csba Research and Policy Brief

High-Quality Professional Development to Support Instructional Materials Adoption Aligned with the New Math Framework

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IN THIS BRIEF

Introduction

The 2023 California Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve (Framework) promotes the complex skills students need to succeed in their education and beyond, including deep mastery of challenging content, critical thinking, problem solving, effective communication and collaboration, and self-direction. Local governance teams play a key role in supporting the process for the adoption of instructional materials aligned with the Framework. Specifically, school boards are responsible for adopting instructional materials aligned to the Framework in a multi-stage process of identifying, reviewing, piloting, and implementing new materials.[1] Even before materials are adopted, school boards can begin shifting local instructional practices by investing in opportunities including professional development for teachers to learn and refine the skills needed to effectively reach students and encourage their math motivation and learning.

This brief examines the instructional changes needed to align with the Framework and the role local governance teams play in providing effective professional development opportunities (also referred to as professional learning opportunities in this brief) to teachers and staff that result in changes to teacher knowledge and practices, as well as improvements in student learning outcomes.

What instructional changes are necessary to implement the 2023 Math Framework, and why are these changes important?

Adopted by the State Board of Education in July 2023, the Framework is intended to support engaging and effective math instruction that better addresses the learning needs of all California students. Major changes to instructional practice that are based in learning science and the practices of countries with high achievers in math include:

- moving away from rote calculations to deeper understanding of math concepts;
- moving away from coverage of disconnected standards to big ideas that integrate and draw connections between math concepts;
- engaging learners in open-ended and multidimensional tasks that develop inquiry and problem-solving skills; and
- grounding instruction in data use and real-world examples.

These evidence-based strategies have been found to promote higher engagement and achievement for all learners, with particular benefits to students who have been underrepresented in science, technology, engineering, and math (STEM) careers, such as female, African American, Native American, Latino, and Pacific Islander students.

Successfully implementing such strategies requires local governance teams to consider the specific opportunity gaps and learning needs of students in their communities. The Framework recommends multiple pathways to math equity for school boards to consider, including:

- expanded access to powerful instruction;
- skillful instruction and differentiated supports; and
- instructional supports that are responsive to the needs of English learners.

What do evidence-based strategies for equity in math instruction look like?

The Framework establishes a goal to provide all students with access to powerful math instruction. It recommends instructional approaches that expand opportunities for enrichment and support, which makes skill-level tracking in early grade levels less necessary. Classroom educators can provide this type of instruction using rich tasks related to real-world questions that allow multiple points of entry and include the use of visual, hands-on, and technological supports, as well as cooperative learning and small-group instruction.

School administrators can support and augment this classroom work by arranging time and resources for math tutoring and small group work, homework help, and additional coursework in expanded learning time during summer and after-school programs. When students can get immediate support as they need it, they are less likely to fall behind, develop large gaps in their understanding, and become discouraged. In middle and high school, yearlong block scheduling and extra lab classes attached to challenging courses can also increase success. For those who plan to begin high school coursework at eighth grade, it will be important to fill any curriculum holes that would have been covered in the traditional eighth grade curriculum, and support teacher planning and development, so that students can succeed.

Since math instruction is cumulative, teachers must understand progressions of learning across grade levels in math so that they can foster students' foundational skills and build readiness toward more advanced concepts.[2] Key to advancing math equity is the use of high-quality diagnostic tools to identify where students are in their math knowledge and allow teachers to build on what students know in a targeted fashion.

Smarter Balanced Interim Assessments, in concert with Tools for Teachers, can support this process. The Smarter Balanced Interim Assessments are optional free, computer-based tests for English language arts/literacy and mathematics that can be administered throughout the year and used to provide teachers with information to support teaching and learning.[3] Tools for Teachers is part of the Smarter Balanced suite of resources and is a free platform for California educators that provides lessons, activities, strategies, standards-aligned assessments, and professional learning to help tailor instruction and boost learning.

