features not present in one-shot workshops (Darling-Hammond et al., 2017; Jackson et al., 2018).

A key feature of professional development is teacher collaboration, which supports shared learning, interactions, and discussions (Darling-Hammond et al., 2017; Desimone, 2009; Garet et al., 2001). Teacher collaboration can support school or district improvement when it fosters coherence among teachers in the same school. This occurs when collaboration aligns new approaches to a broader vision for teaching and learning and encourages teachers to connect their learning to their instruction, curriculum, and use of assessments (Gallagher, 2016; Griffith et al., 2014; Horn et al., 2018; Newmann et al., 2001).

Promise of coaching

Coaching is a particularly promising format for teacher professional learning because it provides supported practice with new approaches, including opportunities to observe strategies, try them in classrooms, receive feedback, and reflect on practice (Kraft et al., 2018). Research underscores the importance of practice and reflection in helping teachers adopt new instructional approaches (McDonald et al., 2013). Designed to be personalized and iterative, coaching enables teachers to observe expert practice, co-teach, and refine instruction over time in a collaborative, low-stakes environment (Gibbons & Cobb, 2017; Kane et al., 2018). Even when delivered at the grade or school level, coaching can be differentiated to support individual teacher development and move practice toward a more aligned, collective approach.

Fragmentation of California's education governance

California's education governance is unusually fragmented. As Myung et al. (2025) describe, California has a "double-headed" education governance system, where two elected executives have different

types of authority over education. Ripma and Loeb (2026) add further nuance, explaining that California relies heavily on delegating authority, even to entities like county offices of education that the state education agency does not hierarchically control. Additionally, COEs vary enormously in capacity, funding, and focus (Trinidad et al., 2026). As a result, the very structure of California's education system is fragmented, relying minimally on authority and substantially on a network of influence. Given that the state education agency has insufficient knowledge management capacity (Myung et al., 2025), the result is "a fragmented landscape of competing initiatives" (p. 27) where districts are likely to experience state guidance as contradictory rather than coherent.

Research questions

To understand district capacity and incentives for improving TK–8 mathematics instruction and the state's efforts to support that improvement, we addressed the following broad questions:

1. What are districts' priorities and how are they set?
2. How are districts working to improve mathematics instruction and student learning in TK–8?
3. What is the state currently doing to improve instruction and student outcomes in mathematics in TK–8?
4. What are potential changes to state policy and practice that could improve student outcomes in mathematics in TK–8?

To answer the first question, we drew on prior research suggesting that California sends multiple, and sometimes competing, signals about priorities through its accountability system and its use of competitive grants (Myung et al., 2025). In that context, mathematics represents only one of many areas districts are responsible for improving, and we wanted to understand how district leaders navigate those competing expectations and whether mathematics consistently rises to the top. To answer the second question, we examined the conditions districts have built for high-quality TK–8 mathematics instruction: the strength of their teacher workforce, the quality and use of their instructional materials, and the professional learning available to their teachers. We explored these conditions through our representative sample of district leader interviews and used site visits to 12 purposefully selected districts to understand more concretely how those conditions shape

implementation. To answer the third question, we mapped the full landscape of support for TK–8 mathematics improvement in the state, including the major state initiatives, the state agencies and county offices that deliver them, and the external providers that districts turn to when publicly funded support falls short. To answer the fourth question, we synthesized findings from the first three questions to identify the most consequential gaps, drawing heavily on what district and state leaders told us they most needed from the state to improve TK–8 mathematics instruction.

Methodology

We addressed these questions through a large-scale data collection effort drawing on both quantitative and qualitative data from district leaders and leaders of organizations that serve them, in state-funded agencies and offices and in non-governmental entities. We drew on three primary data sources.

District leader interviews (n=94)

We conducted interviews with a representative statewide sample of district leaders, stratified by region (see Appendix A for specific counties) and district size, oversampling mid-sized districts. These 94 district leaders were either superintendents or senior district leaders, such as an assistant superintendent for curriculum and instruction, who played a major role in TK–8 mathematics in their district. We refer to this set of interviewees as "district leaders." Table 1 shows the distribution of interviews across the 15 strata in our sampling frame.

Table 1. District leader respondents from a representative sample stratified by region and size (n=94)

	Small (5 or fewer schools)	Mid-sized (6 – 24 schools)	Large (25+ schools)	Total
LA and Inland Empire	3 districts	9 districts	3 districts	15 districts
Southern	2 districts	11 districts	5 districts	18 districts
Central Valley & Central Coast	4 districts	10 districts	3 districts	17 districts
Bay Area, Foothills, & Sierras	6 districts	11 districts	4 districts	21 districts
Northern	6 districts	11 districts	6 districts	23 districts
Total	21 districts	52 districts	21 districts	94 districts

State entity, external organization, and expert interviews (n=32)

To preserve confidentiality, we refer to this diverse set of interviewees as "state leaders." The group included 14 interviews with county offices of education (COEs), including those with leadership roles in statewide mathematics initiatives and GeoLeads, six external providers or consultants, two membership associations, seven mathematics initiative leaders (five of whom were also in COEs), four state agency leaders, and four experts on the state-level role in supporting instructional improvement.

District site visits (n=12)

We purposefully selected 12 districts from our larger sample of 94 that as a group varied in size, geography, student demographics, and performance on state mathematics tests. Districts represented the Central Valley, South, North, and Bay Area and Central Coast regions and varied by size. We also sought a range of student demographics, using metrics such as the percentage of students eligible for Free and Reduced Price Lunch and the range of community types, from rural remote to rural near smaller cities, suburban, and urban. While most districts clustered around the statewide average for mathematics performance, one district had substantially higher student proficiency in mathematics in grades three and eight, and one had substantially lower proficiency. We also selected districts that used diverse resources and supports, including external providers, COEs, statewide initiatives, and

consultants. On each one-day visit, we conducted interviews with district leaders, school leaders, elementary and middle school teachers, and instructional coaches where applicable.

Analysis

Our analysis followed a staged approach. We analyzed district interview data, state leader interview data, and site visit data sequentially, then conducted a cross-data review to identify patterns, outliers, and representative quotes. For each data source, we combined manual reading and coding with AI-assisted analysis using ChatGPT 5.2. Researchers first read through interviews independently and identified key themes by hand. We then used ChatGPT 5.2 to generate its own thematic analysis of the same interview data, which we used to triangulate our manual coding. Where the AI-generated themes aligned with our own, we gained confidence in those findings; where they diverged, we returned to the data to investigate further. We also used ChatGPT 5.2 to identify examples tied to the confirmed themes. We describe each component of our methodology in greater detail in Appendix A.

Findings

There is a persistent gap between the state's ambitious vision for mathematics instruction and what districts are able to enact in practice. The findings that follow show how challenges related to priority, capacity, and coherence contribute to that gap.

Finding 1: Districts' priorities are diffuse, and mathematics is chronically deprioritized.

SECTION FINDINGS

- Leaders invariably recognize mathematics as important, but a cacophony of initiatives competes for attention and mathematics is not consistently prioritized.
- Literacy is a higher priority than mathematics, in part as district leaders respond to a series of literacy-specific statewide efforts.
- District leaders most frequently cited state test scores as a major driver of their priorities.
- District leaders pay attention to Dashboard ratings when they are low but do not use the Dashboard as a strategic planning tool.
- District priorities drive LCAPs, and mounting reporting requirements drain time from instructional work.

The passage of LCFF shifted California's accountability system toward a multi-measure framework in which ELA and mathematics test results are included among several state and local indicators. In this post-LCFF context, we examined what drives district priorities, how state test scores, the Dashboard, and the LCAP shape those priorities, and where mathematics fits in.

Leaders invariably recognize mathematics as important, but a cacophony of initiatives competes for attention and mathematics is not consistently prioritized.

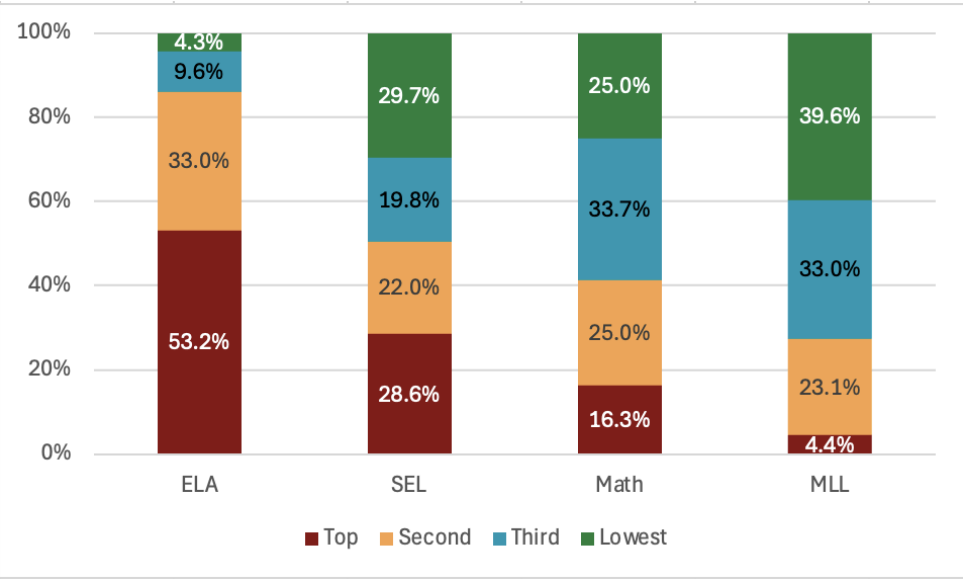
When asked an open-ended question to describe their district's priorities, nearly two-thirds of district leaders did not name mathematics as a top priority. Many leaders shared a long list of important issues and indicators in their responses, which often spanned multiple years of effort. For example:

> We have a strategic plan that has four pillars... student success,... employee engagement,... family and community partnerships,... and improvement, efficiency and innovation... For the student success pillar, we really look at graduation rates, we look at ELA and CAASPP ELA and math CAASPP scores as well as science scores. And then we have a student experience survey that all of our third through 12th graders take that really gives their perspective on how school

is going. So that's where our focus is. And then each school site has kind of a piece within that that they… might personalize a little bit for their site.

As this example illustrates, most district leaders made it clear that mathematics is one among many factors that the district is trying to focus on simultaneously. They acknowledged that those multiple priorities compete directly with each other for resources, especially educator time. As one district leader explained, "There are a lot of initiatives happening at once, and mathematics sometimes gets lost. Implementation suffers when there isn't a clear, sustained focus." This pattern reflects a broader priority gap in the system: while mathematics is widely viewed as important, it is not consistently elevated through state policy signals, funding, or accountability mechanisms in ways that shape district priorities relative to competing demands.

Figure 1. Percentage of districts naming ELA, SEL, Mathematics, and Multilingual learners as top, second, third, or lowest among those priorities (n=91)



To put a sharper point on how mathematics ranks among other priorities, we also asked district leaders to rank-order four critical issues, English Language Arts, Mathematics, English Learners, and Social-emotional Learning, in terms of the allocation of funding and teacher professional development time (see Figure 1). Many district leaders reported that they were of equal importance and also interdependent or overlapping. English language arts was the top priority in the majority of districts.

Social-emotional learning was the top priority in just over one-quarter of districts, though responses make clear that leaders' answers referred to ongoing work to rebuild students' emotional health and social and behavioral skills since the pandemic in addition to skills that fall into formal SEL frameworks such as the CASEL Framework. Mathematics came in third, followed by multilingual learners. Frequently, district leaders' greatest concerns about multilingual learners were around language development and literacy, which led them to select English Language Arts as their top priority.

District leaders often named allocating instructional time for mathematics as a particular challenge, bemoaning how little time there is for TK–8 mathematics instruction once other requirements are met for the school day. One leader shared: "I think that a big part of the challenge is time and capacity. There's only so much time in the day, and mathematics is competing with literacy, social-emotional learning, and everything else. We're constantly making tradeoffs." State leaders, especially COE leaders, described the scarcity of protected instructional time for TK–8 mathematics as a function of a lack of prioritization. One COE leader said: "Even motivated districts hit a wall because there's no time." Box 1 provides an example.

Box 1. Well-intentioned initiative overload

An example from one medium-sized district illustrates how improvement efforts can accumulate faster than a system's capacity to implement them well. The district is advancing a literacy initiative in the elementary grades and a major effort to build educators' cultural awareness and responsiveness. At the same time, it participates in additional support from the Statewide System of Support, engages in multiple state-supported mathematics initiatives, works with an external professional development provider, and takes part in regional grant-funded efforts. Each of these initiatives brings its own expectations, timelines, and reporting requirements. In a district with limited central office capacity and ongoing staffing challenges, this layering of reforms creates fragmentation rather than coherence. Leaders and teachers must divide their attention across many priorities, including strengthening mathematics instruction, making it difficult to sustain depth in any single area. The result is not a lack of effort, but an overload of well-intentioned initiatives competing for the same limited time and energy.

County office leaders, arguably the front line for district support, often reported that their focus also had to be stretched across many different things. One explained, "COEs are stretched thin, and

mathematics is competing with everything else." Leaders told us repeatedly they needed to make tough trade-offs about what they can and cannot do to support districts.

Literacy is a higher priority than mathematics, in part as district leaders respond to a series of literacy-specific statewide efforts.

Many district leaders shared that they see mathematics as just as important as literacy for their students' future success. But district leaders struggled to prioritize mathematics as they and their site leaders and teachers juggle multiple large-scale change efforts simultaneously. One superintendent summarized this challenge:

> We are all in on literacy. It's really hard to do literacy and math at the same time. You can't do two major content areas at an elementary school ever. And we were also rolling out a science adoption and a new social studies curriculum that had been adopted before COVID. I think it's about the time and the capacity, recognizing that your educators at that grade level are teaching all the things.

As Figure 1 shows, more than half of districts ranked literacy as their top priority. This focus on literacy at the local level aligns to and likely reflects a strong focus on literacy at the state level as well, as we describe in Box 2.

Box 2. Prioritizing Literacy in California

In the past five years, California has enacted several major laws to strengthen literacy instruction, particularly in the early grades. SB 114 (2023) requires universal screening of all K–2 students for risk of reading difficulties, including dyslexia, beginning in 2025–26, to support earlier identification and intervention. Building on that foundation, AB 1454 (codified by Education Code §60205) directs the State Board of Education to adopt ELA/ELD instructional materials aligned with evidence-based approaches for teaching foundational reading skills and invests significant state funding in professional development for teachers, principals, and reading specialists, while Assembly Bill 121 (2025), the Education Omnibus Budget Trailer Bill, appropriates Proposition 98 funds to expand literacy coaching, training, and statewide implementation supports. Together, these measures combine early screening, instructional materials reform, and sustained professional learning investments to improve literacy outcomes statewide. There is no parallel effort in mathematics and, absent a concerted effort to increase district capacity, districts would likely struggle with implementation of a parallel mathematics effort.

Some district leaders called for the state to undertake a parallel effort to support mathematics. As one put it:

> We need the county and the state to allocate some funding specific toward implementation of math… If you look across districts, everyone has a literacy teacher on special assignment, an ELD teacher on special assignment, but that always takes priority over math… I think that's an area where the county could provide more coaching, like a trainer of trainers.

The current LCFF system and strong state programs in literacy combine to create a context in which mathematics is not prioritized.

District leaders most frequently cited state test scores as a major driver of their priorities.

Though LCFF was designed to broaden districts' focus, district leaders consistently told us that state test scores were the major driver in setting their longer-term local priorities. One leader shared: "We look very closely at our CAASPP data each year. Those results inform our LCAP goals and where we put our energy." Another clearly articulated that test scores matter more than other indicators: "Attendance

and suspension matter, of course, but the state assessment results are what really drive our instructional priorities." A third said: "The Dashboard gives us a broad picture, but the CAASPP results tell us where we need to act instructionally."

District leaders pay attention to Dashboard ratings when they are low but do not use the Dashboard as a strategic planning tool.

When describing their use of the Dashboard, district leaders did not portray it as a tool for tracking progress toward coherent district goals. Instead, they described responding to low color ratings in the moment, particularly when a subgroup's red rating triggered eligibility for Differentiated Assistance. Because a single student group receiving a red performance level on one state indicator can initiate state identification, leaders often focused on short-term corrective actions tied to specific ratings rather than longer-term strategic improvement. One district leader shared: "It's our accountability system, so we don't ignore it…. For example, when English learners showed up in the red, we did targeted work this last year to address those needs."

Other leaders shared frustration that the Dashboard's performance ratings could shift focus in unproductive ways. Because the outcomes for a small number of students within a given subgroup can have a large impact on ratings, the Dashboard can create swings in districts' attention year-to-year. One leader told us how a single chronically absent special education student combined with a few suspensions of students caught smoking at a dance triggered differentiated assistance, which resulted in a three-year compliance cycle with county oversight:

> It turned out to be one student. We had one student that was chronically absent that moved the needle and made us go into this DA… it was about 10 kids that were in that group, but boiled down to that one kid… And this is a school with 300 kids, so it makes your chart [the Dashboard] a little wonky.

District priorities drive LCAPs, and mounting reporting requirements drain time from instructional work.

District leaders typically saw the LCAP document as what one described as "a side document. We make sure it says the same things, but it's not really the driving document." Many commented positively on the community engagement processes the LCAP requires. As one leader explained:

> The process of going through and looking at our data with our community and trying to figure out what are going to be the best paths forward for helping our students be more successful has a huge impact. The process is great.

The LCAP document itself, however, is widely seen as a burdensome compliance exercise with minimal intrinsic value. As one leader said, "We've set the priorities, and then the logistics of filling all the fields and accounting for all the dollars comes afterward. The length of the LCAP itself makes it a compliance document. It's not a useful instructional planning document." Another added, "It's so meticulous and time consuming that it often pulls staff away from the actual priorities we're trying to address."

District leaders also reflected on how the volume of LCAP reporting has grown since its inception. When LCFF passed, the state reduced the number of categorical grants to provide districts more flexibility and less compliance reporting. With the rise of categorical grants passed in recent years, the amount of documentation district leaders told us they need to produce has ballooned. One superintendent sent us a photo of seven bankers boxes full of compliance documents their district had produced for the state in a single year.

The burden of the LCAP was felt by many districts, but perhaps most keenly in small districts with few staff to share the load. As one explained:

> It feels like it's built for LA Unified and not for our little district. My community and our board are focused on making sure kids are learning and feel safe. I'm not sure how many people actually read the LCAP.

Taken together, these responses show that the LCAP and Dashboard do not play the role of supporting districts to undertake strategic, long-term planning.

Taken together, these findings show that district priorities are shaped by a crowded and often fragmented policy and accountability environment in which mathematics, while widely viewed as important, is not consistently elevated. District leaders navigate a wide array of competing initiatives and requirements, with literacy receiving stronger and more sustained emphasis due to clearer state signals, dedicated funding, and aligned supports. In this context, mathematics is often deprioritized, particularly when time, attention, and instructional capacity are limited. Although state test scores play a central role in shaping district focus, other accountability tools such as the Dashboard and LCAP do not function as strategic drivers of coherent, long-term improvement, instead prompting reactive or compliance-oriented responses. The result is a system in which districts must spread limited resources across multiple priorities, making it difficult to sustain focused effort on mathematics and contributing to a broader lack of coherence in instructional improvement.

Finding 2: The state's TK–8 mathematics expectations far exceed what districts, teachers, and students currently experience.

SECTION FINDINGS

- A large gap exists between state expectations for TK–8 mathematics learning and the realities of typical classroom practice.
- California's mathematics standards shape instructional decisions in most districts, while the Mathematics Framework has far less influence.
- Adopted mathematics instructional materials are widely viewed as misaligned with state expectations, driving supplementation and fragmented instruction.
- Some districts moved ahead with instructional materials adoption without waiting for state guidance.
- The state adoption process provides insufficient guidance on the quality of instructional materials.
- Districts lack adequate support for implementing instructional materials effectively.
- The state's instructional materials adoption process does not support districts to identify appropriate instructional materials for TK.

The state's vision for student learning in TK–8 mathematics can be understood as a combination of state mathematics standards, which lay out expectations for "what" students learn, and the Mathematics Framework, which focuses on "how" teachers can help all students achieve expectations. While instruction is expected to be aligned to standards, the Framework provides recommended but not required guidance about effective instructional approaches. Instructional materials support teachers to deliver instruction. Regardless of the extent to which districts choose to follow the guidance of the Framework, districts need to ensure students receive a coherent mathematics learning experience, which is vertically-coherent and aligned to California's rigorous standards, for students to attain proficiency in mathematics.

A large gap exists between state expectations for TK–8 mathematics learning and the realities of typical classroom practice.

Across our interviews we heard regular concerns about the challenge of teaching grade-level content to students who were behind and teachers' readiness to use the approaches suggested in the Framework. Interviewees told us the Framework represented a departure from previous guidance. As one state-level interviewee explained, "Previous frameworks would actually be focused on the standards themselves, whereas this Framework is really more about the pedagogy behind how to teach mathematics." The same interviewee later elaborated, "I think the Math Framework is revolutionary in the sense that it's another major shift in learning, a shift in pedagogy and emphasis in teaching math to all students." This pedagogical shift marks a major change in how the state approaches mathematics instruction and, consequently, places additional time and capacity demands on districts, schools, and teachers. As subsequent sections show, some district leaders' experience of the Framework is predicated on their assessment of their teachers' ability to enact central practices well. One leader told us:

> Sometimes we design for maybe the top 10% of teachers who really can do this. Meanwhile there's 90% of teachers who are just like, 'I don't know what you're talking about, what am I going to do tomorrow in front of students?'

District leaders shared that, since COVID, teachers have had too many students who are not ready to learn mathematics at grade level, making it difficult to move at the expected pace through grade-level content. They pointed to gaps in both student knowledge and student confidence in mathematics. One district leader shared how confidence and learning intertwine: "There's a lot of unfinished learning, especially after COVID. Student confidence in math is low, and that affects engagement and willingness to persist." As a consequence, teachers spend significant amounts of time remediating learning gaps, which slows their ability to provide grade-level instruction: "Students are coming in with significant gaps, and that makes it really hard to move forward. Teachers feel like they're constantly remediating instead of teaching grade-level math."

State leaders framed this gap primarily as an implementation and systems translation problem. One put it this way: "The vision is strong, but the bridge to classrooms is weak." The Mathematics Framework provides an illustrative example of this disconnect. While district leaders and teachers described the challenges of needing to remediate students, guidance from Chapter 1 of the 2023 Mathematics Framework suggests an asset-based approach instead:

> Once an educator recognizes and believes that every student can learn meaningful, grade-level mathematics at deep levels, the challenge is to create classroom experiences that allow each student to access mathematical thinking and persevere through challenges…. Creating such classroom experiences is not easy. For example, some educators automatically associate classroom diversity with a need for “differentiated instruction….” [T]his framework asserts a different approach to thinking about the diversity that characterizes so many California classrooms. Under the framework, the range of student backgrounds, learning differences, and perspectives, taken collectively, are seen as an instructional asset that can be used to launch and support all students in a deep and shared exploration of the same context and open task (California Department of Education, 2023, p. 11).

State leaders recognized the difference between the Framework's guidance and where many districts currently are with practice. One described the Framework as "aspirational," another noted "We're good at launching things, not at supporting implementation," and a third added, "Districts are told what to do, not helped with how."

Some county office leaders described the pace of change set by the state as a related problem, arguing that districts simply cannot keep up with the rapid rollout of multiple complex initiatives. "Change is coming faster than districts can handle it." We heard this as a generic concern and also one directed specifically at the Mathematics Framework. One support provider put it plainly: "Experts study this work and get input from teachers and say here's what this ought to look like. And it turns out none of this is actually feasible. I mean, the Mathematics Framework is 900 pages!"

This pattern illustrates a central capacity gap: the state has articulated an ambitious instructional vision, but districts and teachers often lack the content knowledge, pedagogical skill, time, and

implementation support needed to enact it in practice. In this context, the Mathematics Framework functions more as an aspirational description of instruction than as a tool that shapes day-to-day teaching.

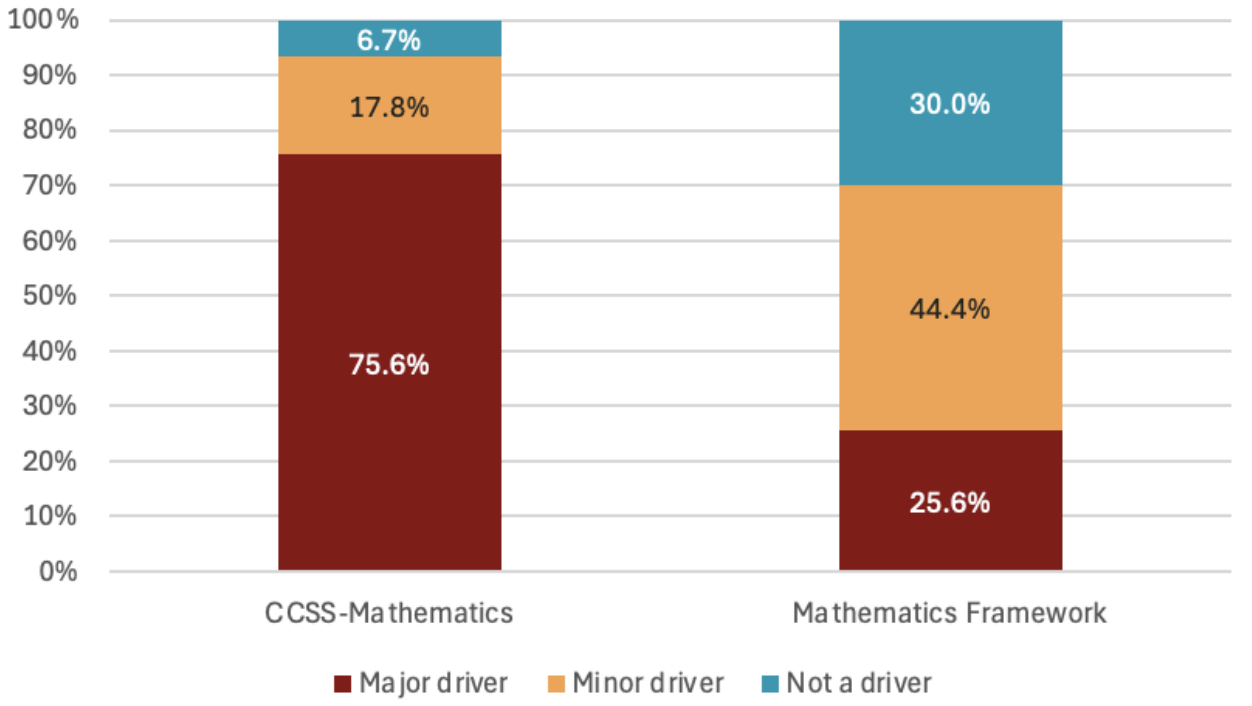
The limited influence of the Framework reflects a set of structural features that shape how guidance translates into practice. District leaders described the Framework as non-binding, complex, and difficult to operationalize, particularly in the absence of sustained support. As a result, its uptake depends heavily on local capacity and initiative rather than on consistent system-wide mechanisms.