In addition to diagnostic assessments to identify where students are in their learning and address content knowledge gaps, professional supports for teachers to plan collaboratively, ideally with the support of a math coach, can support broader student success. The Framework also encourages explicit strategies to teach math in a way that is accessible to the significant share (19 percent) of linguistically and culturally diverse English learners across the state.[4] These instructional strategies include:

- developing math proficiency by integrating the California English Language Development Standards into math teaching;
- using hands-on manipulatives and visual modeling to help students conceptualize and solve problems; and
- engaging in bilingual discussions of math concepts and strategies where appropriate.

With these changes, instructional practices used in California are moving toward equitable, high-achieving systems used by many nations around the globe. To implement high-quality standards and curriculum, these nations fund extensive ongoing professional development opportunities that support teacher learning and effective instruction.[5] California schools should consider doing the same, and such investments are the responsibility of local governance teams.

What does effective math professional development look like?

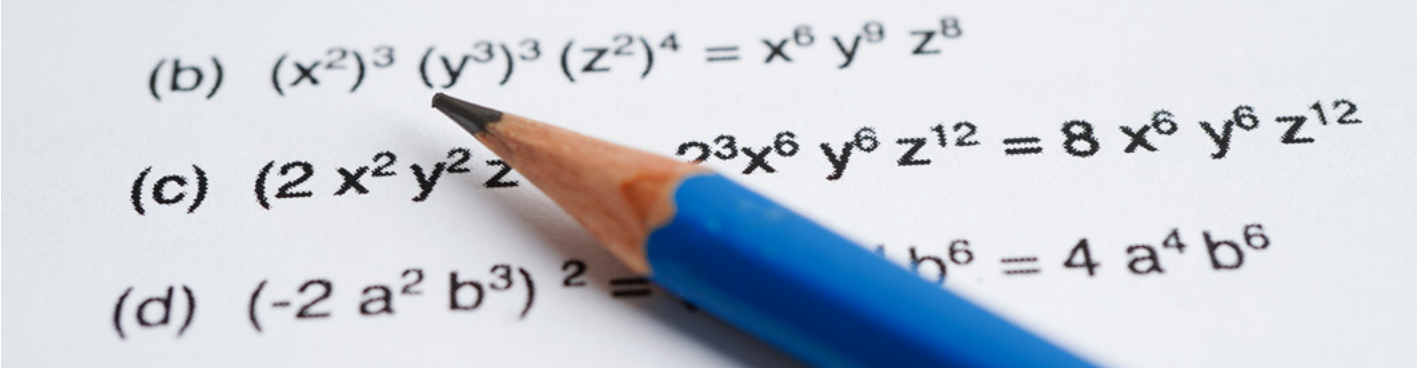
Effective math professional development draws on adult learning theory to move away from passive learning that often takes place outside the context of classroom practice. Instead, effective adult learning connects to educators' prior experiences and professional purposes, involves real-world applications, and provides exposure to new experiences and perspectives to develop more responsive practices.[6] Studies have shown that professional development with these elements has a greater chance of transforming teaching practices and student learning.

In their deliberations, school boards should consider how to support math professional development opportunities that:

- **Are grounded in math content and how to teach it.** Teachers need a strong content foundation in math concepts to support their learning of new instructional strategies. Effective professional development strengthens teaching by connecting instructional methods to applied math concepts and strategies.[7]
- **Incorporate active learning.** Rather than "sit and get" formats, effective professional development engages teachers in activities such as lesson study or analysis of the problem-solving strategies in student work for collective unit planning. This active learning is deeply contextualized in teachers' classrooms and is more powerful and engaging for students.
- **Support collaboration time and focus.** Collaborative learning can be a source of efficacy and confidence in the process of adopting new practices.[8] Opportunities for math teachers to collaborate during the school day can include professional learning communities, shared instructional planning time, work with coaches, and reciprocal peer observations. School boards should consider how collaboration can be achieved in relation to existing and future collective bargaining agreements.
- **Model effective practice.** Offering sample curriculum and demonstrating aligned teaching practices helps reinforce the shared vision for math instruction. Professional learning and coaching can include sample math lesson plans, unit plans, and student work; observing peer math teachers; and video or written cases teaching math concepts and strategies.
- **Provide coaching and expert support.** Effective implementation of new math curricula, tools, and instructional approaches can be enabled through both collective inquiry with colleagues and individualized coaching of math content and teaching practices that are focused on teachers' needs.[9]
- **Offer opportunities for feedback and reflection.** Effective professional development offers time for teachers to think about, receive input on, and make changes to their practice that move toward the shared vision for math instruction.
- **Are of sustained duration.** Effective professional development models provide multiple opportunities for teachers to engage in learning around a set of math concepts or practices. Sustained professional development allows teachers to apply and refine their learning in classroom practice over time.