California's mathematics standards shape instructional decisions in most districts, while the Mathematics Framework has far less influence.

Standards are a major driver of mathematics instructional decisions in the vast majority of districts, cited by more than three-quarters of district leaders in our sample (see Figure 2). District leaders described the standards as "the foundation" or "the minimum expectation." The Mathematics Framework, by contrast, is a major driver of instruction in only about one-fourth of districts and in 30% of districts is not a driver of instructional decisions at all.

This contrast highlights a key distinction between standards and the Framework. Standards establish clear expectations that are embedded in accountability systems, curriculum, and assessment. The Framework provides guidance on how to teach, but it is not consistently embedded in the structures that shape instructional practice. Without alignment to curriculum, professional learning, or accountability mechanisms, the Framework has limited leverage over classroom instruction.

Figure 2. Extent to which State Standards and the Mathematics Framework influence instruction decisions (n=90)



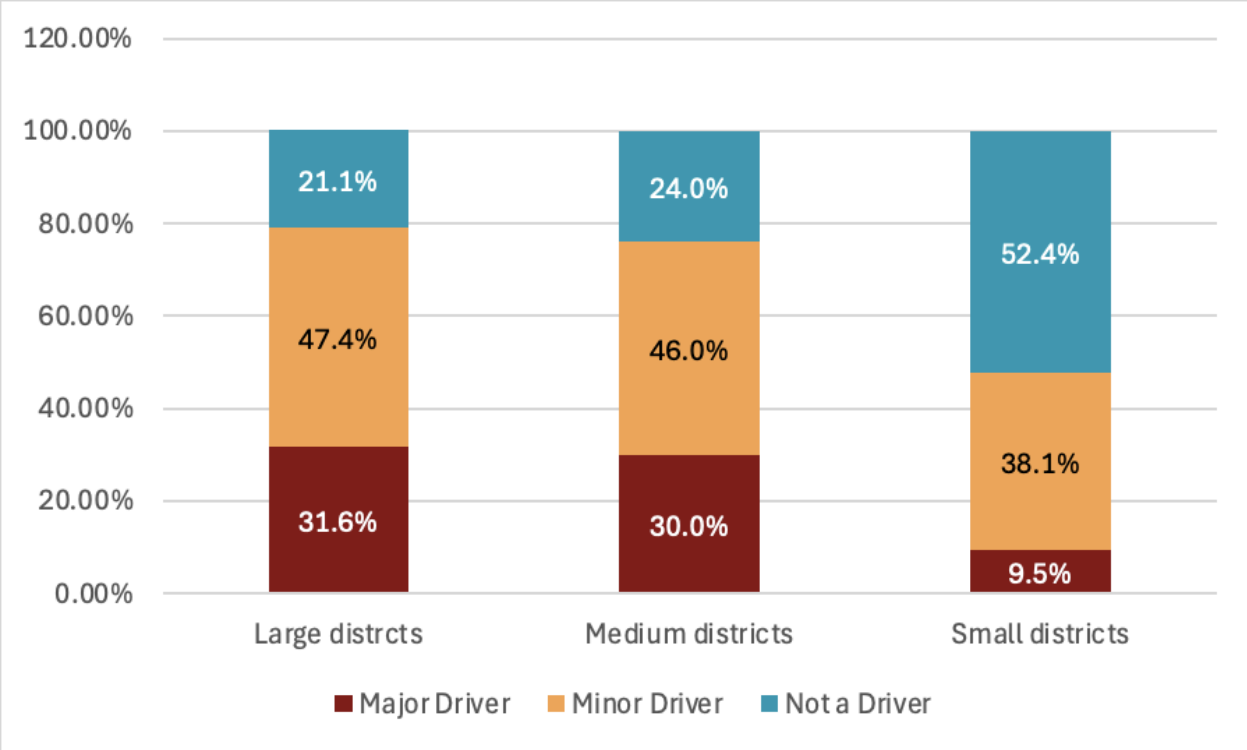
At the time of our interviews, the Framework had been released for about a year and a half, but it was still seen as "recent" and something that was "on the radar" but "not something we've worked on" because it was taking a "back seat" to other competing priorities. Most districts that were engaging with it reported that the Framework informed their professional development and instructional approaches. A small but vocal group had strong opposition to the Framework and was purposely not engaging with it at all, instead "supporting teachers with what they are already doing." One leader explained:

> Our perception is the framework is not encouraging of advanced math pathways, particularly middle school level. And …we just, we just wholly disagree that providing math advanced math pathways at the middle school level creates inequity. We think it's necessary that students and our community expects that our students who are capable of accessing higher level mathematics at that level and be given the opportunity to do so. So the framework is not something that we're spending much time working with as a tool on purpose.

Among districts that were trying to engage with the Mathematics Framework, many noted that it was lengthy and described a picture of instruction that differs substantially from what is typical in most classrooms. One leader explained, "Much of the Framework feels conceptual, and there is uncertainty about how to operationalize it in classrooms." Another noted, "It can be difficult to translate those ideas into day-to-day classroom practice." To align instruction with the Framework, some districts recognized they would need to reconcile how the Framework fit with the rest of their system, meaning the policies, resources, and processes that shape instructional practice. One district leader noted, "The Framework is used as a reference, but we emphasize that it does not replace the Standards or our adopted curriculum." Another said, "We already have an adopted curriculum and pacing guides in place, and there are questions about how the Framework fits with those systems. We are cautious about adding something that might feel misaligned or duplicative." One leader who planned to follow the Framework's guidance recognized that making the instructional shifts called for would be an ongoing process: "We are focusing on slowly moving to the new framework and really looking at inquiry and how that fits in with what we're already doing in terms of direct instruction." This kind of response was relatively rare in our data and reflects a realistic assessment of the work a district would need to do to align with the Framework's instructional approach.

We found that the degree to which districts engaged with the Framework varied by size (see Figure 3).

Figure 3. Extent to which the Mathematics Framework influence instruction decisions across different sizes of districts (n=90)



The sheer length of the Mathematics Framework poses a practical barrier to its influence, particularly in small districts. In one district we visited, a single teacher covered both seventh- and eighth-grade mathematics, the principal, formerly a mathematics teacher, taught the district's only section of Algebra I, and there were no teachers on special assignment or curriculum directors to lead instructional work. While those particulars vary across communities, the broader pattern is common: teachers in smaller systems often carry multiple preparations, support staff are limited, and administrators assume instructional responsibilities alongside their leadership duties. Under these conditions, time to study and interpret a 900-page policy document is scarce. Unlike the 2013 Framework, which organized guidance by grade span in ways that teachers could readily access, the 2023 Framework does not offer single-grade entry points that align neatly with individual teaching assignments (California Department of Education, 2023). In small systems where capacity is thin, the combination of length and organization makes it unlikely that the document will be read closely or systematically.

Across districts, four factors consistently limited the Framework's influence on instruction. First, it functions as guidance rather than a mandate, which reduces the urgency for districts to engage deeply with it. Second, the instructional approach it describes requires substantial teacher content knowledge and pedagogical skill, which many districts reported is not yet in place. Third, the Framework is not tightly integrated with curriculum adoption, professional learning systems, or accountability structures, making it difficult for districts to translate its ideas into operational routines. Fourth, districts lack sustained, system-level support to implement the shifts it envisions, leaving leaders and teachers to interpret and apply it on their own. These factors interact to limit the Framework's role as a driver of instructional change. Even where leaders value its vision, they often lack the conditions needed to enact it consistently across classrooms.

Although medium and large districts cited similar degrees of Framework influence overall, the way leaders in those districts talked about it differed. In medium districts, leaders' descriptions showed the greatest variation, ranging from active endorsement to expressed concern. Large districts were more likely to engage intentionally, using the Framework to shape professional learning and instructional vision while managing rollout carefully.

Adopted mathematics instructional materials are widely viewed as misaligned with state expectations, driving supplementation and fragmented instruction.

We conducted district leader interviews between May and August of 2025, when districts were awaiting the final list of approved instructional materials for K–8 mathematics, which was released in November of 2025. (Throughout the report, we use "instructional materials" to refer to formally adopted programs. In interviews, district leaders often used the term "curriculum" to refer to these materials. We preserve that language in quotations.) The timing of the state's release of approved materials came up frequently in interviews because many districts had been poised to start a process to replace instructional materials they had adopted a decade or more ago. Mathematics instructional materials adoption had been delayed in many districts because adoption cycles are tied to framework updates, and the release of the 2023 Framework took longer than originally expected after the first released draft received substantial critical feedback.

Districts in California use a wide range of adopted material. A recent analysis of School Accountability Report Card (SARC) data found that 13 different titles were adopted in at least 20 California districts, only two of which had a 20% or greater market share. Some districts also adopt supplemental instructional materials, and the range of programs there is even larger (Polikoff and Haderlein, 2026). The districts in our sample mirrored these broader patterns.

We heard consistent reports across interviews and site visits about gaps between adopted instructional materials and both the state mathematics standards and the Mathematics Framework. Two factors contributed to these gaps. First, many districts made instructional materials adoptions shortly after California adopted the Common Core State Standards, meaning the materials predated publishers' ability to fully respond to new expectations. Second, while state mathematics standards have remained unchanged since 2010, the 2023 Mathematics Framework placed stronger and more explicit emphasis on strategies that build conceptual understanding, student discourse, and equitable access for all learners, areas in which instructional materials released shortly after CCSS adoption were often weak (Polikoff, 2015).

District leaders often shared that they expected lower levels of fidelity in using adopted materials because they were so dissatisfied with their current programs. As one described, "Teachers are supplementing regularly to make sure concepts are really landing. It's not that the curriculum is ignored, but it's definitely not sufficient on its own." Leaders in such districts sometimes noted that they planned to set higher expectations for fidelity once they adopted new materials they hoped would be much better aligned with the Standards and Framework.

Some districts, typically smaller ones or those with limited central office staff, framed teacher autonomy around instructional materials primarily as a response to limited capacity to monitor fidelity. One leader explained, "We talk about expectations, but in practice there's a lot of flexibility. Teachers are making decisions day to day. That's just the reality of how we operate." In these cases, the flexibility reflects low capacity to support strong instruction rather than a proactive decision about how best to serve students.

District dissatisfaction with their adopted materials often drove supplementation. Some districts purchased supplemental materials ranging from skill-specific programs to adaptive software, while others acknowledged that their teachers regularly drew from Teachers Pay Teachers or other one-off sources. While supplementation can be positive under some circumstances, in many districts teachers rarely used adopted materials at all. This pattern mirrors findings from a national study (Doan et al., 2024), which cautions that heavy reliance on supplemental materials often produces idiosyncratic and fragmented instruction. In our data, supplementation generally appeared to reduce alignment to state standards, either because teachers replaced grade-level work with remedial tasks for struggling students or because they removed open-ended and problem-solving tasks to focus on procedural fluency and speed with math facts.

We also heard consistent concerns across interviews and site visits about the sheer volume of content within common instructional materials. One district leader explained, "If you really taught all the mathematics curriculum in a textbook, it would take you three years to cover one year's worth of curriculum." Faced with a surplus of material and limited time, some teachers make inconsistent choices about what to cover, and students experience gaps in the content they encounter during a school year. Box 3 illustrates this problem from one of our site visit districts.

Box 3. A cycle of idiosyncratic content coverage and remediation

One district's adopted TK–5 instructional materials recommended 90 minutes of daily mathematics instruction, yet most teachers reported devoting roughly half that time to core, grade-level instruction (approximately 45 minutes, consistent with typical elementary mathematics instructional time across site visit districts). On average, teachers estimated that they covered only about two-thirds of the program's units each year. To address gaps in prior learning, the district purchased a supplemental online program that assessed students' areas of need and assigned individualized lessons for remediation. In one classroom, where the teacher spent approximately 45 minutes per day on grade-level mathematics and an additional 20–30 minutes on online remediation, she reported completing only about half of the grade-level units each year (the lowest estimate we heard). If the omitted units do not contain essential grade-level content, it raises questions about their inclusion in the adopted program; if they do contain essential content, students are systematically missing opportunities to learn it. In either case, the structure created a self-reinforcing cycle: reduced time for grade-level instruction led to incomplete coverage, which in turn generated the remediation demands that consumed instructional time the following year.

One approach districts used to address poorly aligned adopted materials was to have teachers spend significant time creating guidance and materials to support coherent and aligned instruction from a patchwork of sources. Box 4 provides an example.

Box 4. Time drain as consequence of unaligned instructional materials
One district's approach to addressing both misalignment and volume of instructional materials was to systematically examine the alignment between its adopted materials and state standards, removing unaligned and less critical content while supplementing to address gaps. Grade level team leads from multiple elementary schools across the district met to examine their adopted materials in relation to state standards and create a guide to support consistent teacher use. They identified lessons that were poorly aligned with the standards, for example lessons that taught content at a different grade level or where the rigor fell substantially short of standards expectations, and either provided annotations to support aligned use or suggested removing unaligned lessons entirely. They then identified supplemental materials or activities to replace specific parts of lessons or entire unaligned lessons. The result was an elaborate pacing plan designed to ensure that students had opportunities to learn key mathematics concepts despite adopted materials that were broad, shallow, and unevenly aligned to standards. Strong instructional materials still require teacher planning time to meet the needs of students. But the planning time and the depth of teacher knowledge and skill required to plan effective instruction with poorly aligned materials is very costly, because teacher time is a finite resource.

Some districts moved ahead with instructional materials adoption without waiting for state guidance.

Given the challenges described above, about one-third of district leaders reported that they were moving ahead with researching, piloting, or adopting materials ahead of the state recommendations, which were released in November of 2025. These districts explained that they either could not wait for the state to release the approved list or had already begun adoption because their existing materials were outdated and misaligned to student needs:

> We have a math adoption that no longer serves our needs…. I think we've all been waiting for the state. They need to do something! We… either will adopt a new math series this year, or we need to get other supplemental materials that are coherent and consistent for our teachers in math, because the program that we have does not meet the needs of who we serve.

While leaders generally affirmed the principle of local control, many wanted the state to play a stronger role in three areas: more robustly evaluating instructional materials quality and alignment to standards

and the Framework; supporting more consistent and rigorous local adoption processes; and encouraging some regional coherence in instructional materials selection to create economies of scale for professional learning and implementation.

Small districts were especially clear that limited staff capacity made it difficult to undertake a rigorous review process. One district leader articulated these concerns in describing what would benefit her district:

> If the state really provided in-depth, 'this is high quality curriculum. It's not just meeting this floor of a standard' I think that would be helpful, because there's such a patchwork across the state of California and even [local] County on the curriculum chosen. And the process varies so much… right now that's really subjective, unless you put in the time to really, truly pilot curriculum…it depends too much on the salesmanship of the publisher, as opposed to the true outcomes, right?… I just think some standardization would be helpful for the state as a whole, if our goal is to increase math learning for all students.

Beyond concerns about quality and process, this leader and others noted the practical consequences of fragmentation. When neighboring districts select different publishers, county offices are hard-pressed to provide curriculum-aligned professional learning, and districts lose potential economies of scale in training and support.

The state adoption process provides insufficient guidance on the quality of instructional materials.

The CDE administers the state's K–8 instructional materials adoption process, the SBE has final authority to adopt the approved list, and COEs often provide regional support for district adoption. In 2025, the SBE adoption list included 38 titles for "Basic Math K–8" across grade spans K–5, K–6, K–8, and 6–8; the website does not list any programs that were submitted and not approved (California Department of Education, 2025b). CDE also provides a resource called the Guidance for Local Instructional Materials Adoption (GLIMA) to support local adoption processes. The GLIMA is content-agnostic, focusing on ensuring that adoption is legally compliant, standards-aligned, and publicly transparent. Neither the adoption process nor the GLIMA attempts to evaluate the relative

quality of instructional materials or provide substantive direction about which materials are most aligned with the state's vision for mathematics instruction (California Department of Education, 2024).

District and state leaders expressed concerns in our interviews that the state would approve dozens of instructional materials without clearly distinguishing among them in terms of alignment or overall quality, concerns that proved warranted when the list was released. As one state leader put it, "Having so many approved textbooks is not guidance."

District leaders held mixed views on the state process. Some, particularly in smaller districts, urged the state to more strongly vet instructional materials because they lacked the internal capacity to do so. Others assumed that the titles appearing on the approved list would equally support teachers in delivering instruction aligned to state standards, an assumption few experts would share.

Concerns about limited state guidance were amplified by wide variation in local adoption practices. Some districts described deeply studying the Framework and conducting thoughtful pilots. In contrast, one district planned to narrow the list and then invite publishers in to "sell the staff" on their product. A state leader described local adoption practices more broadly as "a series of bureaucratic box-checking."

Districts lack adequate support for implementing instructional materials effectively.

Although leaders at both levels raised concerns about instructional materials selection, state leaders consistently emphasized a related but distinct issue: implementation. As one county office leader put it, "Adoption doesn't mean implementation." And while COEs often take some steps to support district adoption processes, they do not typically support effective use of instructional materials once districts complete the adoption process.

Several state leaders described a broader lack of systemic support for implementation and sustained use over time. They noted a tendency to treat instructional materials adoption as a solution in itself, without sufficient investment in district staff capacity, mathematics content knowledge, or instructional expertise. As one explained, "Districts buy materials but don't have support to use them well," with the result that "teachers are expected to figure it out on their own." Another leader underscored the consequences: "Even high-quality materials fail when teachers lack support to understand the

mathematics and pedagogy embedded in them." Box 5 describes one of our site visit districts, which worked with an outside consultant for many years to improve teachers' knowledge and skills for mathematics instruction. As teachers' skills improved, they recognized that their adopted materials could not support the Framework-aligned strategies they wanted to emphasize, and so after piloting two programs in 2024–25, they adopted new instructional materials for the start of the 2025–26 school year.

Box 5. Improving curriculum and instruction in tandem

Over several years, one district deliberately built toward improving curriculum and instruction by first investing deeply in teacher learning. The superintendent described a sustained partnership with outside consultants that began under the district's prior adopted materials. Rather than focusing narrowly on program implementation, the consultants worked to strengthen teachers' understanding of mathematics itself, particularly number sense, flexibility, fluency, and the Standards for Mathematical Practice. As the superintendent explained, the work began by identifying weaknesses in the existing materials and asking, in effect, "Here's where the holes are. Here's what we're going to come in and shore up."

Over time, this professional learning shifted teachers' instructional approach from more concrete, task-based instruction toward deeper conceptual understanding, justification, and problem solving. The consultants tailored their work to district data and classroom observations, helping teachers analyze student performance and adjust instruction accordingly. The superintendent emphasized that this capacity-building approach, grounded in local needs and reinforced through coaching and feedback, was central to the district's improvement strategy.

As teachers' expertise grew and gaps in the existing materials became clearer, district leaders concluded that the adopted materials were "not meeting the needs of our students." With the consultants' support, they piloted new materials and ultimately moved ahead of the state's adoption timeline to select a program better aligned with their instructional vision and students' needs. In this district, the adoption did not initiate instructional change, it formalized and supported shifts that had already been underway through sustained, consultant-supported professional learning.

Taken together, these findings underscore that instructional materials adoption alone is insufficient to improve mathematics instruction. As the example in Box 5 illustrates, meaningful instructional change

depends on building teacher knowledge and instructional capacity alongside, or possibly prior to, adopting new materials. Without sustained support for implementation, even well-aligned materials are unlikely to translate into improved classroom practice. In this context, districts need not only clearer signals about quality and alignment, but also coherent, ongoing support to ensure that materials are used in ways that reflect the instructional vision of the state's standards and Framework.

The state's instructional materials adoption process does not support districts to identify appropriate instructional materials for TK.

A consistent problem across our interviews was the absence of mathematics instructional materials aligned with state expectations for transitional kindergarten, as codified by the California Preschool/Transitional Kindergarten Learning Foundations (PTKLF). The statute that directs CDE to run the approval process for curricular materials covers only K–8, leaving TK out entirely. Twelve percent of district leaders reported that they had no TK instructional materials in mathematics, did not know whether they had any, or that their district's approach was to have teachers modify kindergarten materials. Several superintendents reported using TK–5 or TK–6 curricula while citing publishers whose materials begin with kindergarten, suggesting that their TK teachers were also adopting or modifying kindergarten material for TK use. This omission leaves districts without guidance for a new grade level that is both foundational to the K–8 mathematics trajectory and one in which educators have relatively limited knowledge and experience.

Taken together, these findings point to a broader system-level disconnect between the state's instructional vision and the conditions required to realize it in practice. The state has clearly articulated expectations for what students should learn and how mathematics should be taught, but those expectations are not consistently embedded in the materials, guidance, and supports that shape day-to-day instruction. Instructional materials are often misaligned or uneven in quality, the Framework has limited influence on classroom practice, and districts vary widely in their capacity to select, interpret, and implement both. In higher-capacity systems, districts can absorb some of this work by establishing clearer guidance, supporting coherent use of materials, and building teacher knowledge and skill. In lower-capacity systems, however, much of this responsibility shifts to individual teachers, who must interpret standards, adapt or replace materials, and make day-to-day instructional decisions

with limited support, often resulting in uneven and incoherent student experiences. Strengthening alignment across standards, the Framework, instructional materials, and professional learning would be necessary to bridge this gap between policy and classroom instruction.

Finding 3: Districts have uneven and often limited workforce capacity for high-quality TK–8 mathematics instruction.

SECTION FINDINGS

- The difficulty districts face to attract and retain qualified and effective TK–8 mathematics teachers varies dramatically by region, district size, and remoteness.
- Credentialed teachers often arrive without the content knowledge and pedagogical skill needed to teach TK–8 mathematics effectively.
- Teacher contracts set aside a few days that could be used for professional development, but that time is often used to address other needs.
- Districts augment contracted professional development days through substitutes and stipends, with uneven results.
- Mathematics professional development is scant and almost entirely voluntary.
- A majority of districts have at least one TOSA, with the number varying by region and district size.
- Most TOSAs carry responsibilities across multiple subject areas and schools, and dedicated mathematics TOSAs are relatively uncommon.

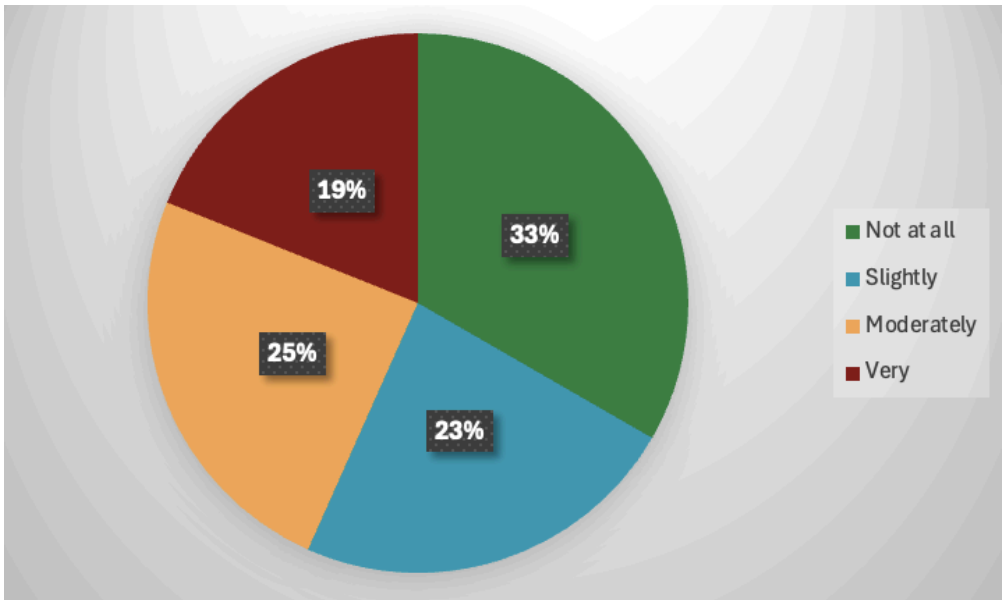
The central element of a district's capacity for high-quality TK–8 mathematics instruction is its teacher workforce, and district and state leaders consistently named workforce gaps as a binding constraint on the feasibility of effective and coherent mathematics instruction. We asked district leaders about hiring strong teachers, their capacity to provide effective professional learning opportunities, and the extent to which they had experts on staff allocated to support TK–8 mathematics instruction. While some districts have no difficulty attracting many qualified candidates for every job posting, others face persistent challenges. These patterns illustrate a central capacity challenge: many districts lack the

workforce expertise and professional learning infrastructure needed to support consistent, high-quality TK–8 mathematics instruction.

The difficulty districts face to attract and retain qualified and effective TK–8 mathematics teachers varies dramatically by region, district size, and remoteness.

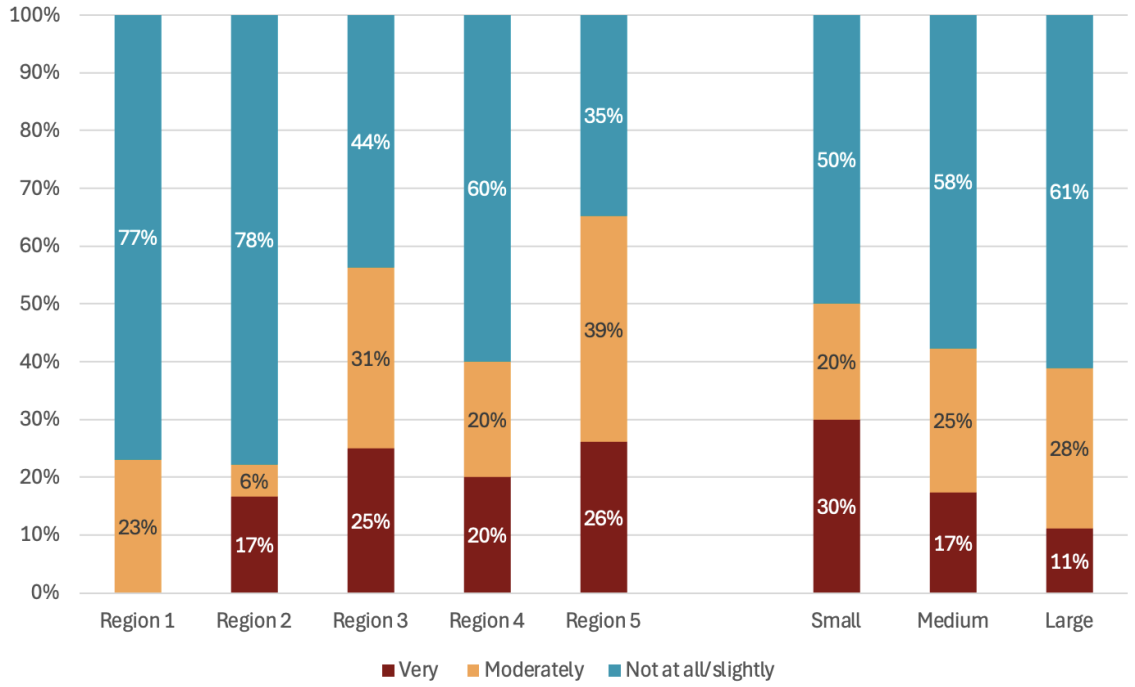
We asked district leaders how difficult it was, overall, to attract and retain highly qualified and effective teachers for TK–8 mathematics. As Figure 4 shows, there was a wide disparity in answers. At one extreme, about one-third of districts reported it was "not at all" difficult, while almost one-fifth found it "very" hard to attract and retain a strong teacher workforce.

Figure 4. District reports of the extent of difficulty attracting highly qualified and effective teachers (n=90).



The degree of difficulty varies considerably by region and district size. As Figure 5 shows, over one-quarter of districts in Region 5 reported that it was very difficult and an additional 39% reported it was moderately difficult to attract and retain the teachers they wanted. Not a single district leader in Region 1 reported staffing as very difficult. The other regions fall in between. Smaller districts experience greater difficulty than medium or large districts in attracting and retaining the teacher workforce they want.

Figure 5. Variation in overall teacher staffing difficulty by region and district size. (n=90)



District leaders from rural districts shared that remoteness created significant staffing challenges. As one explained, "We're rural, so if we're looking at filling positions, especially specialized ones, it's difficult to get people to move here. They may interview, but then they decide they don't want to relocate." Another noted, "We have a staffing challenge because of our location. It's not a desirable commute, and that alone deters a lot of candidates." At the most extreme, one remote district reported needing to use J1 visas to fill special education positions because their location made it very difficult to attract candidates. Regardless of their natural beauty or other local assets, remote districts consistently reported substantial staffing challenges.

Across all districts, three-quarters of leaders cited difficulty hiring special education teachers when describing their hiring and retention challenges. Mathematics followed, with just over a third citing difficulty hiring desirable mathematics teachers. Over four in ten TK–8 district leaders interviewed reported relying on underprepared teachers to staff one or more middle school mathematics positions. Fewer districts in the southern regions of the state, Regions 1 and 2, reported having underprepared middle school mathematics teachers (12%) compared to central and northern regions, Regions 3, 4, and 5 (55%). In the worst cases, mathematics teaching positions went unfilled. As one small, rural

district reported, "We had one class that went without a math teacher the whole year. We've reduced the amount of educators on provisional or short-term credentials, but math and science are still high-need areas."

Credentialed teachers often arrive without the content knowledge and pedagogical skill needed to teach TK–8 mathematics effectively.

Even districts that do not experience staffing shortages may lack the staff capacity needed to consistently provide high-quality TK–8 mathematics instruction. District and state leaders pointed not to lack of effort, but to gaps in preparation and confidence as central barriers. One district leader told us: "Proficiency in math instruction is probably the biggest piece. I think it varies teacher to teacher. Every teacher has their strengths and weaknesses, but I think that math, for some, wasn't necessarily their first or strongest subject, and so they've winged it for many years. I think the biggest obstacle is just the depth of comfort and proficiency of math instruction." Other leaders similarly described challenges related to teacher confidence. One shared: "Teachers often revert to procedural instruction because they are not confident in their own understanding of the math." Many teachers, particularly at the elementary level, are generalists who have not received sufficient training or ongoing support to teach mathematics conceptually.

District leaders repeatedly cited inadequate preparation for both elementary and middle school teachers in mathematics as a key factor contributing to these challenges. Because most teacher preparation programs in the state are one-year post-baccalaureate programs, elementary teachers have limited opportunity to develop deep mathematical knowledge alongside training in other subject areas. One leader summed it up this way: "Many of our elementary teachers do not have deep content knowledge in math, which makes it difficult to teach conceptually." State leaders who raised teacher preparation as a barrier were direct and sometimes harsh: "New teachers in California come into school with theory and no practical skills." Another put it plainly: "New teacher training is pitiful."

The constraints of one-year preparation programs are compounded by a growing list of statutory requirements for teacher credentialing. A state leader explained how each individual requirement has value but the accumulation comes at a cost:

> Every year there are bills introduced to add more… Teachers should be able to do this… there would be bill after bill after bill every year that would say teachers should also be doing this thing, and they should also be doing that thing,….these things are all really, really important. But we have to get educators through a program in a reasonable amount of time.

One interviewee tied these issues together:

> A lot of [teacher candidates] coming into [teacher preparation programs] don't have that confidence in math, and may or may not have good opportunities to develop that confidence as undergraduates. And so then when they're in that preparation program, the faculty are doing their best, and [there are] requirements, but there's a lot of content they're trying to learn how to teach. And when they don't have a strong foundation to build on, it's really hard to do that.

Box 6 describes how gaps in teachers' content knowledge, confidence, and instructional quality interact and reinforce each other.

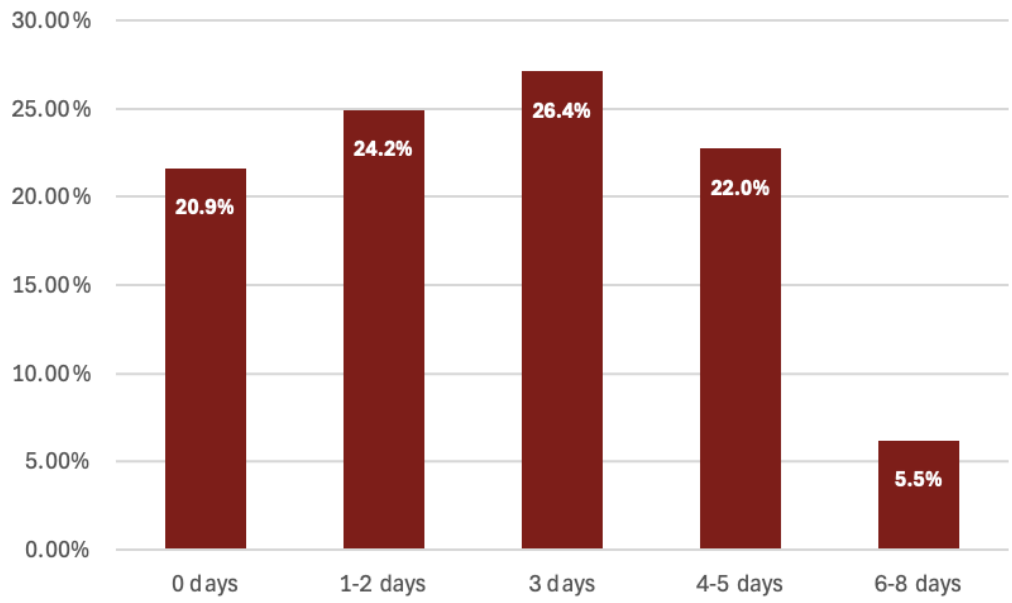
Box 6. Teacher knowledge, confidence, and instructional quality in mathematics

One district leader expressed concern about elementary teacher preparation in mathematics, arguing that improving instruction requires strengthening teachers' own content knowledge. As the leader put it, "In the elementary world, we also need to teach teachers math. They don't have the math background." In addition to learning a new curriculum or instructional strategies, teachers need a deep understanding of mathematics itself. The leader explained, "if your math skills are lacking, you might not teach kids how to love fractions." Limited content knowledge affects classroom practice, especially as students move into more abstract content in the upper elementary grades (Hill et al., 2008). When teachers do not have time to fully understand what they are teaching, "they either resort to the algorithm or they don't teach it." At the same time, the leader emphasized how difficult it is to address this challenge. Elementary teachers are already stretched thin, "they already plan for four subjects a day, so now you're asking them to plan for the curriculum, plan for the teaching, and plan for the math content," and the lack of content knowledge is substantial. The leader went on to describe how declining enrollment has led to cuts in the central office staff who used to provide professional development and in-class coaching to help teachers build their mathematics knowledge and instructional skills.

Teacher contracts set aside a few days that could be used for professional development, but that time is often used to address other needs.

We asked district leaders about the professional development their teachers receive, both generally and in mathematics. Figure 6 shows the distribution of how many whole days districts reported were in the teacher contract available for professional development. About a fifth have no days set aside in the teacher contract; the majority have between one and five days.

Figure 6. Distribution of Districts by Number of Professional Development Days (n=91)



Note: two districts reported half days (2.5 and 4.5) and we rounded up to the nearest whole day

Districts had control over how teachers spend their time on these days, but leaders were clear that not all of these days were used for professional development. One district leader provided a relatively typical explanation of how four days, a relatively large amount of time in our sample, would be used in practice:

> [We] typically will take two of those days at the beginning of the year…. [O]ur first day is, traditionally, they're working at the sites with their site leadership, so that's where they're going to go over this is what our year is going to look like. And that's site-based. The second day we have a district wide breakfast, so all of us get together. Then by 10 o'clock, they head back to

> their sites, and then administrators decide whether the rest of that day is spent in the classroom getting ready for the kids—because they'll come the following day—or if they need more together time. Typically they'll let the teachers work in their classrooms that day. And then we have two days throughout the year, and typically they're around October and around March, where we have a professional development day.

In this district, four days of teacher time without students yielded two days for district-led professional development and possibly part of an additional day led by the school site. As a result, Figure 6 should be interpreted as the maximum possible days where districts could require all teachers to engage in professional development.

About one-fifth of districts have no days of teacher time where they could require all teachers to engage in professional development. District leaders reported that recent contract negotiations in some districts have resulted in less time reserved for professional development. One district leader explained:

> [In 2024–25], we had five days set aside…. This upcoming year [‘25–’26], because of bargaining constraints, we did reduce that by two days. Now we have three days of professional development that are full days dedicated to our teachers—a reduction of two days. We do have other ways [to provide]... the professional development by sub release, [or] paying them to come in on a Saturday. But that's not as intentional as the three solid built in days that we know we get. The other is more voluntary, like, ‘will you come in on Saturday for this?’

Districts augment contracted professional development days through substitutes and stipends, with uneven results.

Given limited time in teacher contracts for professional development, districts turned to hiring substitutes to create student-free time for collaborative work. Small and remote districts, however, reported extreme difficulty finding substitute teachers. District leaders also expressed concern that removing teachers too frequently would harm student learning.

Paying teachers to attend professional development was another common strategy. Two districts in our sample used this approach extensively, offering a two-week institute prior to the start of each school year where teachers were compensated for their time and could choose from a menu of professional learning opportunities. Most teachers in those districts reportedly attended.

Leaders who used these strategies often shared that the results lacked coherence. One said: "We've paid for subs so teachers could get release time, and we've done some after-school sessions with stipends, but it's not systemic. It's kind of here and there depending on funding." Another said: "We can sometimes use funds to bring teachers together outside of the regular day, but it's patchwork. It depends on what grants we have at the time."

Mathematics professional development is scant and almost entirely voluntary.

We asked district leaders specifically about the mathematics professional learning their teachers typically received. One in five districts did not offer any consistent professional development in mathematics in the 2024–25 school year. A similar proportion reported mathematics professional development only for specific groups of teachers, such as those involved in a particular initiative or a grade level receiving more intensive support that year. About a third of districts said their teachers received between one and two days of mathematics professional development, and one in ten received three or four days. Two districts were clear outliers: both were involved in major mathematics initiatives, and reported that all teachers received more than seven days of math-specific professional development.

District leaders' responses made clear that some teachers also independently accessed professional development, either free of charge or with fees reimbursed by the district, while districts offered minimal professional development that all teachers were expected to attend. One leader explained:

> I don't have an idea [how much math PD our teachers get]. It would be hard to quantify, because there are so many different little requests [for the district to provide a sub or pay costs for PD] that come through. We didn't have any concerted PD [in math] that we pushed out. The county offers classes a lot after school… I don't know… [how much] teachers are going to PD after school or on a weekend or in the summer.

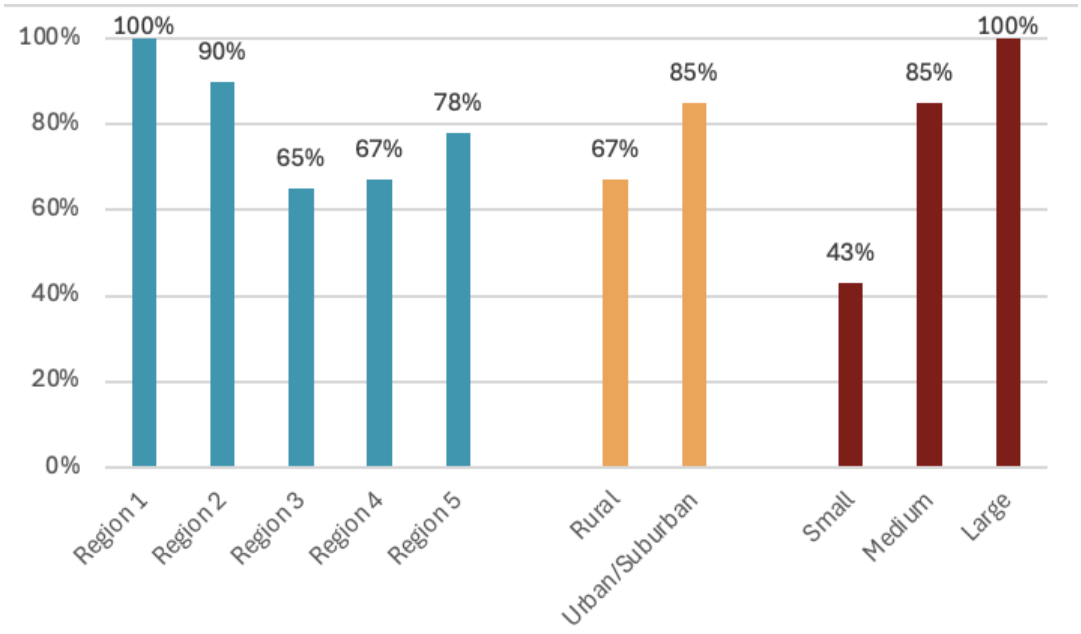
District leaders know this is insufficient. They overwhelmingly pointed to a lack of time for professional development as a major barrier in their TK–8 mathematics efforts. One summed it up this way: "I'd say time is our biggest obstacle, both from an instructional standpoint and from professional learning. There just isn't enough protected time to do math well and also support teachers." Another identified a structural problem with voluntary professional development: "It's optional. It's after school, and the people who tend to come are not the people who need to come." If the goal is to help an entire teaching staff work towards enacting a shared vision of high-quality instruction, time together for professional learning is required.

As districts adopt new instructional materials in mathematics, district leaders frequently told us they planned to have publishers come in to do a professional development session for their teachers on the new materials. Both the literature on effective professional development and experts we interviewed for this study are clear that this will be vastly insufficient if not coupled with ongoing professional development. The types of one-day workshops often described give all teachers the same basic information about program features. They are not sufficient to help an entire teaching staff—who will vary in their knowledge, skills and experience—to use new materials effectively. This is especially for districts that will adopt materials that are well-aligned to the Framework, but have some teachers who will need to make substantial instructional shifts to use them effectively.

A majority of districts have at least one TOSA, with the number varying by region and district size.

District leaders often embed teachers on special assignment, or TOSAs, in their organizations to provide teachers with coaching and support. More than three-quarters of districts reported having TOSAs, but there was substantial variation across districts by region and size (Figure 7). As with other staffing findings, central and northern regions, rural districts, and smaller districts are the least likely to have these staffing assets.

Figure 7. Variation in likelihood of districts having one or more TOSAs (n=92)



Most TOSAs carry responsibilities across multiple subject areas and schools, and dedicated mathematics TOSAs are relatively uncommon.

Districts try to allocate their TOSAs in ways that align with their greatest needs. As one district leader explained, "They support the district priorities that I mentioned earlier, and lead coaching cycles and cycles of inquiry. So math is embedded in that. They're essentially supporting all the content areas and generally effective instruction." In smaller districts where everyone wears many hats, TOSAs face particular pressure to take on responsibilities beyond instructional coaching. One superintendent shared:

> Because our departments at the district office are small, I do HR, in addition to being superintendent. [Our TOSA] ends up doing a lot [of the things] an assistant director or a coordinator might do in another district. [For example] she's taking on the ELA adoption and running that meeting, in addition to doing some of the teacher induction stuff.

Districts that struggle to hire fully credentialed and effective teachers may also allocate their TOSA to, as one district leader explained, "focus specifically on supporting PIPs, STSPs, and interns," meaning

novice teachers or those completing their credential while teaching. When leaders explained how they allocated TOSAs within their district, it became clear that TOSA assignments matched district priorities broadly and that few schools had a site-based mathematics TOSA without other major responsibilities. TOSAs assigned to focus on mathematics typically provided support across multiple schools rather than working deeply within a single one.

State leaders recognized the barrier posed by uneven investment in central office capacity to support mathematics instruction: "There just aren't enough people doing math work at the district level." State leaders also noted that this staffing gap is particularly consequential given the vision for instructional practice outlined in the Framework: "We're asking districts to do very sophisticated instructional work without the staffing to support it." Together, these findings paint a consistent picture: districts across the state lack the math-specific expertise, coaching capacity, and professional learning infrastructure needed to build the kind of coherent, high-quality TK–8 mathematics instruction the state envisions. Box 7 shows challenges that TOSAs face in two districts of different sizes; faced with limited staffing, a high number of teachers to support, and competing needs from the district, it has been difficult to deliver on instructional support for teachers at district scale.

Box 7. Mathematics TOSAs stretched thin

One large TK–12 school district has two mathematics TOSAs for their district, which serves more than 15,000 students. Both TOSAs described their role as primarily focused on supporting teachers and improving classroom instruction, yet in such a large district, their time is stretched thin. One TOSA covers over 12 elementary schools, sharing, “I wish there were like six of me… or at least two.” Working to support a vast number of secondary math teachers, the second math TOSA explained, “I don't think we have enough humans to support the people in the way that we really like to support people.” Left with limited capacity to provide the personalized coaching they expect to deliver, the TOSAs have worked to support in other ways such as through PLCs or working with site leaders.

In a smaller K–12 district, the math TOSAs face their own sets of challenges related to limited capacity and competing district needs. One elementary TOSA sets their own priorities around math - leading curriculum adoption, coordinating professional development, and coaching - yet faces increasing pressures to fill gaps at the district amidst budget constraints and a smaller team:

> “I think the vision [initially] was… you're going to be an instructional coach. [But] we have these emergencies. We're going to put out the fires, and then you'll be able to coach. But that… never happened [especially with a] shrinking…team.” Another TOSA admitted to supporting over 50 teachers. While coaching is a promising, research-based instructional support for teachers, districts like these two vary in their staffing and allocation of TOSAs.

District leaders pointed to the absence of sustained, math-focused coaching as a central barrier to improving TK–8 instruction. One leader noted, "We know professional learning matters, but we don't have the staffing or funding to provide sustained coaching. One-off trainings just don't move practice."

Taken together, these findings show that districts’ capacity to deliver high-quality TK–8 mathematics instruction is constrained by both workforce supply and system design. While some districts can attract and retain strong teachers, others—particularly smaller, rural, and more remote systems—face persistent staffing challenges and rely on underprepared educators to fill critical roles. Even when positions are filled, many teachers lack the content knowledge, confidence, and preparation needed to teach mathematics conceptually, reflecting limitations in current preparation models. At the same time, districts have limited time, infrastructure, and staffing to provide sustained, math-specific professional learning, and available supports such as TOSAs are often stretched across multiple priorities. As a result, the system places substantial responsibility on individual teachers to build their own expertise and translate instructional expectations into practice, leading to uneven and often incoherent instruction across classrooms.

Finding 4: The state system of TK–8 supports for district improvement is fragmented, inconsistent, and insufficient.

SECTION FINDINGS

- California's state system of support for district TK–8 mathematics improvement operates primarily through partnership and influence rather than clear, enforceable lines of authority.
- The design of the support system makes it difficult for local leaders to understand how the state supports instructional improvement in TK–8 mathematics and who to turn to for what
- Among state entities, district leaders primarily accessed TK–8 mathematics support through their COEs.
- District leaders' perspectives on the state-level supports reflect the system's design.
- TK–8 mathematics support varies enormously across COEs. District leaders found COE support most helpful when it provided sustained, in-depth professional development for their teachers.
- State-wide mathematics initiatives reach few districts and their impact on district capacity is limited.
- District leaders relied most heavily on providers outside the state support system.
- District and state leaders want the state to reduce initiatives and set clearer priorities.

Consider a typical California district where about one-third of students are meeting state expectations in mathematics, district leaders recognize that instructional approaches and quality vary from classroom to classroom, and the district is working to build a coherent approach to mathematics instruction aligned with state standards and the Mathematics Framework. We first outline the relationship among the entities that make up the state's support infrastructure for mathematics instruction and what they each offer. We then examine what supports districts in our sample used and what district and state leaders said was most helpful, as well as what districts need but do not often receive from this system. Overall, we find good intentions but substantial fragmentation: the state's governance structure and array of initiatives do not consistently provide districts with clear, coordinated, and sustained support for improvement.

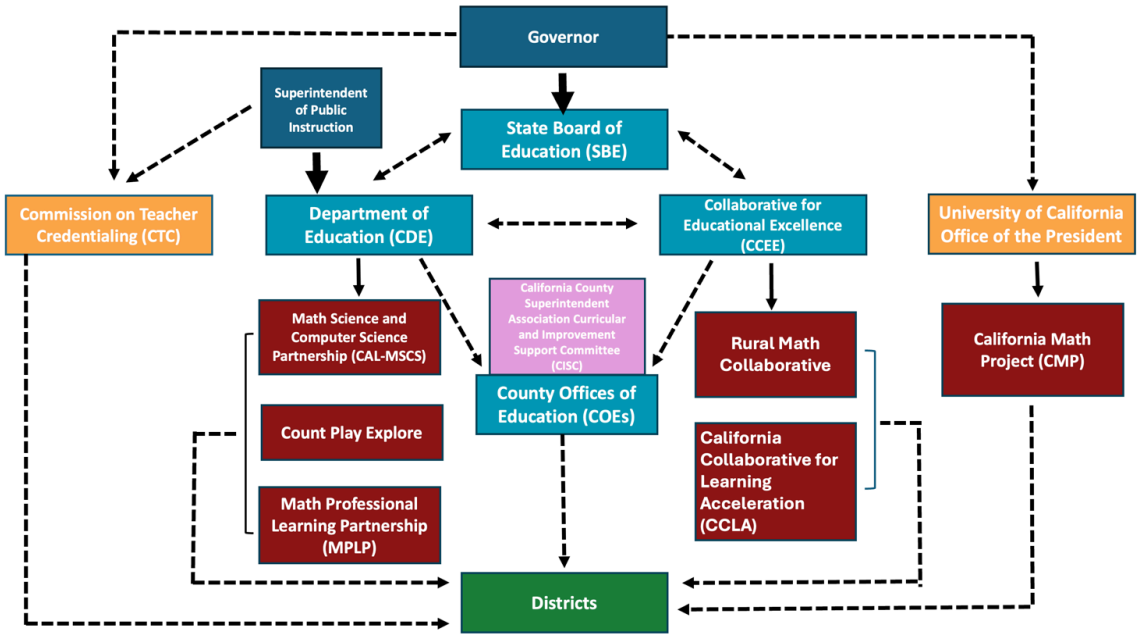
The state provides a range of supports to districts in their TK–8 mathematics improvement efforts through a complicated system with two key features. The first is a "double-headed" governance structure (Myung et al., 2025), where two elected executives, the governor and the superintendent of

public instruction, have substantial, independent influence over education. The second is extensive delegated authority, as Ripma and Loeb (2026) explain: "California distributes authority across multiple autonomous public bodies embedded in statute." Figure 8 illustrates these two features, showing the entities that provide supports to districts and how those entities are connected to each other. In Figure 8:

- Thick solid arrows represent formal authority, defined as powers established in law that enable an actor to shape an agency's composition, decisions, or operations. These powers include appointment authority, statutory roles in governance, and direct administrative control over leadership or staff.
- Dashed arrows among agencies represents mediated authority, defined as the ability to influence an agency's priorities, decisions, or actions without legally established control over its composition, governance, or operations. This influence may arise through relationships, agenda-setting, political leadership, or coordination, but it does not carry binding decision-making power.
- Thin solid arrows shows the three institutional homes of the six statewide math initiatives.