State funding for math professional learning

- Districts can use funds from their recent Learning Recovery Emergency Block Grants to support professional learning for teaching math. The California Mathematics Project (CMP), a statewide network of professional development programs for K-16 mathematics educators can also be utilized, with 19 regional sites that participate in relevant professional development programs. The CMP will receive state funding to train local districts' math coaches and administrators for the Framework in partnership with county offices of education (COE).
- Other state-funded professional development opportunities aligned to the Framework include: the California Mathematics, Science, and Computer Science Partnership (CAL-MSCS) led by Santa Barbara, San Joaquin, and Monterey COEs, the California Early Math Initiative (CAEMI or Count Play Explore) led by Fresno COE, and the Learning Acceleration System Grant led by Santa Clara, Lake, and San Diego COEs.
- The Rural Math Collaborative, led by Lake COE in partnership with Butte COE and CMP, provides asynchronous professional development modules on the Framework and ongoing development and coaching through professional learning networks on Framework-aligned mathematics instruction and interventions. Additional modules covering more concepts from the Framework will be launched in the coming year through the CCEE Statewide System of Support Resource Hub.
- For more information on state investments in mathematics, see the "State Investments" tab on CDE's Mathematics webpage.



What are the strategic conditions and policies needed at the governance team level to ensure staff receive effective math professional development during an adoption cycle?

Local governance teams can establish strategic conditions and policies to simplify implementation and ensure that math professional development is responsive to the needs and desires of math teachers in their specific context.[10] Effective implementation involves:

- Establishing a shared instructional vision of what it means to provide excellent math instruction that is aligned to instructional goals, uses high-quality materials, and provides professional development. Coherence is key to effective implementation and requires coordination among central office staff, site administrators, math specialists, and teachers working from the same vision.
  - *Policy priorities:*
    - » Define Framework-aligned math instruction in your local context and select high-quality, standards-aligned instructional materials that are consistent with that instructional vision.
    - » Train site administrators and relevant central office leaders around that vision and its implications for teaching and school organization.
    - » Identify professional development models that are anchored in the shared instructional vision.
- Build within-district expertise by supporting and developing expert teachers to serve as math advisors and coaches. Districts can benefit from key staff having deep knowledge of the Framework to inform decisions about curriculum, instructional priorities, and needs-based professional development for administrators and teachers. To support this expertise in local districts, the state is funding free training for teachers to develop coaching expertise through the California Math Project (CMP) and selected county offices.
  - *Policy priorities:*
    - » Staff and train expert advisors and coaches to support professional development around the shifts in math content and teaching strategies implied by the Framework.
    - » Utilize COEs and the CMP to consult and support professional development for administrators, lead teachers or coaches, and teacher teams.
- Choose evidence-based approaches to math professional development that are most likely to be effective (see Section II of this brief).
  - *Policy priorities:*
    - » Infuse the new vision with a system of supports across the entire professional continuum (teacher preparation, induction, evaluation, and leadership opportunities) instead of "one-off" workshops.