These definitions matter because formal authority does not equate to supervisory control, as we explain below.

Figure 8. How state entities support district TK-8 math efforts



Districts, shown in green, can access support for improving mathematics instruction through the Statewide System of Support, which is comprised of four entities shown in light blue in Figure 8. The Statewide System of Support offers universal supports available to all districts as well as more targeted supports to districts based on their state Dashboard performance, with each entity having the following roles and features:

- The SBE sets policy, adopts regulations, and approves curriculum frameworks and instructional materials lists during state adoption cycles. In those roles, it supports the work of the CDE, CCEE, and COEs. Although it is an independent body, all voting members are appointed by the Governor.
- The CDE develops policy proposals and frameworks, administers funding and accountability systems, and provides operational support for implementation. The CDE reports to the State Superintendent of Public Instruction (SPI), an elected position.
- The CCEE plays a central role in capacity building and technical assistance within the Statewide System of Support, working primarily with and through COEs but also directly supporting a

handful of districts identified for additional support through the state's differentiated assistance system. CCEE reports to an independent governing board.

- The 58 COEs are led by county superintendents, 53 of whom are elected, and serve as the primary regional support providers to school districts. Elected county superintendents are accountable to their voters. In the other five county offices, county superintendents are appointed by and accountable to individual county office boards.

Although outside of the formal governance system, the California County Superintendent Association's Curricular and Improvement Support Committee (CISC), shown in pink in Figure 8, is an essential partner to COEs. The committee provides significant organizational and capacity support for COEs and other state agencies in their work to support districts in their respective regions and in statewide mathematics initiatives.

At the top of the K–12 system, the Governor and the State Superintendent of Public Instruction are both independently elected executive officers of the State of California. The Governor is the chief executive of the state and has broad authority over state policy and budgeting, including education policy direction and appointments to key boards such as the SBE. The SPI serves as the chief executive officer of CDE and is responsible for executing education policy and providing statewide education leadership.

Two independent state entities, shown in light orange in Figure 8, also provide direct and indirect support to school districts' TK–8 mathematics improvement efforts. The California Commission on Teacher Credentialing is an independent state agency that indirectly supports districts through TK–8 mathematics teacher licensure and accreditation of preparation programs. Although it is an independent body, almost all voting members are appointed by the Governor. The University of California Office of the President oversees the California Math Project, whose mission is to develop and enhance K–12 teachers' content knowledge and instructional strategies. The University of California is constitutionally autonomous, although the Governor appoints the majority of its voting members.

California’s six statewide mathematics initiatives, shown in dark red, are organized across three distinct institutional homes, shown with thin solid arrows. The California Department of Education administers

CAL-MSCS, Count Play Explore, and the Mathematics Professional Learning Partnership, reflecting a state approach centered on grant administration and program oversight. The California Collaborative for Educational Excellence oversees the Rural Math Collaborative, the California Collaborative for Learning Acceleration, and the California Mathematics Network (launched in fall 2025, after the completion of all data collection except site visits, and therefore outside the scope of this study), reflecting an approach oriented toward networked improvement, field-building, and sustained implementation support. The University of California Office of the President supports and coordinates efforts such as the California Mathematics Project, reflecting a model grounded in university-based expertise, research-practice partnerships, and educator professional learning.The six initiatives are:

- California Mathematics Project (CMP). Established in 1982, CMP is a network of 19 university-based sites, housed primarily within the UC and CSU systems across 11 regions of the state and overseen by the University of California Office of the President. The CMP provides math-specific professional learning to teachers and teacher leaders, targeted support that varies across the network, and communities of practice, with a deep emphasis on leveraging the content and pedagogical expertise of participating university faculty (California Math Project, n.d.).

- Mathematics Science and Computer Science (CAL-MSCS). A grant of the California Department of Education led by San Joaquin COE, CAL-MSCS funds regional partnerships to strengthen instruction in mathematics, science, and computer science. The mathematics program is run by the Santa Barbara COE and supports collaborations among school districts, county offices of education, and institutions of higher education to provide sustained, content-focused professional learning, teacher leadership development, and instructional improvement aligned to California standards (CAL-MSCS, n.d.).

- Count Play Explore (CPE). Through the grant structure of CAL-MSCS, CPE is a California early mathematics initiative led by the Fresno COE that focuses on strengthening foundational mathematics learning in transitional kindergarten through the early elementary grades. The initiative builds early mathematics capacity with participating districts across the state, emphasizes developmentally appropriate, play-based, and conceptually rich mathematics

instruction aligned with the Mathematics Framework, and supports districts and educators through professional learning, instructional resources, and leadership development aimed at improving early numeracy and equitable access to high-quality mathematics experiences (Count Play Explore, n.d.).

- California Collaborative for Learning Acceleration (CCLA). Launched in the wake of COVID-19, CCLA created an online repository of high-quality professional learning resources for mathematics, literacy, and language development that integrate universal design for learning, culturally sustaining pedagogy, and social-emotional learning practices. Overseen by CCEE and led by the Santa Clara COE, CCLA aims to offer all educators access to resources and evidence-based strategies to support student learning (CCLA, n.d.).

- Rural Math Collaborative (RMC). A project of the Learning Acceleration Project, a grant-funding structure overseen by CCEE, the Rural Math Collaborative is co-led by the Lake and Butte County Offices of Education. It partners with CCEE and the California Mathematics Project and engages more than 20 rural county offices of education to strengthen mathematics instruction and support educators in small, rural communities. The RMC provides coordinated professional learning, coaching, and leadership support tailored to rural contexts, connecting participating districts with content expertise, peer networks, and implementation guidance aligned to the Mathematics Framework (CCEE, 2026).

- Math Professional Learning Project (MPLP). Recently funded by CDE and led by Kern COE, MPLP is designed to strengthen mathematics instruction across California through sustained, standards-aligned professional learning. The initiative aims to provide coordinated training, coaching, and leadership development focused on implementing the Mathematics Framework and improving instructional practice across grade levels through structured learning sequences and regional networks (MPLP, n.d.).

California's state support system for district TK–8 mathematics improvement operates primarily through partnership and influence rather than clear, enforceable lines of authority.

As the solid and dotted arrows in Figure 8 show, no single entity is formally responsible for ensuring districts receive coherent, math-specific support for TK–8 improvement efforts. Even when a district is identified for Differentiated Assistance (DA) in mathematics, it is required to engage in the DA process with its COE but is not mandated to participate in specific math-focused initiatives or programs. As one state leader put it: "Ultimately we have no teeth to compel districts to do this." The entities that make up the state system of support are themselves accountable to different authorities: SBE to the Governor, CDE to the SPI, CCEE to its independent governing board, and COEs largely to the voters of their elected superintendents. While COEs are formally accountable for fiscal oversight and LCAP compliance, that accountability does not extend to their work supporting district improvement efforts.

Statewide mathematics initiatives have different foci and legislative requirements, different start and end times, and generally operate on one-time grant funding. They are often legislatively required to partner with each other and with state entities, but no formal lines of authority govern those partnerships, and collaboration is largely dictated by relationships and local capacity. Because COEs often compete for grant dollars, the power dynamics among them can cut against the collaboration mandated in statute.

There are formal and informal connections among the Statewide System of Support entities and the mathematics initiatives designed to promote collaboration. For example, the advisory council for CAL-MSCS includes SBE, CDE, and CCEE, among others; the head of the California Math Project serves as a content lead; and all 58 COEs participate. These connections reflect genuine coordination efforts but at the same time, they are not sufficient to produce the coherence districts need, and the resulting diffusion of responsibility means that no single entity is accountable if districts fail to improve.

In sum, California's TK–8 mathematics improvement infrastructure is a layered ecosystem of formal governance, informal influence, regulatory levers, and network-based support structures. Districts, schools, and teachers sit at the receiving end of these overlapping systems, receiving guidance, requirements, and professional learning from multiple directions. The effectiveness of statewide TK–8

mathematics improvement therefore depends less on centralized control and more on coordination, coherence, and capacity across these loosely interconnected actors.

The design of the support system makes it difficult for local leaders to understand how the state supports instructional improvement in TK–8 mathematics and who to turn to for what.

Given the web of state entities, initiatives, and informal organizations with roles in supporting TK–8 mathematics improvement, district leaders are often unaware of the full range of support available to them. One leader put it plainly:

> I still don't understand how the state organizes resources. They seem to be spread out between like 5 or 6 different entities, none of which seem to talk to each other…. That's kind of sad, because I know that people are working really hard to do all those things.

An additional factor that may partially explain some district leaders' limited awareness of the mathematics initiatives is that many state resources are designed to focus primarily on individual educators rather than on district systems or to serve districts through other entities. For example:

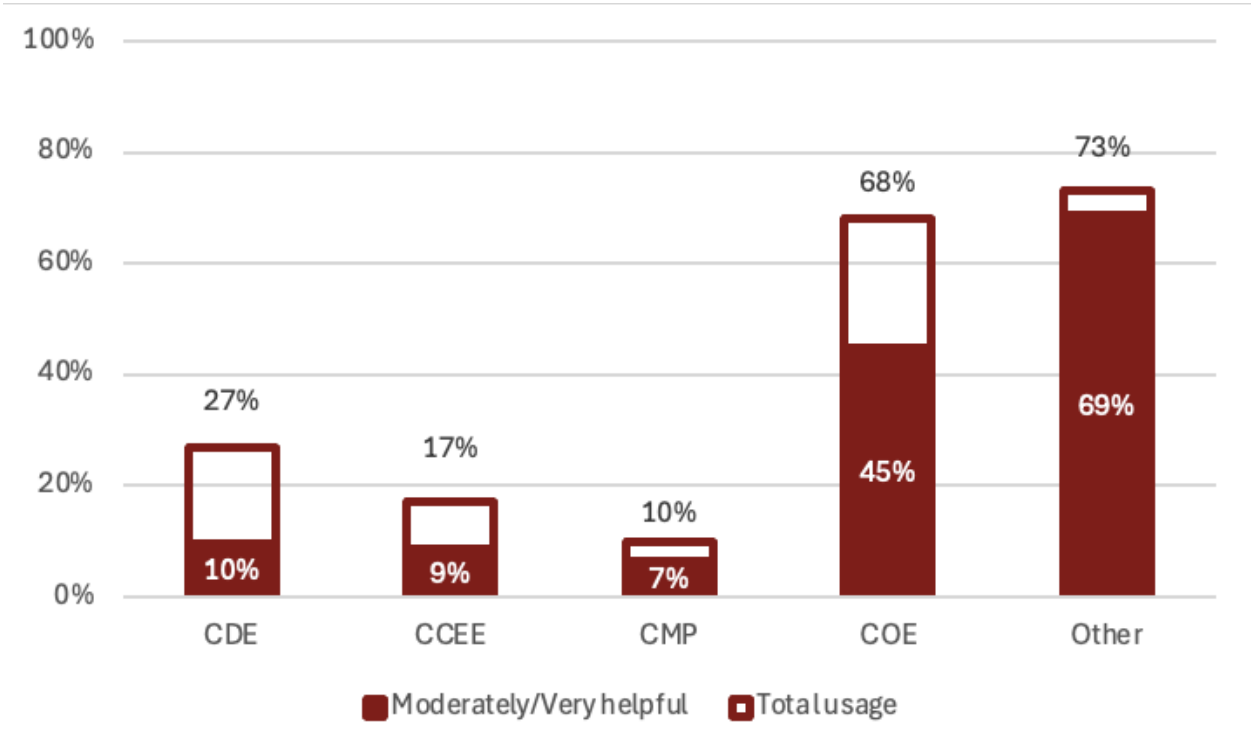
- The California Mathematics Project, for example, focuses on enhancing teachers' mathematical content knowledge and pedagogical content knowledge.
- Multiple initiatives are developing professional development modules for teachers with varying degrees of emphasis on the Mathematics Framework, making it difficult for district leaders to know where those resources originated or the degree to which they were developed in coordination with similar efforts.
- Multiple initiatives are also charged with building COE capacity in different ways, so they play an indirect role in supporting districts by strengthening what is arguably the districts' primary source of support.

As a result, districts may benefit from the increased skills in their teacher workforce or the increased capacity of their COE without recognizing the contributions these initiatives are making.

Among state entities, district leaders primarily accessed TK–8 mathematics support through their COEs.

We asked district leaders about the sources of support they accessed for their TK–8 mathematics improvement efforts, including whether they received any support from CDE, CCEE, the CMP, COEs, and a broad category of supports outside the state system. District leaders' responses included resources they personally used, professional development their district funded for teachers, and other sources of support they knew their site administrators or teachers accessed. Figure 9 shows the percentage of district leaders in our sample who reported accessing support from CDE, CCEE, CMP, COEs, or other sources. The total height of each bar represents the percentage of our sample that reported using each source, and the shading represents the portion of districts that found the source moderately or very helpful. The other sources of support were typically philanthropically funded or paid for on a fee-for-service basis.

Figure 9. Percentages of sample that reported using each source and perception that the source was moderately or very helpful (n=92)



The relatively lower rates of districts that identify support from CDE, CCEE, and CMP are not surprising. CDE and CCEE primarily provide universal supports and general resources such as toolkits, webinars, and workshops, and CMP's mission focuses more on building teachers' knowledge and skills than on district capacity. COEs, by contrast, interact more intensively with districts through direct assistance, their roles delivering math-related state grants, and fee-for-service offerings, which likely explains why over two-thirds of districts cited them as a source of support for mathematics instruction. About two-thirds of those districts found COE support at least moderately useful. Fee-for-service offerings that provided customized assistance, including onsite workshops and instructional coaching, were often described as the most beneficial types of COE support.

More districts accessed one or more other sources of support than any single state-funded support provider. District leaders often told us they paid for support from organizations like Building Thinking Classrooms, Curriculum Associates/iReady, California Education Partners, Solution Tree, and Swunmath, sometimes in addition to and sometimes instead of the supports funded by the state. The vast majority of users found those external sources at least moderately helpful.

Additionally, small districts were more likely to report not accessing any of these resources, even though they were also less likely to have internal staff (e.g., TOSAs or district mathematics specialists) to provide their own professional learning around mathematics instruction for teachers. This is likely partially a function of the fact that more remote communities are likely to have small districts, creating geographic barriers to engagement, as well as the fact that smaller districts receive less funding and may be unable to pay for deep engagement with outside support providers.

District leaders' perspectives on the state-level supports reflect the system's design.

District leaders associated CDE first and foremost with compliance and accountability. Even though CDE also plays a critical role in developing resources like curriculum frameworks and issuing adoption guidance, district leaders most often engaged with CDE's supportive resources through intermediaries, such as a COE presenting a workshop on the Mathematics Framework. Most districts in our sample did not use CDE resources to support their instructional improvement efforts, and those that accessed them did so rarely or passively. One district leader explained, "I attend a ton of webinars. Their website

is usually pretty helpful." Others were less satisfied, perceiving CDE as a producer of too many resources that districts needed to independently mine to gain value:

> I think the challenge with CDE is we get a lot of stuff from them, and it is over-saturation… We get so many emails from them that I honestly don't look. If I need something, then we'll go on their website….And you know that adage, when you prioritize everything, you prioritize nothing.

CCEE's role is designed largely to connect partners within the state ecosystem and serves as an indirect support to most districts, primarily through COEs. Within the Statewide System of Support, CCEE plays a lead role in coordinating capacity-building efforts and providing Direct Technical Assistance, and it also offers some universal supports. A state leader with an up-close view of agency collaboration explained:

> Typically what will end up happening is that the legislature will provide [CCEE] funding in order to do things that the Department doesn't have the capacity to do…[CDE doesn't] always have a large amount of expertise in all of the content areas. So you would almost imagine [there] would [be] a whole team of mathematics experts…at the Department, but there isn't...

Because CCEE's primary role is supporting other entities in the Statewide System of Support, many district leaders expressed little or no knowledge of the agency's functions, with statements like "CCEE isn't even on my radar." A few districts in our sample worked with CCEE as part of the direct technical assistance provided at the highest tier of state support, and their perceptions were mixed. One district described CCEE as a source of "alignment and making sure that people aren't hearing four and five different things." Another reported, "We're very fortunate to have one of the best state resources for support with CCEE." In contrast, one district felt they were providing information without experiencing tangible benefits: "I couldn't say that there was any support there. Like right now you're asking us questions. It's more compliance. And more work."

Overall, district leaders were less likely to access the types of supports they most wanted for improving mathematics instruction, namely embedded experts who could build their district's capacity through

deep and customized work, from CDE or CCEE because their roles are not designed to provide these types of support.

TK–8 mathematics support varies enormously across COEs. District leaders found COE support most helpful when it provided sustained, in-depth professional development for their teachers.

"When you know one COE you know one COE" is a phrase we heard repeatedly to describe the high level of variability across the state's 58 county offices. COEs are typically multi-district regional entities intended to bridge state initiatives and district work, and there were strong similarities across the 14 we interviewed (one of which was a single-district county). Although COEs exercise formal fiscal and LCAP oversight authority, participation in their instructional support work is voluntary for districts: "We can suggest focus areas, but ultimately we respond to district demand." COEs also have discretion over how much support around TK–8 mathematics instruction to offer, if any at all. Box 8 describes how that discretion played out for one small rural district.

Box 8. COEs are not required to offer supports for mathematics instructional improvement
One of the rural districts in our site visits was small enough that there was approximately one teacher per grade level in the district. When we first asked the superintendent about COE support in mathematics, he told us he had already missed his chance to receive some for the year: "I became aware that the County Office had already done one sort of survey of the new curriculum options. I missed the flyer on that, but that's happening in the fall again, so we'll catch it then." When we asked whether the state or COE could better support the district, the superintendent described how COE supports had changed in recent years: "Over the last maybe five to ten years, they decreased the amount of collaborative professional development training time for all the different teachers in the county. And maybe for the big districts, that was fine because they ran their own. But for us small districts, it means that we don't have the opportunity to do a lot of grade level peer time with each other in professional development. I've got one second grade teacher and one third grade teacher. Where are they going to have that collaborative time with a group of third grade teachers to talk about what they're doing? They don't have it." Over time, the local COE stopped offering their most effective types of support for improving instruction, leaving a gap for this small district.

When describing whether and how they prioritized mathematics, COE leaders were careful to articulate their constraints. Some felt they could not prioritize mathematics at all: "We try not to privilege one content area over another unless there's a strong district pull." Another framed the choice as a function of capacity: "If we prioritize math, we have to be clear about what we're not prioritizing." These constraints produced two notable variations in COE approaches.

The first variation was between depth and breadth. With current resources, COEs cannot do deep work with all of the districts they serve. Some decided explicitly to go deep with fewer districts: "We'd rather do sustained work with fewer districts than surface-level work with everyone." Others took the opposite approach, ensuring that they offered every district some level of support regardless of depth.

The second variation was between instructional improvement and system navigation. Some COE leaders described their core priority as improving instruction: "Our priority is helping improve instruction in classrooms. That's where the work has to land." Others spent most of their time translating state signals for districts: "We spend a significant amount of time translating what the state is asking for."

When COEs were considered most helpful, it was because they provided districts in-person, sustained professional development. One interviewee explained, "Probably the county office was most helpful just because it was a live person that came in and did some valuable training." District leaders also appreciated when the COE partnered with another provider, such as Building Thinking Classrooms, California Education Partners, Curriculum Associates, or Solution Tree, to provide specific content the district wanted. Other district leaders appreciated their COE's role in statewide initiatives like the Rural Math Collaborative and CAL-MSCS.

COEs were less likely to be used or received low helpfulness ratings when they were perceived as lacking relevant, high-quality offerings. One district leader questioned the depth of county support:

> I have not seen a focus from our county to have in-depth learning like the [external providers we work with]. So we actually, regrettably, have used our county less and less. I just don't know

> that we have quality programs that are really geared to what we need. So we have come to rely on outside sources.

Other district leaders explained that COE expertise did not meet the level of knowledge that existed within their own district. One explained, "For someone who didn't have the knowledge base that our coaches have, it probably would have been an okay training, but our coaches are so much farther along in the learning." Several district leaders told us their COE had not offered supports for mathematics in years, though they anticipated that would change in 2025–26 as COEs took on a role in supporting district instructional materials adoption.

Some of the more in-depth COE services required districts to pay fee-for-service or to find substitutes to free teachers to attend workshops, both of which were barriers for some districts. Small and rural districts found it hardest to access these resources, which is particularly problematic because these districts were also the most likely to lack internal capacity to offer their own high-quality professional learning. Some district leaders also noted that COEs charged the same amount as outside consultants for intensive, customized support, such as sending coaches to districts as part of a district-specific professional learning series, even though the COE already received funding to support districts through channels like differentiated assistance funds. District leaders who held those views typically opted for outside consultants instead. While COE provided the more districts with helpful support than any other public entity, the variability in COE capacity and services, coupled with one-time funding for initiatives and a lack of accountability for outcomes, works against the goal of serving all districts well.

State-wide mathematics initiatives reach few districts and their impact on district capacity is limited.

Leaders estimated that more than 50 mathematics initiatives are operating across the state, including the six statewide initiatives described above, yet district engagement remains selective and uneven. When district leaders in our sample did participate in statewide initiatives—most often through county-led networks—they generally viewed them as valuable. Districts participating in the Rural Math Collaborative, for example, described it as a meaningful investment in local capacity, highlighting its coaching model and its alignment to the Mathematics Framework through lesson study, number sense, and math task development. A small number of districts also referenced CAL-MSCS, emphasizing its

practical classroom applications and opportunities for teachers to observe one another's practice. In these cases, leaders positioned statewide initiatives as extensions of their broader district mathematics strategies rather than as stand-alone programs.

When district leaders were aware of support from the California Math Project, it was most often related to recent training on the Mathematics Framework and the CMP's long-standing work on developing teacher leaders. One TOSA in a site visit district explained:

> [CMP is] the reason why I'm a coach. The work that I did with the Math Project transformed my math teaching, and it wasn't just a one and done. I think I was in that team for three or four years with the California Math Project.

We also found strong appreciation of the CMP among districts served by one of their 19 campus sites located in a densely populated region with multiple districts in our sample. CMP sites most often focus on building the knowledge and skills of teacher leaders, in line with their mission. The leader of this particular regional site chose to focus on improving the quality of mathematics instruction across entire districts, including work directly with teachers in their classrooms, through multiple-year partnerships that district leaders valued deeply. One district leader described the range of complementary experiences they received from that campus site:

> The [regional Math Project] comes out quite a bit…. [They] trained our teachers on special assignment (TOSAs), who do trainings [for other teachers in our district]. But they also have done pull-out teacher training. They've done demo [lesson]s and coteaching, and then they also created and upkeep conceptual framework lessons that augment the textbook that we use, and those get delivered to students… They're highly structured lessons, but very much building on academic discourse among students and conceptual understanding of the mathematics concepts.

Overall, participation in these initiatives is typically limited in scale and may not be strategically coordinated at the district level, which constrains their impact on district capacity. In many cases, initiatives engage small cohorts of teachers rather than whole systems. Sometimes teachers opt in on

their own, in other cases, districts designate one or two teachers to participate with the expectation that they will share what they learn with colleagues. In both models, however, the structure for spreading learning is often weak. Teachers may be still developing their own practice with new approaches and have limited time or support to translate that learning for others, particularly if their role does not include release time to work with other teachers. When participation is teacher-initiated, district leaders are not always aware that their teachers are engaging in professional learning, further limiting their ability to leverage that expertise strategically. As a result, even high-quality professional learning remains diffuse, with limited mechanisms to spread learning beyond individual participants.

At the state level, these dynamics are compounded by limited coordination across initiatives. Several state-level interviews pointed to duplication of effort, especially in the development of professional learning resources, alongside limited understanding of how those resources are used or whether they influence classroom practice. As one interviewee described,

> One of the things that we discovered in our design meeting was the duplication of work specifically around professional learning modules… There's a saturation of those modules, but yet we don't know the impact of their use [and] we can't measure the transfer of learning into the classroom and how that's impacting student outcomes and student experiences. So there's a big gap between what these state initiatives are doing and true student outcomes.

Taken together, these dynamics suggest that the challenge is not only limited reach, but also fragmentation across initiatives, which weakens their collective ability to build district capacity and improve instruction at scale.

The California Statewide Mathematics Network, the newest initiative under the charge of CCEE, represents a potential step toward greater coherence. By convening regional hubs and cross-initiative teams, the network could create stronger connective tissue across initiatives that currently coordinate as best they can within the constraints of their individual grant terms.

District leaders relied most heavily on providers outside the state support system.

District leaders consistently reported that publicly-funded supports on their own did not meet their needs. While some districts sought more intensive, in-district support by contracting with their county offices of education (as Figure 9 shows), a large number of districts in our representative sample ultimately looked for help outside the state system and most found what they received helpful. Across district interviews and site visits, we learned about a wide range of providers that district leaders brought in to support their TK–8 mathematics improvement efforts, such as non-profit organizations, individual consultants (such as university faculty or former COE staff), or textbook publishers. The services they offered ranged from support for improving the use of specific instructional approaches or materials to broader instructional or leadership coaching. These providers were typically funded through fee-for-service arrangements or philanthropic grants, though a few were hired by COEs to provide services to districts in their region.

District leaders reported that local consultants could build the trust and credibility necessary for effective professional learning. One leader shared: "It helps when the consultant knows our community and has worked in districts like ours. There's more trust, and the support feels more relevant." Leaders also turned to local consultants when they felt that other providers had models or approaches that did not fit their contexts, particularly in small, rural communities. One superintendent from a small district explained: "We tend to work with people who understand small districts like ours. Someone coming in with a big urban model doesn't always fit. We need people who get our context."

The credibility of local consultants often enabled the deep, tailored, and sustained work district leaders said they needed. One district leader described the work of local consultants this way:

> [We have consultants] that come in to work with us that are just really highly skilled in math instruction. They're able to get down into it but they're not just about strategies. They're also about those, you know, those underlying math practices. This is why we do it, getting teachers to understand it at a deeper level versus, you know, this is how you implement the curriculum. They come with a wealth of knowledge that strategies that we can use that are very specific to the needs of our students, based on our data, based on our teachers and observations that

> they've made. They have come in and done a lot of training with our TOSAs and directly with teachers. So they spend multiple days in our district, both providing professional development and going out and providing feedback on site visits at school sites. They work directly with our TOSAs, with our director of curriculum, and then we also send [teachers for direct support from them].

Leaders in some districts, typically mid-sized or large districts, reported relying on multiple external providers to address different TK–8 mathematics instructional needs, with the work of coordinating those providers falling to district or site leaders. For example, district leaders might select one organization for curriculum implementation, another for coaching, another for leadership development, and still others for intervention or data systems to support professional learning communities. While leaders valued the specialized expertise these providers brought, they also acknowledged that the piecemeal approach could create fragmentation, duplication, or misalignment. One district leader shared: "We have one group supporting our curriculum rollout, another doing coaching work, and then someone else helping with data. They're all good, but they're not necessarily connected to each other." Patching together resources was sometimes due to the availability of funding, which often came from one-time grants. One leader put it this way: "A lot of what we're able to do depends on what grants we have at the time. When funding comes through, we can bring someone in, but it's not always sustainable."

District and state leaders want the state to reduce initiatives and set clearer priorities.

District and state leaders described the proliferation of initiatives at the state level as a source of incoherence that filters through the support system down to school districts. As one state agency leader put it: "A big problem is one-time funding for multiple initiatives. We estimate we have 50 mathematics initiatives right now, and there is no real cohesion around their charges." State guidance and requests for applications often suggested or required that local leaders integrate related efforts and blend funding. Leaders acknowledged the logic of braiding funds but shared that making those connections across initiatives was difficult in practice. As one COE leader put it: "Connecting all these grants is really random." The result is that many initiatives, regardless of their impact, struggle to sustain benefits after the grant period ends.

The lack of clear priorities created a pervasive sense of overwhelm among state interviewees. One county office leader said plainly: "The sheer number of activities is a huge issue for us. Folks are overwhelmed." Another shared: "There are just too many disconnected efforts. Districts don't know which one they're supposed to prioritize." The overload had material effects on COEs' ability to support districts. In our interviews with county office leaders, we heard repeated descriptions of translating state signals for districts, filling capacity gaps that districts could not fill themselves, stitching together fragmented guidance, and slowing things down so districts could absorb what was being asked of them. COE leaders were frustrated that they were making up for weaknesses, gaps, or dysfunctions elsewhere in the system rather than operating within a well-designed, coherent structure.

The fragmentation also produced fatigue at multiple levels of the system. As one county office leader put it: "Districts are tired of starting over every year." Another shared: "People disengage when nothing feels stable." One provider raised the particular challenge of literacy frameworks arriving so quickly on the heels of the Mathematics Framework: "These elementary teachers are going to lose it." As county offices sought to provide support across more and more programs, that support did not always feel coherent or useful. One county office leader captured the problem: "Everyone is trying to help, but it lands as noise instead of clarity."

In sum, district leaders need support for their TK–8 mathematics improvement efforts that the state system is not currently providing. District leaders were clear-eyed about the extent of work and time required to move from current instructional practice in TK–8 mathematics to practices aligned with the Mathematics Framework. The supports that state agencies and COE provide for all districts are relatively low intensity and not well-aligned with the research on the types of professional learning that shift teachers' instruction. With a few exceptions, robust supports for instructional improvement in mathematics are available only to districts that pay for them or receive a short-term grant. When districts prioritize mathematics improvement and have the resources to do so, they turn to outside providers (including some COE along with independent organizations) because those providers understand their context and can go deep in ways that universal supports cannot. Smaller districts are most likely to fall through the cracks in this system even while they are least likely to be able to support teacher professional learning on their own. These findings show how priority, capacity, and coherence

gaps interact: mathematics is not consistently prioritized, districts lack the capacity to implement ambitious instructional reforms, and the system of support is too fragmented and diffuse to compensate.

Conclusions and Implications

We conducted this study to understand how California's governance structures, policies, and support systems shape TK–8 mathematics improvement efforts. We heard from 94 district leaders, as well as dozens of state agency officials, county office leaders, teachers, instructional coaches, school leaders, external providers, and experts. Their perspectives, taken together, paint a picture of a system populated by dedicated professionals working within structures that too often diffuse their efforts rather than focus them. Consequently, most districts are not getting the support they need. The evidence across this study points to three interconnected system-level challenges—priority, capacity, and coherence—that together constrain California's ability to improve TK–8 mathematics instruction at scale.

In this final section, we step back from the specific findings presented in each section to consider the broader patterns that emerged across our data. We organize our conclusions around three themes: the existing strengths on which California can build, the governance disconnects that constrain local improvement efforts, and the diffuse policy landscape that compounds those governance challenges. For each conclusion, we draw out the implications our evidence points toward, focusing on what the findings suggest about where change would be most consequential. In some cases, we also draw on examples from other states that have addressed similar challenges, not to recommend a specific approach but to surface viable alternatives and challenge the assumption, reflected in some interviews, that 'this is just the way it is' or that there are few other ways to approach these issues. These implications focus on how existing structures and resources could be better aligned to support district-level instructional improvement.

Conclusion 1: California has strong foundational assets for improving TK–8 mathematics, but those assets are not currently organized into a coherent system.

The evidence in this study indicates that California has already developed many of the key elements needed to support high-quality mathematics instruction. The state has articulated an ambitious instructional vision through its standards and Mathematics Framework. It has invested in multiple initiatives, organizations, and partnerships intended to support that vision. District leaders, county offices of education, and external providers are actively engaged in improvement efforts, and there are clear examples across the state where sustained support has led to meaningful gains in instructional practice.

These assets, however, are unevenly connected and inconsistently available across districts. Supports such as sustained professional learning, instructional coaching, and curriculum-aligned training are often limited to specific initiatives, regions, or grant-funded efforts. As a result, access to high-quality support varies widely, and improvement depends heavily on local leadership, capacity, and resources. This unevenness produces a system in which strong practice develops in some contexts while remaining out of reach in others.

The pattern that emerges is one of accumulation without alignment. Individual programs and supports demonstrate value in isolation, yet they do not consistently reinforce one another or build toward shared statewide goals. Without stronger coordination and integration, the system continues to generate pockets of progress rather than broad-based capacity for improvement. Strengthening the connections among existing assets would increase their collective impact and support more consistent instructional improvement across districts.

Conclusion 2: Governance structures limit the system's ability to translate instructional vision into consistent classroom practice.

The evidence in this study indicates that the distance between California's instructional vision for mathematics and what occurs in classrooms is shaped by the structure of the state's governance system. Responsibility for setting direction and providing support is distributed across multiple entities, each with distinct roles, funding streams, and accountability relationships. These entities carry out

important functions, yet their work is only loosely connected, and no single organization is responsible for ensuring that districts receive the support needed to enact the state's vision for mathematics instruction or for whether those efforts lead to improved outcomes.

This distribution of authority creates gaps in coordination and weakens the system's ability to sustain instructional improvement over time. Policies, frameworks, and initiatives move through the system without a consistent mechanism to translate them into practice at scale. Districts operate as the primary agents of implementation, yet they must navigate multiple sources of guidance and support that are not consistently aligned. In this context, the realization of the state's instructional vision depends heavily on local interpretation and capacity rather than on a coherent and reliable system of support.

The absence of clear, end-to-end responsibility for instructional improvement means that no entity is accountable for ensuring that policies translate into improved classroom practice, contributing to variability in how policies are experienced across districts and classrooms. Even when the state articulates a strong vision, the system does not consistently ensure that the conditions required to enact that vision are in place. Strengthening alignment among state entities and clarifying responsibility for building district capacity would improve the system's ability to carry instructional priorities through to classroom practice.

Governance implication 1. The evidence points to a need for system-level governance reform, both for TK–8 mathematics improvement and for instructional improvement more broadly.

California is at a moment of leadership transition, with a new Governor, State Superintendent of Public Instruction, and State Board President assuming office. The findings in this report suggest that the priority local leaders most need from state leaders is not new initiatives, which would continue to flood an already overwhelmed system, but deliberate governance reform. The example of instructional materials adoption and implementation illustrates how CDE, SBE, and COE are all involved, but their roles are both intertwined and incomplete, leaving districts without strong support in this key area. Clarifying roles across agencies, strengthening formal lines of authority, and creating mechanisms that

ensure coordination rather than fragmentation would be a critical step. Such reforms would likely yield benefits well beyond TK–8 mathematics.

System-level governance change is complex and will take time. The evidence points toward the value of concrete structural shifts, including clearer accountability among state actors, more explicit responsibility for local capacity-building, and stronger formal connections across agencies that currently operate in parallel, all organized around a clear and stable set of priorities. The alternative, continuing to layer new programs onto a fragmented and relatively under-resourced state governance system, is likely to exacerbate the uneven implementation and sense of overwhelm we documented in this report.

Governance implication 2. The evidence points to reenvisioned regional support structures as critical to building district capacity for TK–8 instructional improvement.

In the context of broader governance shifts, the findings point to the particularly critical need to reenvision the regional support system. In a state as large and diverse as California, sustainably building district capacity for TK–8 instructional improvement will almost certainly require a regional structure. California's existing county offices are uniquely positioned to serve in that role: they have local presence, valued relationships, and, though variable, some existing infrastructure. Yet COEs are currently neither required nor held accountable to provide support for instructional improvement in TK–8 mathematics or otherwise (CCEE offers support for highly distressed districts), and districts are not required to accept support for improving instruction when COEs offer it. The evidence in this report suggests that this voluntary model has produced uneven implementation and unequal access to support across districts.

The findings point toward the need for a regional model to build TK–8 mathematics instructional capacity across districts, with accountability structures that align work to state priorities and district needs. This model could build on county offices of education if their roles, resourcing, and accountability structures were redesigned, while also drawing on external providers to expand expertise and capacity, either through state partnerships or through COEs themselves. Resources historically directed toward one-time initiatives could be redirected to build more durable TK–8

mathematics instructional expertise within regional systems, including county offices and their partners. State executive agencies could provide guidance and training on what high-quality instruction and professional learning looks like in the context of state standards, frameworks, and approved instructional materials. The state could also vet external partners to support these efforts, as California and other states have done in other cases.

Other large states offer examples of how this kind of reorientation might work. A recent comparison of education governance in California, New York, Texas, and Massachusetts (Ripma and Loeb, 2026) found California unique among them in distributing authority for programmatic improvement across multiple autonomous entities. Box 9 describes how New York State's BOCES operate as regional intermediaries in a hybrid governance structure that connects them to both state agencies and the districts they serve.

Box 9. New York State's regional education intermediaries serve as a link between the state and the districts they serves

New York State's education governance system includes regional intermediaries called Boards of Cooperative Educational Services, or BOCES. Each of the state's 37 BOCES (which cover all districts in the state except the five largest districts) work with the state, are governed by a regional board elected by its member districts, and led by a district superintendent. Each BOCES provides program and service supports that are responsive to the needs of their member districts, including career and technical education, special education supports, shared administrative services, and a menu of professional development offerings. Funded primarily from fees collected from districts and additional state aid, each BOCES is responsive to the district leaders it serves. At the same time, BOCES district superintendents also serve as the State Commissioner for Education's representative in their region, providing a connection between the state and its regional intermediaries. Additionally, each BOCES develops regional service and program plans in response to the needs of its member districts. A recent New York State policy, "Regionalization Initiative," formalized a collaborative improvement planning approach between BOCES regions and the districts they serve (New York State Education Department, 2024; New York State School Boards Association, 2024). These plans are subject to state review, providing another accountability and shared support link between the state, regional tier, and districts.

Conclusion 3: A diffuse policy landscape weakens signals about the importance of mathematics; system incoherence leaves many districts without the capacity to improve mathematics instruction.

The evidence in this study indicates that California's policy environment sends multiple, and often competing, signals about district priorities. District leaders are responsible for advancing work across many domains, including literacy, social-emotional learning, multilingual learner support, universal transitional kindergarten, as well as optional programs such as community schools. In this context, mathematics does not consistently receive sustained attention or resources at a level that would position it as a central focus of instructional improvement.

This diffusion of priorities interacts with limited capacity and fragmented supports to constrain district action. Leaders must make tradeoffs about how to allocate time, funding, and professional learning, and those decisions are shaped by the relative strength and clarity of state signals. Where policy signals are stronger, districts are more likely to organize resources and attention accordingly. Where signals are weaker or less consistent, efforts are more likely to be intermittent, fragmented, or dependent on local initiative.

The broader effect is that key elements of the system do not consistently reinforce one another or build toward sustained improvement in mathematics instruction. Curriculum adoption processes, teacher preparation systems, and professional learning opportunities are not consistently aligned with the state's instructional vision or with one another. Without clearer prioritization and stronger alignment across these components, districts struggle to organize their work in ways that support coherent and continuous improvement. Strengthening the clarity and consistency of policy signals and focusing state resources on building district capacity would better enable districts to sustain a focus on improving mathematics instruction over time.

Policy implication 1. The evidence points toward the importance of stronger and more consistent priority signals for mathematics and a policy approach that builds coherence.

Prior research and the findings of this study indicate that California's policy environment sends multiple signals across a wide range of priorities. District leaders consistently described the resulting challenge

of allocating limited time, attention, and resources across competing demands. None of the 94 district leaders we interviewed suggested that the state should play a less active role because of local control. Instead, a large majority described the value of clearer, fewer, and more stable priorities, with mathematics more explicitly elevated among them.

The relationship between policy signals and district prioritization is reflected in how states use available levers to focus attention and reduce fragmentation. Box 10 provides an illustrative example of how one state approached this challenge. It draws on an interview with Kunjan Narechania, former CEO of the Louisiana School Recovery District and former Assistant State Superintendent of School Improvement at the Louisiana Department of Education. She described how Louisiana prioritized improving student learning in literacy and mathematics, incentivized districts to do the same, and supported districts to find the resources they needed all while reducing the burden of funding and compliance reporting.

Box 10. How state policy signals shape district prioritization and reduce fragmentation

Across the country, the formal authority of state education agencies over districts is relatively limited. As Narechania explained, “I do think California is unique. But what is common in every state is that the LEA is accountable to an elected board that is the same everywhere, and that means that the state has very limited levers, no matter its governance structure, on how to influence districts to make change…. No matter your governance and no matter your political leanings, the levers across states are similar, and the difference is the extent to which states choose to use them or not.” Even while states lack control, they can still use funding, guidance, and incentives as levers to influence districts.

One way states use these levers, Narechania suggested, is by reducing fragmentation and concentrating resources on a small number of core instructional priorities. In Louisiana, those priorities were deliberately concrete and few: ensuring that districts adopted high-quality instructional materials in literacy and mathematics and providing teachers with the training and support needed to use those materials effectively. She described state policy tools as serving three purposes: "they should signal quality, make the right choice the easy choice, or clear out the noise. Instead of funding 200 grants that sort of fund 200 programs, fund the work that matters the most, and to the extent possible align all grants to one set of things." In Louisiana, this principle produced a unified funding and planning process known as the "Super App." Rather than requiring districts to submit separate applications, plans, and budgets for numerous federal and state programs on different timelines and to different offices, the state consolidated these processes into a single annual application through which districts could plan priorities and apply for funds at once. Districts identified their local instructional priorities and the state provided

explicit guidance about which funding sources could legally support those priorities, doing much of the cognitive work of braiding funds for districts. When districts aligned their spending with the state's priorities, Louisiana used discretionary funds to help close budget gaps. When districts chose to allocate funds toward other priorities, the state did not use its discretionary funding to fill those gaps. Narechania described the goal as "making the right choice the easy choice," encouraging districts to focus on high-quality curriculum and teacher support through simplified planning and aligned incentives rather than mandates.

A third theme in Narechania's account was the importance of connecting state policy to classroom practice through a clear implementation chain. Education systems often adopt policies and later judge their success based on student outcomes without specifying the sequence of changes in adult practice required to produce those outcomes. States that anchor their work in a clear picture of the learning experiences they want students to have, and then align their policies, resources, and supports to the actions required to produce those experiences, are better positioned to drive coherent and sustained improvement.

This example illustrates how states can shape district behavior through the alignment of funding, guidance, and incentives. When policy signals are concentrated and reinforced across multiple levers, districts are more likely to organize their work around a shared set of priorities (Mission et al., 2025). This example also shows how Louisiana operationalized the prioritization of literacy and mathematics. While California districts recognize literacy as a state priority, numeracy is also a fundamental skill for daily life, civic participation, and economic opportunity. California's current trajectory suggests that without elevating mathematics to the same level of priority as literacy, improvement will remain slow and uneven.

Lastly, Narechania's discussion of a clear implementation chain from state policy to the classroom is critical for determining which policies would bring coherence and which would add more noise for districts. A clear implementation chain addresses the complexity of translating policy into practice by aligning the multiple systems, levels, and processes that shape how policy is implemented in schools (Damschroder et al., 2009). This focus is particularly important given the scale of instructional change already underway, as many districts work to align with the Mathematics Framework and implement new instructional materials. Working backward from a clear vision of what educators should be doing, policies should be adopted only when they directly support those practices and avoid diverting time,

attention, and resources away from the sustained effort required to improve core instruction. Evidence from another state further illustrates how sustained prioritization of mathematics, combined with aligned supports, can shape instructional improvement at scale. Alabama's Numeracy Act provides one example. Box 11 describes the Act and its early results.

Box 11. How aligned policy signals and sustained investment support system-wide mathematics improvement

In 2022, Alabama enacted the Alabama Numeracy Act (SB171), a comprehensive legislative initiative aimed at transforming K–5 mathematics instruction statewide. The Act emerged from a stark reality: on the 2019 National Assessment of Educational Progress (NAEP), Alabama ranked 52nd in the nation for fourth-grade mathematics achievement, with only 22 percent of students demonstrating proficiency on the state mathematics assessment and far lower rates among historically disadvantaged populations (National Council on Teacher Quality, 2025). The law is notable for the degree to which it simultaneously addresses governance, vision-setting, and implementation capacity as interconnected components of a coherent system.

At the governance level, the Act established the Office of Mathematics Improvement within the Alabama State Department of Education, creating a dedicated institutional home for mathematics improvement efforts focused on the state's lowest-performing schools. It also created the Elementary Mathematics Task Force (EMTF), charged with vetting and curating instructional materials, professional learning opportunities, and student assessments, centralizing quality assurance functions that had previously been left to individual districts. A separate postsecondary task force was formed to align teacher preparation programs with the knowledge and skills needed to teach elementary mathematics effectively. In response, the state revised its requirements so that all early childhood and elementary teacher candidates must complete 12 credit hours of integrated mathematics content and pedagogy courses, with nine of those credit hours at the junior or senior level (Mackey, as cited in National Council on Teacher Quality, 2025).

The Act set a clear instructional vision anchored to Alabama's revised Course of Study: Mathematics standards, the product of an extended, consensus-driven revision process that incorporated national guidance alongside input from Alabama teachers and families. The vision is reinforced by a newly developed assessment system, both summative and formative, aligned to the revised standards and giving teachers timely, actionable feedback on student learning throughout the school year.

To build implementation capacity, the Act mandated dedicated, full-time mathematics coaches in every public K–5 school: one coach for schools with fewer than 800 students, two for larger schools. Recognizing both the workforce and fiscal implications of this commitment, at approximately $90,000 per coach in state funding, the state adopted a phased approach beginning with roughly 250 coaches in the lowest-performing schools in 2023, adding 200 in the second year, with an additional 200 expected in 2026. Funding flows directly from the state education agency to districts through memoranda of understanding stipulating that funds be used exclusively for mathematics coaching, with coaches protected from reassignment to administrative duties. The state's centralized mathematics initiative, the Alabama Math, Science, and Technology Initiative (AMSTI), provides training for all coaches, and state leaders have increasingly focused on aligning professional learning directly to high-quality instructional materials, recognizing that strong materials alone do not drive results unless teachers are supported in using them skillfully (A+ Education Partnership, 2022; National Council on Teacher Quality, 2025).

Early results suggest the approach is gaining traction. On the 2024 NAEP fourth-grade mathematics assessment, Alabama recorded the largest score gain in the nation, rising from 52nd to 32nd overall (National Council on Teacher Quality, 2025). State leaders attribute these gains to the sustained focus on aligning standards, assessments, instructional materials, coaching, and teacher preparation as components of a single coherent system rather than independent initiatives.

This example illustrates how aligning standards, assessments, instructional materials, professional learning, and teacher preparation around a shared vision can strengthen both prioritization and capacity, while reducing variation in how districts interpret and act on state policy. The Alabama Numeracy Act provides a concrete example of this kind of system alignment. It also demonstrates how sustained investment can elevate mathematics as a priority and support teachers in enacting that vision in their classrooms. An important distinction for California is that while the state has articulated a clear instructional vision through its standards and Framework, the Framework functions as guidance rather than a mandate, so the influence of the Framework depends on the extent to which districts align their local approaches with that vision. California could follow Alabama’s lead and provide state-level training for coaches to ensure every school had someone with expertise in the Framework

on site. Without stronger and more consistent policy signals, California's investments are likely to continue to produce variable results across districts.

Policy implication 2. The evidence points toward the importance of sustained, high-quality professional learning aligned to the state's instructional vision for TK–8 mathematics.

When we think about designing a system based on what would best support students' mathematics learning, we envision a system that would give students a coherent mathematics learning experience: content would build in a rational sequence over time and pedagogical approaches would be consistent enough to help students leverage knowledge built one year to support their learning the following year. This would require a system that builds both individual teachers' knowledge and supports coordination among teachers within each district around fundamental pedagogical approaches and content coverage.

Ongoing professional learning is a central mechanism for building instructional capacity, but the evidence in this study indicates that yet the current system is not structured to support that function effectively. District leaders and teachers described the absence of structured, school-based opportunities to collaborate, practice new strategies, and receive feedback as a central gap. Instead they described a landscape of professional learning that is largely voluntary, limited in duration, and disconnected from classroom practice. One in five districts in our sample reported offering no consistent professional development in mathematics in 2024–25, and most available opportunities were optional. District leaders consistently described this model as insufficient to shift instructional practice at the site level, resulting in students having incoherent mathematics learning experiences as they move through school.

Constraints on time, funding, and organizational structure play a significant role in shaping this landscape. More than half of district leaders identified time as the primary barrier to professional learning, and the relationship between time and funding limits districts' ability to invest in more intensive approaches. In addition, some contractual provisions and local norms restrict how instructional support staff can engage with teachers, further limiting access to ongoing coaching and

feedback. These constraints contribute to a system in which professional learning remains episodic and unevenly distributed across schools and districts.

A few states have used instructional coaching as a central strategy to ensure that support for instructional improvement aligned with the state's vision reaches all classrooms. In these states, agencies have partnered with vetted vendors to train instructional coaches in key components of that vision and to support their work in schools. Box 12 provides an example of how one state has embedded coaching within a coordinated approach to professional learning.

Box 12. Louisiana's State Department of Education's role and approach to supporting instructional coaching for all teachers statewide

Louisiana's state government played a central role in expanding literacy supports into classrooms by both setting expectations and resourcing on-the-ground help for teachers. Through a series of policies and the Louisiana Comprehensive Literacy Plan, the state required every K–3 school to provide literacy coaches whose job is to support teachers in implementing evidence-based reading instruction. These coaches provide job-embedded professional learning, including modeling lessons, observing classroom practice, giving feedback, and helping teachers interpret student literacy data, and their work is connected to statewide professional learning systems and regional literacy specialists so that expectations for high-quality instruction remain consistent across the state (Early Literacy Matters, 2024; Louisiana Department of Education, 2024).

The Louisiana Department of Education also provides ongoing training and resources directly to literacy coaches and districts. The state organizes professional learning, communities of practice, and coaching supports through approved vendors and regional specialists, helping coaches deepen their knowledge and strengthen their ability to mentor teachers. By embedding coaching in the daily work of schools and aligning it with statewide literacy assessments and instructional tools, Louisiana created a coherent system linking state policy, professional development, and classroom practice (Louisiana Department of Education, 2022, 2024).

Louisiana's literacy reforms are linked to measurable gains in student outcomes. On the 2024 NAEP, Louisiana's fourth graders improved from ranking 49th nationally in reading to 16th over the period from 2019 to 2024 (Louisiana Department of Education, 2025).

This example illustrates how embedding coaching within a coherent system of policy, professional learning, and instructional support can strengthen the connection between the state's vision and classroom practice. When coaching is integrated with broader systems and consistently available, it supports teachers in enacting that vision in their daily instruction.

California has also invested in coaching, but in a less comprehensive and systematic way. California's largest coaching investment targets schools with a high proportion of low-income students, English learners, or foster or homeless youth through its Literacy Coaches and Reading Specialists Grant Program (AB 181, 2022, funded at $250 million). This 5-year grant provided funding to LEAs to improve literacy instruction, with local discretion on how to spend those funds to develop school literacy programs. While funds were primarily to be used for hiring literacy coaches and reading specialists, they could also be used to contract with tutors, purchase instructional materials or for other literacy-based expenditures. The grant also funded the Sacramento County Office of Education to provide support for grantees, which included optional training on the science of reading (as well as other topics) (Novicoff, 2026). California has also worked to support coaching in mathematics instruction through the Math Professional Learning Partnership (SB 153, 2024, funded at $20 million). It has some key features of Louisiana's approach. It is designed to train administrators, mathematics coaches and teacher leaders in each of the 11 CISC regions, but its design and funding are far below what would be needed to ensure that every elementary school has a trained instructional coach for mathematics. In contrast to these two California programs, Louisiana's strategy is more comprehensive and requires coaches to receive state training, thus creating clearer alignment among legislation, professional learning, coaching structures, and classroom practice.

Policy implication 3. The evidence points to strengthening district-level capacity as a central mechanism for improving TK–8 mathematics instruction.

District-level capacity plays a central role in translating state policy into classroom practice. The evidence in this study shows that current state efforts to support mathematics improvement are distributed across a range of universal resources, such as documents, toolkits, and webinars. While these supports are broadly accessible, district leaders consistently described them as insufficient to

produce sustained changes in instructional practice. State initiatives typically also focus more on building teacher skills than district capacity, creating an overreliance on teacher leaders to train their colleagues without the supports necessary to do that well.

As a result, many districts in our sample turned to external providers for more intensive, context-specific support, often through fee-for-service arrangements or time-limited grants. These supports were described as more responsive to local conditions and more effective in building instructional capacity, but access depended on district resources and available funding. Consequently, opportunities to engage in deeper, sustained improvement efforts were unevenly distributed across districts.

The analysis indicates that state systems of support are more likely to enable coherent instructional improvement when resources are organized in ways that strengthen district capacity over time. Approaches that help districts coordinate funding, align initiatives, and focus on a smaller number of instructional priorities reduce fragmentation and support more consistent implementation. When such coordination is limited, district leaders must navigate multiple funding streams and program requirements, which can diffuse attention and constrain their ability to sustain improvement efforts.

Evidence from other states (e.g., Alabama, Louisiana) illustrates how policy structures can be used to support more focused and coordinated district action. In these contexts, funding mechanisms and planning processes are designed to reduce administrative complexity and align resources around shared priorities, increasing the likelihood that districts can sustain coherent improvement strategies over time. These approaches often begin with a subset of districts and expand gradually, reflecting the time and organizational change required to build capacity at scale.

Across the data, district leaders emphasized that sustained, district-level support is critical for enabling instructional change. Where such support is limited, improvement efforts rely more heavily on local initiative and existing capacity, leading to uneven implementation across districts. Strengthening the alignment, focus, and duration of state supports would increase the likelihood that policy translates into consistent and sustained improvements in mathematics instruction.

Policy implication 4. The evidence points toward the importance of strengthening teacher preparation as part of a coherent system for improving TK–8 mathematics instruction.

The evidence in this study indicates that limitations in the teacher workforce represent a central constraint on efforts to improve mathematics instruction. Over four in ten TK–8 district leaders in our sample reported relying on underprepared teachers to staff one or more middle school mathematics positions, highlighting the extent to which districts are operating with limited instructional capacity. Regardless of credential status, district leaders consistently described challenges in staffing classrooms with teachers who have sufficient content knowledge and pedagogical skill in mathematics to teach math to the conceptual rigor of the standards. The findings suggest that current preparation models contribute to this pattern. California's dominant credential structure concentrates most pedagogical coursework and clinical training into a single post-baccalaureate year, which limits opportunities for sustained development of mathematics content knowledge and instructional practice. As a result, districts assume responsibility for building foundational skills through in-service professional learning, within constrained time and resource conditions. This arrangement places significant pressure on local systems and contributes to variability in instructional quality across schools and districts. Getting Down to Facts III includes a separate report (Grossman & Kaul, 2026) focused on teacher preparation that offers more detailed analysis of this area. The findings of this study highlight mathematics as a particularly acute gap within the broader preparation system, affecting both multiple-subject and single-subject credential pathways.

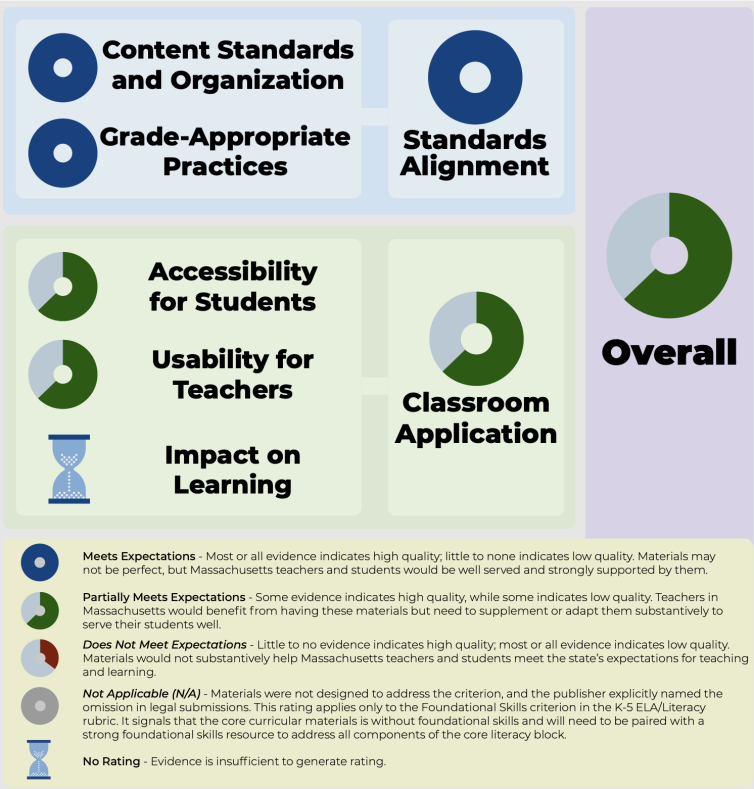
Policy implication 5. The evidence points toward the importance of clearer signals about instructional materials quality, broader inclusion of Transitional Kindergarten (TK), and stronger support for implementation.

The easiest implication for the state to address would be to make changes in its instructional materials adoption process. This would not require new legislation but rather using the existing process to clearly signal differences in instructional materials quality and their alignment with the state's vision of instruction, giving districts stronger guidance while preserving local control over which materials to ultimately adopt.

The evidence in this study indicates that the current instructional materials adoption process places substantial demands on district capacity, particularly in small- and mid-sized districts that have a narrow bench around curriculum and instruction in mathematics. District leaders consistently described the challenge of navigating a long list of approved materials that provides limited information about how those materials align with state standards and how likely it is that teachers will be able to use them to teach their student population to the rigor of the standards. In this context, the adoption process requires districts to undertake complicated and resource-intensive evaluations with limited guidance, increasing the likelihood of uneven decision-making across districts. Systems that offer transparent, criteria-based descriptions of instructional materials reduce the burden on districts and support more coherent local decision-making. Box 13 provides an illustrative example of how one state with substantial local control provides clear guidance to support district decision-making.

Box 13. How Massachusetts creates transparency about the strengths and weaknesses of instructional materials

The Rennie Center's Curriculum Matters initiative, developed in partnership with the Massachusetts Department of Elementary and Secondary Education (DESE, 2024; Rennie Center for Education Research & Policy, 2025), is designed to support districts in identifying and selecting high-quality instructional materials aligned to state standards. A central feature of this work is CURATE (CUrriculum RAtings by TEachers), a structured review process in which panels of Massachusetts educators evaluate instructional materials using common, research-based criteria related to standards alignment, usability, and instructional quality, and research-based evidence of effectiveness (Massachusetts DESE, 2025). Their website presents summative ratings along with more detailed narratives explaining the reasoning behind each of the ratings, for example, how much support the curriculum provides teachers for differentiating instruction for English Learners. In the example below, (where we have removed the name of the curriculum), shows a curriculum that was rated "meets expectations" for both domains of standards alignment and "partially meets expectations" for the two rated domains of classroom application. (Note: none of the currently reviewed K–5 mathematics curricula have a rating for impact on learning.)



The resulting CURATE reports are "resources to support Massachusetts school districts in their process to make informed, local decisions about curricula" and are designed to be used "as a starting point for their own comprehensive evaluation and selection process, in collaboration with a diverse stakeholder group" (Massachusetts Department of Elementary and Secondary Education, 2026). The resources help districts narrow options and guide local decision-making rather than constrain it. Importantly, the curricula do not all receive the same ratings. For grades K–5 mathematics, there are currently nine curricula. Two received the highest ratings ("meets expectations" in four domains), and one received the lowest rating ("partially meets expectations" in four domains). The remaining six fell between these endpoints, receiving a mix of "meets" and "partially meets" ratings across domains. By centering teacher expertise and providing transparent, criteria-based information, Curriculum Matters and CURATE aim to strengthen district capacity for coherent, system-level curriculum decisions while preserving local control over adoption and implementation (Massachusetts Department of Elementary and Secondary Education, n.d; Rennie Center for Education Research & Policy, 2025).

This example illustrates how providing clear, comparable information about instructional materials quality can support district decision-making while preserving local control. By reducing the cognitive

burden associated with evaluating materials, such approaches strengthen district capacity to make coherent and informed choices.

A related pattern emerges in how states structure the size and composition of their approved instructional materials lists. When the number of approved materials is large and differentiation among them is limited, the responsibility for identifying high-quality options shifts to districts. This dynamic places the greatest burden on those with the least capacity to absorb it. By contrast, systems that more actively curate and differentiate among options provide stronger signals about quality and reduce variability in local decisions. Box 14 illustrates how one state has structured its adoption process to shape district behavior while maintaining local authority.

Box 14. How a large, diverse state uses their curriculum adoption process to increase the chance of effective TK–8 mathematics instruction

In Texas, instructional materials adoption operates through a centralized state review process that meaningfully shapes district decision-making. The Texas Education Agency (TEA), under the oversight of the elected State Board of Education (SBOE), administers the Instructional Materials Review and Approval process, tightly anchored to the Texas Essential Knowledge and Skills (TEKS). Publishers submit materials on a subject-by-subject cycle, and state-appointed review panels evaluate them against detailed statutory and regulatory criteria including alignment to TEKS, instructional quality, factual accuracy, suitability, and accessibility requirements. The State Board votes to place materials on the state-approved list or to reject them. Rejection is a routine and consequential outcome. As a result, the approved list represents a curated set of vetted options rather than a broad catalogue of largely equivalent choices (Texas Education Agency, 2023). Texas has gone further by developing its own state-sponsored mathematics curriculum, Bluebonnet Learning Math, a TEKS-aligned program made available statewide as an open educational resource. By pairing centralized vetting with additional per-pupil funding incentives for districts that adopt SBOE-approved materials, the state has narrowed the field of options and signaled preferred pathways for implementation. Districts retain legal authority to adopt non-approved materials, and roughly 40 percent historically have done so (Doan & Kaufman, 2024; Midland Reporter-Telegram, 2024). The system preserves local control within a structure that clearly differentiates stronger from weaker options and encourages adoption of those the state has identified as high quality (Texas Education Agency, n.d.; Texas Education Code §31.024)

This example highlights how instructional materials adoption systems can function as a mechanism for signaling quality and guiding district choices. At a formal level, California and Texas share several structural features: both anchor adoption in state standards, convene expert review panels, maintain state-approved lists, and preserve districts' legal authority to select materials. The difference lies in how actively the state exercises its role. In California, state approval primarily signals broad alignment within a large marketplace of options, and districts face little regulatory or fiscal incentive to choose from the state list. In Texas, the state intentionally narrows its approved list and pairs approval with financial incentives. The result is not the elimination of district choice, but a system in which the state exerts clearer influence over quality and coherence across districts. When approval processes are paired with clearer differentiation and aligned incentives, districts are more likely to select high-quality materials aligned with the state's vision of instruction. Greater convergence around a smaller set of materials, particularly within regions, would also make it more feasible for COEs to provide the materials-aligned professional learning that district leaders described as needed.

The findings also point to a gap in how instructional materials guidance is applied across grade levels. Twelve percent of district leaders in our sample reported having no TK mathematics materials, being uncertain about what materials were in use, or adapting kindergarten materials for TK. This pattern reflects the absence of a formal state instructional materials adoption process for TK, which occupies a hybrid space between early childhood and K–12 systems. Although the state provides guidance, it does not maintain an approved list of materials or a parallel review process. In the absence of clear signals and support, districts rely on local interpretation, contributing to variability in instructional approaches and weakening alignment across grade levels.

Finally, instructional materials adoption alone does not lead to improved instructional practice. Adoption is only the first step. As district leaders noted, even when high-quality materials are selected, their impact depends on sustained, materials-aligned professional learning and support. State support for implementation currently operates through a diffuse set of structures, limiting its consistency and reach. Systems that more directly connect instructional materials adoption with ongoing, materials-aligned professional learning and instructional support—particularly in ways that can be

delivered at scale across districts using common materials—are more likely to strengthen teacher practice and improve student learning outcomes.

Looking ahead

The educators, administrators, and state leaders who participated in this study shared a common frustration: the system's complexity often works against its own goals. District leaders want clearer signals and stronger support to build local capacity. COE leaders want to do deeper work with fewer competing demands. State leaders want greater coherence across initiatives. Teachers want materials that work and time to learn to use them well. The patterns we documented, including fragmented governance, diffuse priorities, uneven curriculum quality, limited professional development infrastructure, and a support system that reaches most districts only through universal resources, are interconnected. They reinforce each other, and addressing one without attending to the others is unlikely to yield lasting improvement. California has the building blocks: ambitious standards, a detailed framework, dedicated professionals at every level, and a network of initiatives that, with greater coherence, could be more powerful than the sum of its parts.

There is a meaningful difference between centralization and coherence. Centralization concentrates decision-making authority at the top. Coherence ensures that decisions and supports at multiple levels align around shared goals, even as primary authority remains local. California is a local control state, and there is real merit in the principle that local decisions are best made locally. The evidence from our study reflects that. Individuals at every level value their ability to use professional judgment to accomplish their goals. Yet interviewees at every level also described the costs of incoherence: too much choice with too little support. With so many decisions delegated to individuals, district leaders told us the system lacks alignment. In site visits, teachers mirrored that perspective, describing professional autonomy taken to such an extent that it had negative impacts on student learning and increased burden for teachers. The exception was in places where district leaders had built internally coherent systems that balanced teacher autonomy with instructional support and leadership direction. The fact that most district leaders have not been able to build that internal coherence points to the difficulty of sustaining excellence in a fragmented state context. Nearly all of the people we interviewed

described a desire to move along the continuum, away from unstructured autonomy and toward greater system coherence.

The evidence suggests that the state agencies and county offices must take a more active role in how they support districts. Local control means districts retain strong decision-making authority. It does not mean that the state and county offices of education should cede responsibility for helping districts use that authority well. In interviews, we heard a pervasive tone about the COEs' and the state's limitations and gaps in their support for districts. Certainly, state power is more limited in California than in some other states, but some of the presumed limits do not have a factual basis in legislation or the Education Code. Policymakers and leaders who seek to increase coherence could provide more narrow guidance, design strategic incentives, reduce fragmentation, and trade compliance burdens for clear accountability around outcomes to make it easier for districts to succeed.

We opened our report with a reflection from Mike Kirst (2024), the architect of LCFF, who recognized both the improvements in education governance that occurred during his tenure and the work yet to be done:

> 'Looking back, it was naïve to believe that these policy reforms alone would be enough to achieve the desired impact. We successfully corrected for some of the failures of prior attempts to generate educational improvement by over-focusing on accountability. I failed, however, to realize the extent to which accountability-focused approaches of the past had underinvested in building the system capacity necessary to support educators in developing the knowledge and skills that would enable them to teach successfully in the new ways that the new standards demanded. Our policies did not do enough to overcome this deficit...California has made significant investments, funded by the state and/or private foundations, in capacity-building projects..... However, efforts like these have created "islands" of high-capacity teachers surrounded by wide "deserts" of schools and districts lacking system capacity to provide consistently engaging, standards-aligned instruction.' (Kirst, 2024, pp. 1–2)

In the area of TK–8 mathematics, the evidence in this study supports Kirst's assessment. The many education leaders, educators, providers, and experts we interviewed together tell a consistent story

about the need to change the system so it builds local capacity rather than diffusing it. The building blocks for improvement exist. What the evidence points toward is the need for the state to provide coherence, sustained focus, and political will to assemble them into a system that works, not in isolated pockets, but for every district, every school, and every student across the state.

Appendix A: Study Methods

In this appendix, we describe the extant literature and primary data we collected that form the evidence base for our findings and recommendations. We also describe the processes by which we analyzed and triangulated those data.

Our data collection included interviews with district leader interviews, state leader interviews, and district site visits.

District leader interviews

We drew a random sample of California school districts, stratified by region of the state and school district size, and oversampled mid-sized districts. We excluded charter schools because our focus is on state governance. We also excluded county-run districts, SBE-run schools, State Special Schools, and high school districts. That left us with a universe of 858 school districts from which to choose our sample. Finally, we excluded districts where our initial outreach found that there were not eligible superintendents (typically superintendents who were brand new and could not answer questions about SY24-25, but also one district that did not have a named superintendent or interim). We reached out to a total of 188 eligible districts and we conducted 94 interviews, resulting in a 50% response rate.

We wanted to ensure that we explicitly took into account possible variations by region and size and district in our interviews. To stratify our sample, we created region and school district size variables:

- **Region**. The state has several ways in which it cuts regions and counties. We began with the ten California census regions from the 2020 collection. Since we could not stratify by 10, we collapsed those 10 regions into 5 as follows:
    - **Region 1.** LA and Inland Empire: Los Angeles, Riverside, San Bernardino
    - **Region 2.** Southern: Imperial, Orange, and San Diego counties
    - **Region 3.** Central Valley and Central Coast: Fresno, Inyo, Kern, Kings, Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Tulare, and Ventura counties

  - **Region 4.** Bay Area, Foothills, and Sierras: Alameda, Alpine, Amador, Calaveras, Contra Costa, Madera, Marin, Mariposa, Merced, Mono, San Francisco, San Joaquin, San Mateo, Santa Clara, Stanislaus, Solano, and Tuolumne counties
  - **Region 5.** Northern: Butte, Colusa, Del Norte, El Dorado, Glenn, Humboldt, Lassen, Mendocino, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, Shasta, Sierra, Siskiyou, Sonoma, Sutter, Tehama, Trinity, Yolo, and Yuba Lake counties.

- **District size.** We defined three district size categories based on the number of schools in each district. We chose to select by number of schools instead of school enrollment because we know central offices tend to organize differently given the number of schools in the district. (Note that the number of schools is highly correlated with enrollment). We created the district size variable therefore as follows:

  - Small: District with 5 or fewer schools.
  - Mid-sized: District with 6–24 schools
  - Large: District with 25 or more schools

California's districts have an interesting distribution in terms of the population of students served. One district, Los Angeles Unified School District, serves about 520,000 students, more than 10% of the state's students. The 442 districts classified in our sample as small, cumulatively serve a bit more than half that many students (less than 290,000 students). Based on the nature of this distribution, we decided to oversampled mid-sized school districts, since they serve more than half of the state's schoolchildren and also because they are less likely to be featured in district research.

Once selected, we created an outreach protocol and began contacting potential interviewees. This outreach included "cold" emails and calls to district superintendents and their administrative support person if applicable. We also reached out to state leaders, county office leaders, and others who have relationships with either the school districts themselves, or with a leader in their county office of education. In those cases, we provided them with an email draft to use in reaching out to the superintendent to encourage them to participate in the interview. In all outreach efforts, we made clear their participation was entirely voluntary, and encouraged participation by emphasizing the

unique opportunity to lend their voices to a research effort that would reach the desk of the new Superintendent of Public Instruction and the new Governor.

We made at least three attempts to schedule interviews. We emailed the superintendent and their administrative assistant first, and offered a brief phone call to describe the interview and study purpose. We allowed at least one week before reaching out again. From there, we went a variety of routes, depending on whether the administrative assistant had responded, whether we had a contact who emailed the superintendent directly, and other contextual factors we learned during our outreach. When we still had no answer after three attempts, we went back to our sampling frame and selected the next district in the same strata (by size and region) and repeated the process.

Through these efforts, we were able to interview 94 school district superintendents or their designees, representing a 50% response rate and oversampling mid-sized districts, from a range of geographic areas in the state and district size, as shown in Table A1.

Table A1. District leader respondents from a representative sample of California school districts stratified by region and size and oversampling mid-sized districts

	Small	**Mid-sized**	**Large**	**Total**
LA and Inland Empire	3 districts	9 districts	3 districts	15 districts
Southern	2 districts	11 districts	5 districts	18 districts
Central Valley and Central Coast	4 districts	10 districts	3 districts	17 districts
Bay Area, Foothills, and Sierras	6 districts	11 districts	4 districts	21 districts
Northern	6 districts	11 districts	6 districts	23 districts
Total	21 districts	52 districts	21 districts	94 districts

Though we did not select on demographic or performance variables, we performed t-tests on our sample to assess whether the means of a range of demographic and state test performance variables in our sample districts were statistically significantly different from those in our sampling frame that were

not in our sample. As Table x shows, out of the 75 t-tests we performed, only three were statistically significant, all within large districts: percent of Asian students, percent of district categorized as city, and percent of district categorized as suburban. Our district sample, across all 15 strata of region and size, is representative along every other demographic and state test performance variable we tested.

We also conducted statistical significance testing between the number of districts in our sample by strata and the number of districts not in our strata. As Table A2 shows, of those 15 tests, four were statistically significant: large districts from Regions 1 and 5; small districts from Region 1; and mid-sized districts from Region 2. Therefore, our sample districts in the remaining 11 of our 15 strata are representative by region and size. This is to be expected since we oversampled in smaller strata to ensure we had multiple districts in each region size group.

Table A2. T-test results for differences in demographic and state test performance between districts in our sample and districts not in our sample

	Out of Sample			In Sample			
Variable	**Obs**	**Mean**	**Std. dev.**	**Obs**	**Mean**	**Std. dev.**	**ttest (ns=not sig)**
SMALL DISTRICTS							
charter_pct	421	**0.062**	0.162	21	**0.094**	0.180	ns
enrollment~l	421	**663**	795	21	**839**	885	ns
tk_8_enr	421	**577**	691	21	**766**	837	ns
el_pct	421	**0.157**	0.170	21	**0.182**	0.205	ns
frpl_enr_k12_pct	421	**0.578**	0.245	21	**0.546**	0.261	ns
pc_city	421	**0.043**	0.180	21	**0.070**	0.223	ns
pc_sub	421	**0.165**	0.357	21	**0.278**	0.435	ns
pc_town	421	**0.153**	0.344	21	**0.115**	0.294	ns
pc_rural	421	**0.637**	0.459	21	**0.536**	0.467	ns
pct_stu_as~n	282	**0.036**	0.075	14	**0.047**	0.058	ns
pct_stu_af~n	269	**0.019**	0.037	15	**0.018**	0.020	ns
pct_stu_hi~o	413	**0.437**	0.297	20	**0.486**	0.262	ns
pct_stu_wh~e	417	**0.437**	0.263	20	**0.411**	0.233	ns
pct_sb~3_ela	328	**0.407**	0.201	17	**0.443**	0.136	ns

	Out of Sample			In Sample			
Variable	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	ttest (ns=not sig)
pct_sb~4_ela	332	**0.410**	0.209	18	**0.444**	0.146	ns
pct_sb~5_ela	325	**0.444**	0.216	17	**0.499**	0.154	ns
pct_sb~6_ela	320	**0.416**	0.197	17	**0.454**	0.192	ns
pct_sb~7_ela	302	**0.450**	0.200	14	**0.516**	0.170	ns
pct_sb~8_ela	296	**0.439**	0.193	14	**0.467**	0.172	ns
pct_s~3_math	329	**0.439**	0.213	17	**0.462**	0.148	ns
pct_s~4_math	332	**0.387**	0.220	18	**0.428**	0.177	ns
pct_s~5_math	325	**0.319**	0.218	17	**0.337**	0.156	ns
pct_s~6_math	320	**0.310**	0.207	17	**0.372**	0.214	ns
pct_s~7_math	303	**0.322**	0.202	14	**0.367**	0.168	ns
pct_s~8_math	296	**0.304**	0.205	14	**0.331**	0.158	ns
MEDIUM SIZE DISTRICTS							
charter_pct	278	**0.089**	0.174	52	**0.074**	0.150	ns
enrollment~l	278	**6048**	4251	52	**5646**	3277	ns
tk_8_enr	278	**4640**	3133	52	**4601**	2748	ns
el_pct	278	**0.186**	0.138	52	**0.167**	0.103	ns
frpl_enr_k12_pct	278	**0.567**	0.247	52	**0.552**	0.233	ns
pc_city	278	**0.195**	0.357	52	**0.166**	0.310	ns
pc_sub	278	**0.489**	0.448	52	**0.524**	0.444	ns
pc_town	278	**0.177**	0.339	52	**0.204**	0.373	ns
pc_rural	278	**0.139**	0.253	52	**0.106**	0.176	ns
pct_stu_as~n	276	**0.093**	0.144	52	**0.090**	0.098	ns
pct_stu_af~n	277	**0.030**	0.045	52	**0.032**	0.036	ns
pct_stu_hi~o	278	**0.517**	0.268	52	**0.492**	0.228	ns
pct_stu_wh~e	278	**0.262**	0.205	52	**0.286**	0.199	ns
pct_sb~3_ela	277	**0.428**	0.174	52	**0.442**	0.170	ns
pct_sb~4_ela	278	**0.435**	0.178	52	**0.452**	0.174	ns
pct_sb~5_ela	278	**0.469**	0.181	52	**0.487**	0.177	ns
pct_sb~6_ela	278	**0.448**	0.179	52	**0.465**	0.188	ns

	Out of Sample			In Sample			
Variable	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	ttest (ns=not sig)
pct_sb~7_ela	264	**0.465**	0.178	47	**0.462**	0.195	ns
pct_sb~8_ela	264	**0.460**	0.172	47	**0.456**	0.183	ns
pct_s~3_math	276	**0.463**	0.184	52	**0.473**	0.177	ns
pct_s~4_math	278	**0.415**	0.194	52	**0.428**	0.191	ns
pct_s~5_math	278	**0.349**	0.197	52	**0.362**	0.190	ns
pct_s~6_math	278	**0.338**	0.190	52	**0.362**	0.191	ns
pct_s~7_math	264	**0.336**	0.192	47	**0.334**	0.191	ns
pct_s~8_math	264	**0.322**	0.194	47	**0.312**	0.187	ns
LARGE DISTRICTS							
charter_pct	65	**0.060**	0.072	21	**0.095**	0.077	ns
enrollment~l	65	**32026**	63703	21	**37107**	23679	ns
tk_8_enr	65	**22623**	43408	21	**25264**	16599	ns
el_pct	65	**0.197**	0.086	21	**0.217**	0.089	ns
frpl_enr_k12	65	**0.651**	0.200	21	**0.643**	0.206	ns
pc_city	65	**0.393**	0.421	21	**0.656**	0.342	*
pc_sub	65	**0.568**	0.416	21	**0.309**	0.338	*
pc_town	65	**0.005**	0.036	21	**0.000**	0.000	ns
pc_rural	65	**0.034**	0.076	21	**0.033**	0.062	ns
pct_stu_as~n	65	**0.088**	0.110	21	**0.147**	0.128	*
pct_stu_af~n	65	**0.058**	0.059	21	**0.048**	0.038	ns
pct_stu_hi~o	65	**0.591**	0.208	21	**0.536**	0.236	ns
pct_stu_wh~e	65	**0.177**	0.146	21	**0.181**	0.119	ns
pct_sb~3_ela	65	**0.401**	0.137	21	**0.415**	0.142	ns
pct_sb~4_ela	65	**0.412**	0.141	21	**0.428**	0.147	ns
pct_sb~5_ela	65	**0.449**	0.142	21	**0.462**	0.154	ns
pct_sb~6_ela	65	**0.435**	0.142	21	**0.453**	0.141	ns
pct_sb~7_ela	65	**0.442**	0.143	21	**0.457**	0.155	ns
pct_sb~8_ela	65	**0.433**	0.134	21	**0.445**	0.153	ns

	Out of Sample			In Sample			
Variable	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	ttest (ns=not sig)
pct_s~3_math	65	**0.423**	0.145	21	**0.447**	0.152	ns
pct_s~4_math	65	**0.381**	0.153	21	**0.409**	0.158	ns
pct_s~5_math	65	**0.319**	0.153	21	**0.350**	0.159	ns
pct_s~6_math	65	**0.312**	0.148	21	**0.356**	0.151	ns
pct_s~7_math	65	**0.307**	0.151	21	**0.341**	0.161	ns
pct_s~8_math	65	**0.288**	0.148	21	**0.310**	0.161	ns

Table A3. T-test results for differences in number of districts by region and size strata between districts in our sample and districts not in our sample

	Out of Sample		In Sample		
	Obs	Mean	Obs	Mean	ttest (ns=not sig)
SMALL					
Region 1	421	**0.033**	21	**0.143**	*
Region 2	421	**0.045**	21	**0.095**	ns
Region 3	421	**0.311**	21	**0.190**	ns
Region 4	421	**0.169**	21	**0.286**	ns
Region 5	421	**0.442**	21	**0.286**	ns
MEDIUM					
Region 1	278	**0.255**	52	**0.173**	ns
Region 2	278	**0.090**	52	**0.212**	**
Region 3	278	**0.216**	52	**0.192**	ns
Region 4	278	**0.277**	52	**0.212**	ns
Region 5	278	**0.162**	52	**0.212**	ns
LARGE					
Region 1	65	**0.431**	21	**0.143**	*
Region 2	65	**0.200**	21	**0.238**	ns
Region 3	65	**0.108**	21	**0.143**	ns
Region 4	65	**0.231**	21	**0.190**	ns
Region 5	65	**0.031**	21	**0.286**	***

We developed a semi-structured interview protocol to guide our district leader interviews, which were conducted by a team of five researchers. The protocol addresses, in part or in whole, all of the research questions about the current experience of district leaders and their views of what supports could help. It included a mix of closed and open-ended responses. We asked respondents to respond to questions as they related to SY 2024–25, but to also include initiatives that included SY 2024–25 but spanned multiple years. The protocol had five major sections:

- **Priorities**. We asked leaders generic questions about what their district priorities were, how those priorities are set, and how the LCAP and dashboard were used. We then asked a series of questions about their TK–8 mathematics work in particular. In the math-specific questions, we asked about the role of state mathematics standards and the Mathematics Framework. To facilitate quantitative comparisons within questions, we coded responses. To understand what motivated district priorities in mathematics, we asked, "What is your current focus around instruction and student learning in math?" We coded an answer as a "major driver" if the district leader mentioned it as important without any follow-up probes from the researcher. If the initial response included a mention of the standards, Framework, or LCAP process but indicated they were not particularly salient, we coded them as a "minor driver." A district's response could also be coded as a "minor driver" if the initial response did not include mention of standards, the Framework, or the LCAP process, but when we asked a follow-up probe for those factors, the leader then explained that they played a part in district decision-making. If the district response—even to the probing question—did not provide evidence that the factor mattered for decision-making, we coded it "not a driver."
- **Resources and supports**. We asked district leaders to think broadly about the set of resources and supports that they drew on—both internally within their district offices and from external sources—to support their TK–8 mathematics improvement efforts. We prompted them explicitly to tell us if they had accessed any services from CDE, CCEE, COEs, and the California Math Project. Among those providers district leaders cited, we asked them the degree to which each was helpful to them.
- **Professional development**. We asked leaders about the amount of time in their 2024-25 teacher contract available for professional development and how much of that was devoted to

math instruction. These were open-ended questions and superintendents often elaborated about other time in the calendar year (e.g., "professional learning communities" time, staff meeting time, and in a couple of cases additional paid days over the summer) that were available for professional learning.

- **Curriculum and instructional materials**. We asked leaders a series of questions about the mathematics instructional materials teachers in their districts used in both elementary and middle school classrooms. We asked leaders the name of the mathematics materials, to what extent they were aligned to standards, and to what degree teachers were expected to use those materials with fidelity versus supplementing.
- **Differentiation of instruction**. We asked about expectations for differentiation within the regular class setting as well as structures for differentiation (e.g., tutoring, honors classes). We also asked about participation in various math course sequences in middle school and 9th grade math course placement. We do not report on these questions in this report.
- **Artificial intelligence**. We asked about how administrators and teachers use generative AI, which tools they use, the perceived promises of risks of these tools. We do not report on these questions in this report.
- **Staffing and workforce**. In this section, we asked to what degree staffing was a major barrier for their TK–8 mathematics work, both for elementary teachers who typically hold a multiple subjects credential, and middle school mathematics teachers, who typically hold a single subject credential. For middle school math teachers, we asked about credentials. We also asked about the presence of Teachers on Special Assignment and the nature of their roles.
- **Barriers and needs**. In our final block of questions we asked district leaders to reflect on the work they are doing in TK–8 mathematics and to identify what got in their way. We also asked them to think about what the state system of support might do to clear those barriers and bolster their capacity.

We tested a draft protocol in our first two interviews, made two sets of revisions, debriefed the pilot with the team, and calibrated on the final version. The primary changes we made based on the pilot were to edit for clarity and length, as we wanted to respect the one hour time slot we requested from

busy district leaders. We recorded each interview via Zoom with interviewee permission, and then transcribed the audio for analysis.

State leader interviews

Using the governance map in the PACE governance report (Myung et all, 2025) and our analysis of current mathematics initiatives in the state, we developed a list of organizations who collectively form the support system for districts in their TK–8 mathematics work. We interviewed a total of 32 leaders—which we call "state leaders" in our report to protect confidentiality and minimize lengthy descriptors—from:

- **State agencies**. We interviewed leaders from four state agencies: the State Board of Education, the California Department of Education, California Commission on Teacher Credentials, and the California Collaborative for Excellence in Education.
- **County offices of education**. We conducted 14 interviews with COE leaders. We spoke to COE leaders from every regional lead (as identified by the California County Superintendent Association), COEs that district leaders in our sample identified as important support providers in their TK–8 mathematics work, and COEs who have leadership positions in current statewide mathematics initiatives.
- **Leaders of statewide mathematics initiatives**. These include two interviews with the California Math Project (both a leader from the hub at UC Office of the President and one of the UC campus chapters); and interviews with COE leaders of five math initiatives: California Early Math: County Play Explore; Rural Math Collaborative; California Collaborative for Accelerated Learning; California Math Science Computer Science Project (the math lead); and the Math Professional Learning Partnership. This list overlaps with the list of COE leaders.
- **Associations**. We interviewed leaders from two membership organizations, representing teachers as well as county offices of education.
- **Providers**. We interviewed six providers who were cited by multiple district leaders in our interviews as critical support providers.

- **Experts**. We interviewed four experts on topics relevant to the state role in supporting instructional improvement.

To conduct these interviews, we developed a semi-structured interview protocol, with "blocks" of questions that applied to various roles. For example, we developed a generic block of questions for COEs, and also a block of questions for COEs leading statewide mathematics initiatives. Sometimes our COE interviews included both blocks if they were serving as a leader of a mathematics initiative, and in other cases we asked only the generic block of questions. Three researchers—two from the district leader interviews and one new researcher—conducted these interviews.

These state leaders interviews tended to be more open-ended than our district leader interviews, because we were often asking specific questions about specific initiatives or roles and/or asking to confirm or elaborate on germane information we gathered from other interviews. Across all, however, we asked questions about:

- Role in the TK–8 mathematics ecosystem in California
- Priorities
- Activities/services
- Accountability
- What constituted success
- Barriers and needs

Site visits

Within the 94 districts we interviewed, we purposely selected 12 of them to conduct in-depth, one-day site visits. To select them, we used the following criteria:

- **Districts that are addressing common barriers**. We sought to go deep in a dozen districts to show what the barriers that surfaced in our district leader interviews looked like on the ground. We do not see this as a "bright spots" analysis, but rather aim to illustrate the range of ways districts are trying to cope with key barriers we identified in our district leader interviews.

- **Districts that are using common resources and strategies.** Relatedly, we wanted the group of site visit districts to reflect the range of resources and strategies districts in our interviews are using. Here again our goal is to elucidate how these strategies and tools are implemented, not necessarily to lift them up as exemplars, but rather to illustrate what those resources and strategies looked like at the local level.
- **Demographic and performance diversity.** Across the full set of 12 sites, we sought to select a group that reflects the diversity of school districts in California with respect to geography, size, proportion of students they serve who are eligible for free and reduced-price lunch, proportion of students who are designated English learners, and the percent of students who scored proficient on the mathematics CAASPP in both 3rd and 8th grade.

We gathered data on these criteria for all 94 districts, and then asked the interviewers to recommend districts for site visit selection based on the first two criteria. This resulted in 28 districts, which we then sorted further by applying the third criterion. Since we already had success interviewing district leaders in these districts, we had reasonably positive responses to requests that we visit for a day. The half a dozen or so who declined did so because they had too many other things going on during our data collection window and didn't want to disrupt their schools.

Given the small sample size of 12, it is important to note that these are not statistically representative of districts in the state the same way that our district interviewees are. Rather, they serve to bring life to the key issues our district leader interviewees raised and show how they manifest in local communities and schools. This is how they vary by size, region, the percentage of students eligible for free or reduced priced lunch (FRPL), and the predominant census designation for rural, town, suburb, and city:

- There were four small districts, six medium districts, and two large districts
- There were two LA/Inland Empire, one southern, two Central Valley and Central Coast, two Bay Area, Foothills and Sierras, and five Northern region districts
- Three districts had <40% FRPL, five had between 40–65% FRPL, four >65% FRPL
- Using census designations for rurality/urbanicity, we can see the predominant type of community served by each district: one predominantly rural, three predominantly town, five predominantly suburban, three predominantly city

- Across all providers, these districts reported working with: no external supports, California Education Partners, UnboundEd, independent consultants, local COE.
- They also differed in terms of all of the major topics reported on in this report, such as priorities, engagement with the standards and Framework, staffing challenges, approaches to using curriculum in instruction, professional development

Teams of two researchers went to each district for one day. In two districts, weather or illness prevented the trip, so we conducted the interviews virtually. Our general approach to the site visits was to schedule interviews with the following roles:

- One or two senior district leaders, at least one of whom should be in the cabinet (e.g., person leading curriculum and instruction, person who supervises principals
- Two principals, ideally one of an elementary school and one of a middle school
- Two teachers in full-time teaching roles, ideally one in an elementary school and one in a middle school
- Teacher on Special Assignment (TOSA) or similar role. Not all districts had this position. If there was a mathematics TOSA, we interviewed them. Most commonly, we interviewed a TOSA with responsibilities across grades, subject areas, and teacher group.

We selected interviewees in each of our site visit districts with the recognition that these roles and numbers vary by site. Especially for small districts, leaders often served in multiple roles in the district and sometimes in schools as well. We asked each district to identify a point person, and we coordinated with them to identify the right people to interview and help us schedule the interviews.

We developed a generic semi-structured interview protocol and four tailored protocols to align to the position associated with each of the four interview types. The generic protocol included questions about:

- Nature of district (and school, if applicable) community
- Role in district or district
- Priorities of district

We also developed tailored questions by site to explore the strategy, resource, and/or barrier that we selected them to explore in depth. The two researchers assigned to each site then created a site-specific protocol, blending the generic and tailored questions.

After each visit, the two researchers who conducted the interviews created summaries of the visits. The full team met regularly during the site visit data collection window to discuss key findings, make suggestions to ensure smooth logistics and minimal disruption to district and school leaders, and tweak and tailor protocol questions.

Data analysis

We conducted a staged analysis of our data using both hand coding and AI (ChatGPT 5.2). We sequentially analyzed each of our three primary data groups separately: district interview data, state leader interview data, and site visit data.

Our district interview analysis was our largest and most complex. We first created a master Google Sheet file with all responses to all questions. Our team of five researchers who conducted the interviews all participated in all aspects of our analysis process, which included:

- **Assigning each researcher a block of questions**. For their block, each researcher skimmed through all 94 responses and wrote down initial ideas about what the key findings might be and questions they wanted to ask other interviewers about the data they reviewed.
- **Calibrating on initial ideas and questions**. We then had a series of analysis meetings in which each researcher presented their initial ideas for findings and posed questions. Based on the interviews they conducted, in a discussion format the other researchers offered insights about how they might change, add, or delete initial findings.
- **Developing initial set of findings**. We then asked each researcher to update their initial findings based on the calibration meeting.
- **Using AI**. We then turned to ChatGPT 5.2. We uploaded the master data file and asked it to generate findings in two ways: first, we asked it to generate findings on its own. We directed it to provide district names and examples for each finding to be sure it was conducting the

analysis properly, and redirected it as necessary. Importantly, we did not have it focus only on question blocks, since many answers were interdependent and information about staffing, for example, may have come up as the district leader was describing district priorities. Next, we fed in each of the initial findings researchers developed and asked it to tell us the extent to which those findings were supported by the data, again giving examples. From there, we iterated across the two sets to develop a conceptual spine and set of draft findings. We also used a custom AI bot built using Claude's Opus 4.6 model (as of March 28, 2026) to do a descriptive analysis of CAASPP results in English language arts and mathematics for 2024-25.

- **We tested and discussed those findings** with the team, asking for their input. We went back to AI and asked it to clarify or confirm questions or concerns the team raised.

We then turned to analyzing the state leader interview data, which we analyzed in the following way:

- **Hand coding**. We read through each interview transcript, and created a set of qualitative codes.
- **Using AI**. In ChatGPT 5.2, we uploaded the transcripts of our interviews and followed the same process as we did for district data: asked it to find themes itself, and asked it to test the codes we identified by hand.
- **We shared the results with the other researchers** who conducted state leader interviews, and followed the same process of refinement as we did for district interviews. We also triangulated findings from the district and state leader interviews.

As site visits were being conducted, we developed an initial draft report based on our lit review, district interview analysis, and state leader interview analysis.

For our site visit data collection, our analysis process included:

- Site visit researchers created tailored protocols to follow up on key findings from the district leader interview.
- For each interview, researchers captured a few sentences of key findings and illustrative quotes.
- The pair of researchers then worked together to create a summary of the visit.
- Using the triangulated findings from the district and state interview data, we then:

- Hand coded interviews from each district, and then triangulated that with the summary findings from the site visit researcher pair.
- Tagged places in the initial draft from district and state interviews where site visit findings and/or quotes should be integrated.

Appendix B: Site visit descriptions

As we describe in more detail in Appendix A: Methodology, we conducted 12 site visits of districts that varied in size, geography, student demographics, and performance. Districts represented the Central Valley, South, North, and Bay Area/ central coast and a varied range of size. We also considered the range of student demographics using metrics for students on Free and Reduced Lunch. All districts shared a common identity as close-knit communities where they tended to describe the value of relationships, local history, and the key role of schools within the community.

We chose districts that used diverse resources and supports including external providers, county offices of education, statewide initiatives, and consultants. The supports that our twelve site visit districts tapped for their TK–8 mathematics improvement efforts included:

- Building Thinking Classrooms
- California Collaborative for Educational Excellence (CCEE)
- Cognitively Guided Instruction
- Cotsen Foundation for the Art of Teaching
- Curriculum Associates/iReady
- California Education Partners
- Independent consultants
- Marzano consultants
- National Center for Urban School Transformation
- Rural Math Collaborative
- San Diego State University
- Solution Tree
- University of California Merced
- WestEd

In writing up case vignettes, we tried to stay close to local voices and perspectives. As a result, we use several acronyms for terms that are more typically known by their acronym or a shortened version of their name than by their official name. These include:

- Common Core State Standards (CCSS)
- County Office of Education (COE)
- English Language Development (ELD)
- Extended Learning Opportunities Program (ELOP)
- Individualized Educational Program (IEP)
- Local Control Accountability Plan (LCAP)
- Professional learning communities (PLC)
- Resource Specialist Program teacher (RSP)
- Smarter Balanced Assessment Consortium (SBAC)
- Science Technology Engineering Math (STEM)
- Social and Emotional Learning (SEL)
- Transitional Kindergarten (TK)
- Teachers on Special Assignment (TOSA)

District 1

Nestled in the mountains in the southern part of the state, this mid-sized TK–6 district boasts very high 3rd grade scores on state standardized assessments—well above the state and county average. When a team of new district leaders took the helm almost a decade ago, they instituted major changes to create a sense of urgency about their achievement gaps, build internal capacity to promote coherence, and provide strong support to all teachers across its schools. With very competitive salaries, the district does not struggle to hire high quality teachers, and boasts a strong collaborative culture and sense of pride throughout its teacher workforce. District and school leadership share aligned priorities focused on whole child support, student achievement, and SEL, the last of which they are hoping will address increasingly difficult and sometimes violent student behavior.

Anchored in the 2023 MathematicsFramework—which leaders see as the "how" to the standards—the district has focused on instructional moves that facilitate problem solving and discourse, including math talks and rebalancing classroom discourse to focus more on students explaining their math reasoning vs. teachers talking "at" them. Districtwide mathematics work—articulated by teachers and leaders alike—is centered on the "three P's":

- Promise standards: These are a subset of grade-level mathematics standards groups of teachers identified as essential, with an eye towards vertical articulation across grade levels. Instruction, assessment, and use of data via iReady in their robust schoolwide and grade-specific PLC structure are all aligned to these promise standards.
- Pacing guide: This centralized tool is aligned to promise standards, developed by teachers, and reinforced by its mathematics TOSAs.
- Pilot: Frustrated by the state's delay in the Framework and then the adoption process, they went ahead and piloted two curricula they believed would ultimately make the state's adoption list (we visited them one month before the list was released).

The district's work is supported by a mix of internal and external resources. Internally, the district uses supplemental LCAP funds to pay two districtwide mathematics TOSAs. These TOSAs have wide latitude and provide coaching, feedback, co-teaching, modeling, professional learning opportunities, and

materials to mathematics teachers. We heard positive perceptions about the quality of the TOSAs expertise, planning, and professional development support. One interviewee shared, “We have top notch math TOSAS [who] are incredibly passionate about [math professional learning.]” District leaders describe TOSAS as doing “boots on the ground” work where they model and coach, using what they learn in classrooms to inform professional development.

The district also leveraged the buy-in from teacher leaders to support mathematics learning and improvement. Multiple interviewees explained that this enthusiasm was an important step in building the culture around the work. “It’s not something where everyone was all in right away… but we had enough people that were willing to start.” Originally recruited to serve on a curriculum adoption committee, the district has a large group of volunteer teachers (about 70 out of 400) they pay to go deep on the shifts in the Mathematics Framework in after school professional development. Equipped with support and the investment to continue the work, “teachers [have become] kind of our leaders… they were the ones going back to their sites and sharing.” The district has built on that momentum to ultimately include all teachers in that professional learning. Externally, they have worked with an outside partner to bolster their professional learning community PLC structure and culture. Even with these strong supports and supportive culture, teachers tell us wrapping their heads fully around the big shifts in the Mathematics Framework will take time and continued work, a key learning for all districts navigating a dynamic shift from the state.

District 2

Located in Southern California, this mid-sized PK–8 district serves a community shaped by life near the U.S.-Mexico border. About three-quarters of students live in poverty, most are English learners representing more than 30 home languages, and many experience housing instability. A strong sense of pride and commitment to place shapes their culture and their workforce, which boasts several teachers and leaders who were themselves once students in the district. While their state test scores are low, some schools have shown substantial progress in the past few years.

The district's approach to mathematics is largely embedded within broader system priorities: improving student achievement, strengthening school culture and climate, student engagement, and deepening family partnerships. The district has strong centralized tools and expectations, featuring weekly 90 minute PLCs by grade level, with release time provided by STEM teachers. This time is used for a mix of professional learning and data use, particularly collaborating using iReady student data that include RSP teachers to better align supports for students with IEPs. The district leverages Title I and ELOP funding to provide in-class and after school intervention support for struggling students. Specific mathematics efforts include a partnership with Parent Institute for Quality Education (PIQE) on family engagement and a training session for its middle school mathematics teachers on the Mathematics Framework.

The district invests in layers of support to build capacity for teaching and learning. Professional learning is delivered during the school day, typically by grade level. The county office of education is a key provider, particularly around the Mathematics Framework. The district has also engaged an independent consultant to provide grade-band-specific mathematics training. The district TOSA is also available to support mathematics teaching; principals can invite the TOSA to provide support based on specific teacher needs, such as modeling a lesson, or to help support PLCs use student data.

To strengthen the use of instructional materials and resources, the district is preparing for a new mathematics curriculum adoption, expected to begin next year, after the state issues its approved list. The district's current mathematics curriculum is widely viewed as outdated and underutilized, particularly in middle school, where teachers rely heavily on a patchwork of supplemental and self-created materials, especially in a context where budget is limited. One interviewee shared that

teachers are looking for "whatever free resources we can, because the budgets… [are] getting a little bit slimmer now. So we're looking for free resources… and picking and choosing anything that we can, and creating our own stuff." Leaders expressed concern about the cost and time of a teacher-driven pilot and selection process—which they strongly support—for their new curriculum. At the same time, there is recognition that stronger instructional coherence supported by aligned materials, clearer expectations, and more consistent implementation will be critical to improving TK–8 mathematics outcomes. Interviewees also shared that the district needs to help teachers shift their instructional mindsets to align to the Framework, and that they expect to continue to have significant resource demands to support their many multilingual students with continued learning and language needs. Overall, the district reflects a strong, mission-driven community who is continuing to work to build capacity and translate its structures and investment toward high quality TK–8 mathematics instruction with significant resource constraints.

District 3

This mid-sized district along the Central Coast serves over 4,000 students across TK–8. Despite facing some challenges with recent changing student needs, the district boasts stable leadership and staff and a cohesive, collaborative small-district culture with community and parent involvement. The district's multi-year focus in mathematics reflects the need to address historically low mathematics performance, alongside broader priorities to "get back to basics" in academics and SEL following the pandemic.

The district has engaged in a multi-year effort to improve mathematics instruction by 1) sustaining a long-term partnership with external consultants, 2) building leadership capacity at multiple levels of the district including elevating the expertise of TOSAs, and 3) designing designated times for differentiation in addition to tier 1 instruction.

The external consultants worked with the district to systematically build teacher content knowledge, support shifts in pedagogy and strategies aligned with the state standards and the Mathematics Framework, and strengthen instructional leadership among principals and TOSAs. One interviewee shared:

> I think that kind of longevity has helped us… a lot with our teachers. Our teachers hold [the consultants] in very high regard… [W]e're not a district that mandates certain things… [instead we work on] really getting that staff buy in… Having the time for [the consultants] to build that reputation… has been really meaningful.

One way the consultants supported the district work was through the pilot and adoption of a new TK–8 mathematics curriculum ahead of the state mandate to complement the district's emphasis on standards and pedagogical shifts. The new curriculum reinforced the district's instructional shift over several years from a primarily direct instruction model to one characterized by guided inquiry, open tasks, and student discourse. One teacher shared,

> I never imagined that the kids are really doing most of the talking. I feel like when I first started as a teacher, I had this idea of the 'I do, we do, you do' model, and now… it's kind of more like they are taking their own lead.

While interviewees shared broad support for this shift over time, several noted that changes in mindset and pedagogy will require continued time and support.

To support enactment of the new instructional strategies and sustain implementation, the district strengthened instructional leadership through new roles and leadership structures. We heard from district leaders about a sense of cohesiveness and structures in place to share expertise through regular core management meetings, principal PLCs, and leader-specific professional development. To support teachers to use the new curriculum to teach effectively, the district continues to to work with their outside consultant to build teacher pedagogical and content knowledge. Leaders commented on their continued work in formalizing walk throughs. The district also employs TOSAs, who are "critical to [the district's] success." TOSAs assigned to schools act as a bridge between the consultant and the teachers, providing continuous implementation support, extended professional learning opportunities, walk throughs, and feedback. The role of the TOSAs is another example of the district's focus on relationships and collaboration. "Our teachers know who their TOSA is… they build that relationship, as opposed to having them be more district based." While most PD is voluntary, district staff try to elicit buy-in from teachers to attend.

To increase time for differentiation instruction and intervention, the district overhauled their master schedule. The elementary school paired small group intervention time with specials classes, splitting homogenous groups for targeted instruction. The middle school expanded their literacy and mathematics periods to 62 minutes, marked by 45 minutes of tier I instruction and 17 minutes of additional differentiated instruction. Even with these strategic shifts, we heard that continued growth will take time. Teachers told us that they experience some challenges with keeping up with the pacing of the new curriculum because lessons that emphasize discourse-based activities are very dense.

District 4

This small Central Valley school district serves a close-knit, rural community rooted in agriculture. The district enrolls just over a thousand students across a handful of schools and serves a predominantly low-income population. Many families work in farming and related industries, and the district supports a large share of multilingual learners. Like many rural districts in the region, it sits within commuting distance of small cities and about an hour from a larger one, where higher salaries make teacher recruitment and retention more challenging; about half of middle school teachers were interns. District leaders lean on strong community ties to counterbalance these pressures, and student achievement in mathematics and English language arts has exceeded the state average.

The district's approach to mathematics is structured, standards-driven, and consistent across classrooms. Teachers anchor instruction in an adopted curriculum and an adopted supplemental program. They use an instructional model that emphasizes whole-class teaching, frequent checks for understanding, whiteboards, structured peer discussion, and calling on both volunteers and non-volunteers. Engagement routines look similar from the early grades through middle school, creating shared expectations for participation and time on task. Teachers submit weekly lesson plans, and administrators conduct regular informal walkthroughs to monitor implementation and provide feedback. Teachers described this process as initially stressful but ultimately helpful:

> They will come in for no more than five minutes… just take quick observations… and then give us insight… what we're doing well… or what we could do a little better on… the first time they enter is always stressful… but then after that, you forget about it… It just helps me see in what areas I could do a little better.

Across interviews, teachers emphasized that expectations felt clear and attainable, feedback was actionable, and students remained consistently engaged. They also reported relatively few behavior problems, which they attributed to structured lessons, visible administrators, and supportive families.

To strengthen students' higher-order thinking, the district supplements its core curriculum with a short daily routine focused on problem solving and strategic reasoning, particularly around word problems and performance tasks. Teachers received dedicated training and now incorporate these tasks for

10–15 minutes each day. At the same time, leaders remain "really big on math facts," emphasizing procedural fluency and computational accuracy. As one explained, they see "rigor coupled with this higher level thinking" as essential to student success. In their view, students must be fluent with operations in order to analyze multi-step problems, determine appropriate strategies, and explain their reasoning. Online skill practice and interim assessments reinforce this balance between fluency and application. Together, the approach reflects a deliberate pairing of automaticity and reasoning: procedural skill is treated not as an end in itself, but as a foundation for deeper mathematical thinking. Support for struggling students is layered with teachers reteaching in small groups during class, offering after-school tutoring funded through ELOP, and deploying intervention support in the upper grades. The strategy reflects a clear theory of action: consistent, teacher-led instruction paired with added time and targeted support will drive standards mastery.

The district keeps its curriculum adoption process streamlined. Administrators narrow the field to "no more than four" programs before bringing teachers together to review options. In screening materials, leaders focus heavily on classroom usability and technology integration. As one noted, "the big deal is now, what's the digital component? … that's really what keeps the kids engaged." Publishers are invited to present and "sell it" to teachers, and teacher comfort and buy-in play a central role in the final decision. The process does not appear to include more formal quality-control steps—such as structured evaluation rubrics, systematic analysis of alignment to the state Mathematics Framework, independent quality reviews, or pilot testing. Instead, it prioritizes manageability, perceived engagement (especially through digital tools), and fit with existing practice, followed by clear expectations for consistent implementation once a program is selected.

District 5

This large Central Valley district is rural and serves a high population of students who identify as English Learners or qualify for Free and Reduced Price Lunch. The district has historically had low mathematics performance and has worked with state and external technical assistance providers to build infrastructure for improvement. Since then, it has developed a district vision for mathematics aligned with state expectations and built internal structures to support that vision.

The district is prioritizing alignment with state expectations for mathematics, emphasizing standards alignment, increased rigor, conceptual understanding, and Framework-aligned pedagogy. To support this work, the district has invested heavily in PLCs and TOSAs as primary improvement engines for teacher coaching, professional learning, collaboration, and data cycles. PLCs began through a grant and coaching from an external organization, gradually transitioning to district and school site ownership. Teachers meet regularly in PLCs with additional common prep time during the school day. Across interviews, we consistently heard about common PLC practices such as unwrapping standards, analyzing data, and planning instruction together.

Supported by the district, TOSAs actively participate in PLCs so that teachers "get focused support… and [PLCs help coaches] keep track of the support" they provide. We also heard that PLCs provide "the benefit in bringing [teachers] together" alongside TOSAs "pushing in and working with individual sites [and teams.]" In addition, TOSAs design professional development, translate standards and research, support administrator walkthroughs, and previously developed a district mathematics scope and sequence focused on children's mathematical skill development. Most interviewees described the professional development as robust, with new teachers receiving the most intensive coaching. Across professional development opportunities, district TOSAs heavily emphasize alignment with the state standards and the Mathematics Framework to support teacher learning and "build a common playing field where everyone's coming to the same understanding." One educator explained, "we've got all our teachers reading [the framework], highlighting and doing jigsaw." The district has also invested additional supports at the middle school level. To address low performance in middle school mathematics, it reduced class sizes and hired additional personnel to support small-group instruction, tutoring, and classroom management.

Led by the TOSAs, the district has also invested time in adopting a more rigorous curriculum aligned with state standards and the Framework, with the goal of improving curriculum fidelity. The district views its previous curriculum as outdated, contributing to instructional variability in mathematics. For example, teachers report that the existing curriculum has not addressed the skills and conceptual understanding they wanted to develop in students. As a result, teachers are "pulling kind of from everywhere" — using resources from a variety of websites — aiming to supplement and enrich the curriculum, and there is a real concern about the lack of rigor that is "reinforcing math practices and concepts." The district also aims to build greater consistency in high-quality mathematics instruction across schools, delivering on its instructional vision and previous investments in educator capacity, professional learning, and collaboration.

District 6

This small, rural district boasts a collaborative community that seeks to serve varying and increasing needs of its population. As a rural district, it has been difficult to access support afforded to the larger, more urban districts in the state: "We lack those kinds of opportunities in rural areas."

With timely funding opportunities post-pandemic and a dedicated, persistent group of instructional leaders, the district was able to make changes that otherwise would not have been possible. These changes included multi-year partnerships with external providers toward aligning the instructional program with state standards, increasing student engagement, and expanding teacher professional development through PLCs and coaching.

The district's mathematics improvement is led by the district mathematics TOSA. Every interviewee viewed the TOSA as a vital heartbeat to the district' work, describing them as "pretty incredible," "knowing [their] stuff" and "the driving force" to the mathematics work. As a long-time member of the community, this leader single-handedly sought out and connected with external and state resources and maintained high instructional and strategic expertise to build capacity internally in the district. For example, the TOSA engaged a group of highly collaborative teachers to support work designed to shift pedagogy from a direct instruction model toward an approach that would increase rigor of instruction and focus on student-driven guided inquiry. Together, they undertook a process to analyze the Framework, align their instruction with standards, and ultimately adopt a new mathematics curriculum.

The district staff we interviewed recognized that hard work over time has been necessary for teachers to shift their practices and mindsets. One interviewee explained:

> [The TOSA] essentially recruited a group of teachers that were willing to be a part of that work and ran them into the ground, but in a good way. It was grueling work. It was very, very time consuming because they were learning a different approach, and they were spending way more time on the back end than they were on what happens in front of the kids on a given day.

But the work has also been challenging for a small district with limited resources and without sufficient support from the state. We heard concerns about the complexity of the Mathematics Framework and

also that the adoption process itself was “overwhelming” simply because of the amount of choices the state approved. Data use also is an area of focus. To address these challenges, the district continues to build upon efforts in recent years to find resources, sustain partnerships, and ensure the work is spread across the district.

As a community, they also face a host of other challenges like generational poverty, chronic absenteeism, student mental health and behavior, and family support—all exacerbated by the COVID-19 pandemic. One interviewee noted, “It's so much bigger than math…the teachers’ capacity is pretty full. They need help.” They are trying to balance maintaining mathematics instructional work as a priority with a growing list of student needs.

District 7

This school district serves a small, rural Central Valley community shaped by agriculture and long-standing family ties. The district operates a small number of schools and enrolls a diverse student population with a substantial share of multilingual learners. The district offers dual-immersion programming beginning in the early grades, reflecting both community heritage and a commitment to bilingualism. Schools function as central civic institutions, and it is common for educators and families to have multigenerational connections to the district. District leaders describe a collaborative culture focused on strengthening academic instruction, particularly in mathematics, while attending to students' broader developmental and linguistic needs.

At the elementary level, mathematics instruction is relatively coherent. The district is working with an independent provider, and teachers describe a shared set of routines—structured discourse, collaborative problem solving, and regular fluency practice—that teachers find practical and relatively easy to use. Although teachers rarely reference the Mathematics Framework by name, the independent provider's training reflects its emphasis on discourse, reasoning, and grade-level rigor, effectively embedding its ideas into practice without explicitly branding them as such. Grade-level teams use a common pacing guide aligned to state standards and have revised lessons and topic assessments together to sharpen their focus on key content. A few teacher leaders, who receive additional training and substitutes for release time, support this work. They provide classroom observations every trimester, non-evaluative feedback for peers based on those observations, and modeling of new practices.

Professional learning at the elementary level has been strongest when it is collective and practice-based. When they first adopted a CCSS-aligned mathematics curriculum around a decade ago, they found it "overwhelming" and so reached out to the COE for customized support. Teachers speak positively about the facilitator who modeled lessons and provided concrete tools for the entire staff. More recent county offerings are viewed as less aligned to their needs, and participation has waned. Overall, elementary educators describe a culture of shared responsibility and steady instructional refinement, which they attribute to the supports they have gotten from outside providers over the years: "If we hadn't [worked with the outside providers], I think we would be lost. We wouldn't know

what to do. But [provider]... gave us the tools to be able to look at our lessons and be able to adapt them to make sure they're grade level, appropriate."

At the middle school, collaboration structures are in place—teachers meet regularly to review units, analyze assessments, and discuss student performance—but classroom practice appears more individualized. Teachers adapt their adopted curriculum, supplement with additional resources, and make pacing decisions based on their own judgment. Leaders express concern about students' foundational fluency and readiness for algebra, and skill levels vary widely within classes. Engagement with the Mathematics Framework is minimal at the secondary level; teachers report little direct exposure to it, and some beliefs about effective mathematics instruction run counter to core tenets of the Framework. Perceptions of county support are also more skeptical at the middle school, where past experiences with external coaching were described as poor quality. Together, these patterns suggest that the elementary schools are steadily aligning instruction to the state's mathematics vision through teacher-led collaboration, shared routines, and sustained support from outside partners, initially the DOE and now an independent provider. These outside supports have played a key role in building teacher capacity and reinforcing a common approach. In contrast, the middle school has not leveraged its existing structures or external partners to build a shared, Framework-aligned instructional model, leaving vertical alignment across the district incomplete.

District 8

This district is a small, collaborative community in the Foothills with a low unduplicated population and a higher population of students with IEPs. As a system, the district focuses on a few key priorities and aligns its data, leadership, and resources to identify and create structures of support. We heard that mathematics is "front and center," supported by a recent curriculum adoption and ongoing professional development focused on implementation, standards, rigor, and alignment with state assessments. Their SBAC mathematics scores were well above the state average last year.

While the district has partnered with external providers in the past, internal leadership leads the mathematics improvement work, specifically anchored by one district leader. This leader's role includes building the instructional capacities of other district and site leaders, supervising coaches, supporting teacher development, and guiding the curriculum adoption and implementation. Several interviewees characterized this leader as highly responsive, supportive rather than evaluative, and deeply involved in instruction. This leader's approach focuses on growing "administrators as instructional leaders" and providing "just in time PD for teachers," driven by data from their classrooms.

The district mathematics leader is supported by other staff and multi-layered professional development structures including coaching from TOSAs. Teachers shared positive thoughts on the high levels of sustained professional development, collaborative time, and coaching available to them. District and site-based leadership support teacher implementation through structured walkthroughs. One educator commented, "We want that consistency so teachers know what to expect… [around the] focus district wide." In addition, the district maintains high teacher retention, which enables cumulative improvement and continuous skill building.

As part of the work in mathematics, the district engaged in a multi-phase mathematics curriculum pilot, adoption, and implementation process. Their new curriculum is described as rigorous, standards-aligned, and focused on instruction where "we can see more of the discourse and more of the brain work coming from students than from teachers." We heard that implementation has taken years of aligned, continuous work, as interviewees acknowledged that the learning process "was going to be hard [because]... It was a completely different way to teach math and a completely different way

for students to learn math." Teachers shared that even with a rigorous and standards-aligned curriculum, they had to invest significant effort to structure the curriculum in ways that best met the needs of their students. The timing of lessons and pacing of the curriculum have "been a struggle," because "[students are] not coming in with the prerequisite skills." After years of persistent, intensive focus on mathematics professional development, coaching, and collaboration, one leader shared:

> We joked about it, as I was doing classroom walk-throughs early on, like in our year one of implementation, I was like, it's a standoff [between teachers and students] in there… But now I go into classrooms, and it's such a shift. It's a huge shift.

This perspective suggests the ongoing time needed for districts to implement new mathematics curriculums well.

We asked every educator about barriers to their mathematics work. We heard about the common pressures to district capacity, but sustained funding was echoed in every interview. One leader emphasized that "ongoing work" needs to be supported by financial resources. "For districts that are going to be just in it, it will be hard with the budget crunch…it really does come down to having the funds to have the right human beings in the places." Another interviewee commented on the limitations the state has created for their district:

> It's been a challenge here because we are faced with getting rid of lots of things that we've had the blessing of having like coaching… and those kinds of things that we value for our kids, and that support teachers in general so that they can focus. It's being pulled away because we don't have the funding.

This district's story exemplifies how instructional coherence and continuous learning can be developed over time, while also illustrating the ongoing challenges districts across the state face in sustaining this work.

District 9

This small K–12 district in Southern California serves a socioeconomically diverse student population. Following leadership transitions and district restructuring, district and site leaders are working to establish coherence amid budget constraints. With recent changes in district leadership, interviewees identified mathematics as a top priority to address pandemic-related learning loss, as well as declines in foundational skills and mathematics mindsets.

The district has historically faced central office leadership turnover and budget constraints, resulting in limited coherence and increased autonomy and responsibility for site leaders to define their own approaches for mathematics support. On one hand, these challenges have pushed school leaders to engage in "creative thinking to meet your needs." For example, one school used discretionary funds to pilot new curricula in response to teacher demand. On the other hand, this increased autonomy has resulted in variation in program implementation and sustainability across school sites.

New leadership is beginning to establish a more coherent approach to mathematics improvement. We heard about emerging efforts to build instructional and curricular alignment, including a districtwide committee, a math-specific task force, and professional learning structures around mathematics. One educator explained:

> We have magic-bulleted a lot of things since I've been in this district. Oh, we're bringing in this program. It's going to be great, but there's no plan…[Then, we hear w]e're not doing that anymore. [Now, i]f we're bringing something in or building something, it is built to sustain…That's with everything we approach, particularly with our mathematics goals this year.

The district has also introduced new instructional structures designed to address student learning gaps. They adopted new curricula ahead of the state, with at least one school piloting materials before broader rollout. One teacher shared, "So often what we find as educators is that one curriculum doesn't meet the needs of everything we're looking for, or it won't differentiate enough." They also reinvested in a structured intervention block in the elementary schools in order to provide timelier and increased learning support for students with specific mathematics needs. Currently, elementary students can receive schedule-protected intervention time with at least one dedicated intervention

teacher. Specific elementary school sites designed specific approaches and structures, like teacher-student ratios, skills covered, and activities to meet the needs of their specific population. The middle school does not yet have an intervention block, though staff are advocating for one: “We've been pushing for a math intervention class because we need it.” We also heard from elementary and middle school teachers to maintain and expand upon the intervention programs, in alignment with the district’s vision for sustainability. One educator shared the hope that intervention is "continuous" and becomes “a core part of the day.”

With new leadership and a renewed vision for mathematics improvement, the district continues to strengthen coherence in guidance and support across the system while continuing to encourage site-based instructional leadership. And this district’s perspective sheds light on opportunities for the state to embed further support, first, by streamlining reporting and honing in priorities instead of “100,000 other priorities that take the place of [math] and get in the way.” Leveraging opportunities for coherence at the district and state level could provide further improvement in districts like this one, who already have a vision on what improvement could look like.

District 10

District 10 is a mid-sized district in a remote area of California. The industries that once drove the local economy have left and the community has high rates of poverty and trauma, which lead to challenging student behaviors and chronic absenteeism. Everyone we spoke to in this community also told us about its strength and resilience in the face of these challenges and how tightly the school and the community partner. Nonetheless, student performance is substantially below the state average in mathematics.

The remote location shapes the district in important ways. It has created a culture of self-reliance but also a mindset that is distrustful of outside ideas. We heard deep concerns about whether the state standards were appropriate for students here and whether it was fair that the SBAC assesses all students across the state equally, while no one assesses students in urban areas to measure whether they have the basic skills necessary for rural life. The location also creates a major staffing problem, as one teacher explained:

> My joke has been that our eighth grade science [position] is like Defense Against the Dark Arts. We have not been able to retain an eighth grade science teacher for longer than a year at a time. For the last five or six [years] we've only had one make it through the whole year."

Interviewees consistently described the burden created by trying to support emergency credentialed teachers.

Workforce needs are compounded by the fact that the district does not have strong internal capacity to support teacher learning around high-quality instruction. Until a recent set of grants allowed the district office to expand, there was only one staff member responsible for all professional learning. While there are professional development days in the calendar, a sizable portion of teachers reportedly call in sick for them. The district has a new initiative of principal walkthroughs that are supposed to provide constructive instructional feedback for teachers, but principals have not received enough professional development around what high-quality instruction looks like to implement it well. Lastly, we heard of multiple initiatives being undertaken by inexperienced teachers because their more

experienced colleagues were unwilling to take on those responsibilities; veteran teachers were then dismissive of the results of their more junior colleagues' work.

Fragmentation can be seen in many aspects of the district, starting with priorities: "I feel like we've been in the rut of being just reading focused for many, many years. Mathematics has never really been [a priority]...and our test scores reflect that." We consistently heard that in mathematics, the adopted curriculum was used sparingly, but teachers had access to multiple district-purchased supplemental materials and software, in addition to anything they found independently. The district's afterschool teacher professional development offerings were broad. In the month we were there, they offered afterschool workshops on a wide range of topics: literacy, technology, arts, special education, ELD, culturally-affirming instruction, and SEL—but not mathematics. Lastly, the district is participating in at least three mathematics initiatives with external providers, along with initiatives in other subjects, and more general continuous improvement work. In spite of their strengths, it is difficult to imagine how any district could move forward on so many fronts at once.

District 11

This small, rural TK–8 district serves a close-knit community shaped by the rolling hills of Northern California. Operating a single school with roughly one teacher per grade level, the district reflects a regional culture that values independence and local identity—an ethos that shows up in its emphasis on place-based and interdisciplinary learning. Like many small systems, it navigates the constraints of limited scale while benefiting from strong relationships, stable staffing, and a collaborative culture in which new initiatives can take root quickly.

Mathematics instruction reflects both strong teacher commitment and significant structural constraints. In the elementary grades, teachers have an adopted curriculum designed to build conceptual understanding of rigorous content through hands-on learning, but they rarely implement it in full. Limited instructional time means teachers often cover only some of the instructional units, omitting some topics altogether in the process. Teachers also supplement extensively to address gaps in fact fluency, adjust pacing, or make lessons more easily accessible to their students. While these adaptations demonstrate care and professional judgment, because there is little vertical articulation, and students experience an uneven progression in key mathematics skills. In the middle grades, teachers have a different primary curriculum adoption and often draw from multiple programs, balancing grade-level standards with remediation of foundational skills. As students move from elementary to middle school, they encounter shifts in both materials and instructional structure, due to the lack of alignment.

Across grades, wide differences in student preparation further complicate instruction. Teachers describe classrooms spanning multiple years of skill development, with some students lacking foundational number sense and others ready for accelerated content: “I have about a third of my class who are significantly below grade level… and then I have a handful that are ready for algebra.” Differentiation structures in mathematics are largely teacher-built rather than systematized, and collaboration, while collegial, does not consistently translate into vertically aligned mathematics practice. The district is considering adopting one program for TK–5 and a separate program for the middle grades. However, even within the middle grades, it is not clear that teachers will adopt a single shared curriculum. One middle grades teacher described drawing from multiple programs and selecting

materials based on fit rather than committing to one curriculum as the main resource for instruction, noting, “I pull from different places… I’m not tied to one thing.” This flexibility reflects professional autonomy, but without deliberate alignment work, it risks reinforcing fragmentation not only between elementary and middle school, but also within the middle grades themselves.

At the same time, mathematics appears to operate in the shadow of a more fully developed literacy infrastructure. Teachers describe clear systems for reading instruction and intervention, including dedicated time, personnel, and routines for identifying and supporting struggling readers. In contrast, mathematics intervention is more ad hoc: teachers reteach during flex periods, repurpose aides when available, or rely on supplemental tools without a consistent schoolwide model. When scheduling or staffing tradeoffs arise, literacy blocks and supports appear more protected than mathematics. One teacher described losing her mathematics support person to address literacy needs: “The first grade this year [has a large cohort], and their ACT reading was so low that my math support person was pulled out of my class and put in to [support] the reading for the first grade…” As this example illustrates, although educators consistently express concern about mathematics outcomes and gaps in student understanding, the district has not yet built the structural time, intervention systems, or coordinated supports necessary to address those challenges—largely because literacy continues to occupy the first and most protected position in the instructional hierarchy. In a district with considerable socioeconomic advantage, the fact that mathematics performance recently declined and now sits only modestly above the state average underscores how these structural patterns—limited time, uneven instruction, and fragmentation—translate into outcomes that fall short of what the community’s resources might otherwise predict.

District 12

This large district serves a diverse community shaped by agriculture, small business activity, and growing residential development. The district reflects the contrasts of its community, with higher-resourced neighborhoods alongside areas with significant economic need and a substantial population of multilingual learners. District leaders emphasize long-term planning and community engagement through a multi-year plan developed with families, staff, and community partners. Instructionally, the district is working to strengthen coherence across schools through clearer expectations for teaching and learning, expanded college and career pathways, and stronger use of data and professional learning. Leaders also describe challenges common to many California districts, including staffing shortages in specialized subjects, supporting multilingual learners, and lingering academic and social-emotional impacts of the pandemic.

Within the broader improvement agenda, mathematics has historically received less attention than literacy and social-emotional learning, a pattern that continues today. Educators across interviews describe multiple initiatives shaping instructional work across the district. As one interviewee observed, schools often experience "five strategies but like 90 initiatives… kind of standalone things… related, but not exactly," capturing the sense that many efforts exist simultaneously without forming a clearly integrated system. Within this broader landscape, teachers describe several initiatives that affect mathematics instruction in particular, including curriculum implementation supported by teacher-developed instructional guides, formative assessment cycles, and districtwide professional learning structures focused on mathematics teaching.

A second theme concerns teacher capacity. District leaders, instructional specialists, and teachers describe wide variation in teachers' preparation for teaching mathematics. Many teachers entered the profession with limited preparation in mathematics content or pedagogy and are most comfortable teaching procedural skills rather than facilitating open-ended tasks or discussions of student reasoning. Strengthening teachers' understanding of mathematics and how students learn it has therefore become a central focus of district improvement efforts. TOSAs support this work by designing professional learning, facilitating collaborative planning, and providing classroom coaching. However, the district's capacity to provide this support remains limited. A small number of TOSAs serve many

schools while also taking on numerous district responsibilities, leaving little time for sustained classroom coaching. As one teacher explained:

> I would love her to be more accessible as a coach. I think she often gets so pulled into bigger meetings at the district that she misses out on being able to actually be in the classroom and helping teachers.… I just don't think it feels like an actual resource right now, because… there's one of her for how many of us.

These capacity constraints also shape how district leaders are thinking about the direction of mathematics instruction. Recent efforts—including the adopted mathematics curriculum and a partnership with an outside professional development provider—encourage classrooms that emphasize the reasoning, discussion, and student explanation called for by the Mathematics Framework. At the same time, the district has begun introducing initiatives that promote more structured instructional routines with clear lesson formats and consistent expectations for classroom practice. Some educators described challenges reconciling these approaches. Others interviewees questioned whether the broader policy vision for conceptual mathematics instruction is attainable given current levels of teacher preparation and the capacity to support teacher learning in the district. As one educator noted, recent policy guidance is "moving even more into a more conceptual-based approach… and we were already struggling to get results we want in math." A district leader described the challenge of translating complex policy ideas into clear guidance for teachers: "the more that all these things are becoming more and more difficult and complex, the harder it is for us to understand and then try and sell teachers on 'here's what you should do.'" Taken together, these perspectives suggest a system weighing the conceptual vision promoted in recent policy guidance against concerns about whether teachers currently have the preparation needed to enact it effectively.

Appendix C: References

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