Vignettes: Effective mathematics professional development in action

Increasingly, local educational agencies (LEAs) are adopting professional learning models that are closely embedded in classroom work. One strategy leverages expert math coaches to support a shift from drive-by professional development to sustained learning that allows math teachers to continuously improve. A study that evaluated the impact of elementary math coaches on student achievement over three years found that, when placed in school leadership roles to provide onsite collaborative math professional development, math coaches enhance instruction and significantly improve student achievement.[11] Math coaches in this study engaged in their own professional learning on math content, teaching practices, and coaching strategies prior to and during their first year of placement, and their expertise deepened as they learned and worked closely with instructional and administrative staff. As a result, their positive effects on student achievement increased over time. These findings emphasize the promise of expert math coaches to lead LEA professional development, transform instructional practice, and increase student learning.

Another study of classroom-connected professional learning through Primarily Math, a professional development model for elementary math teachers, which illustrated how to strengthen teachers' math content knowledge and help them develop positive beliefs about teaching and learning math.[12] The model features a combination of focused learning during weeklong summer institutes with long-term projects assigned over the course of the school year. Professional development involves collaborative assignments, self- and group reflection of video evidence, and shared unit planning for classrooms. An evaluation of K-3rd grade teachers from three large, urban school districts found that students of Primarily Math teachers grew significantly more in math achievement than students of comparison teachers. The evaluation identified high-quality program content, sustained duration of professional learning, coherence between activities and classroom practices, and interactions within supportive professional communities as key to successful implementation.

Source: Darling-Hammond, L., Hyler, M. E., Gardner, M. (2017). *Effective Teacher Professional Development*. Palo Alto, CA: Learning Policy Institute.

- Identify professional development models that provide technology-facilitated opportunities for learning and coaching so that teachers can more easily share their practice within and across schools.

- Implement math professional development models with quality and fidelity, providing adequate time, instructional materials and resources, and human capital.
  - *Policy priorities:*
    - Evaluate and redesign the use of time and school schedules to increase opportunities for math professional development and collaboration, in line with collective bargaining agreements. Options include participation in professional learning communities, peer coaching and observations across classrooms, reciprocal teaching, lesson study, and collaborative planning.
    - Examine existing collective bargaining agreements and consult with staff to determine if consideration should be given to potential changes in current or future negotiations.
    - Monitor implementation beyond tracking seat time, by conducting regular needs assessments of the supports and professional development most needed and desired by math teachers.
    - Assess outcomes in an ongoing cycle of continuous improvement in partnership with school community members.

Questions for local governance teams to consider:

- Who on our staff has a clear understanding of the Framework and the implications for instructional changes to our local math program? How will these changes be communicated to others as our LEA moves towards implementing instructional changes or curricular adoptions?
- Does our LEA have the right data to understand the effectiveness of our math instruction, and are those data disaggregated to show the strengths and learning needs of our student populations?
- What process is in place for our LEA to assess the instructional practices and learning needs of district, county, or LEA math teachers? In what ways does the process draw upon classroom educators' perspectives?
- What policies and/or regulations may need to be referenced or updated to align with the goals of the board when providing new professional development opportunities?
- How will our LEA identify and evaluate potential professional development providers, including LEA staff and external organizations?
- Does our LEA have a scheduled time with district leaders to review math professional development models as part of our materials adoption process?
- How do any proposed professional development models align with the principles of effective professional learning outlined in Part II of this brief?
- What strategy or process is in place for teachers to review and comment on the professional development models under consideration, including those with experience teaching students with disabilities and English learners?
- Does our LEA have adequate funds in the budget for the provision of math professional development to prepare teachers for an effective adoption? What are our regular touchpoints to track this within the Local Control and Accountability Plan monitoring process?
- What is our LEA's plan for evaluating the effectiveness of math professional development?

Policies

CSBA GAMUT Policy and Policy *Plus* subscribers have access to the most up-to-date CSBA sample policy language. The following sample board policies (BP), board bylaws (BB), and administrative regulations (AR) have been developed for districts to use in formulating and adopting their own policies relevant to instructional materials:

- BP 0410 – Nondiscrimination in District Programs and Activities
- BP/AR/E(1) 1312.2 – Complaints Concerning Instructional Materials
- BP/AR 1312.3 – Uniform Complaint Procedures
- BP/AR/E 1312.4 – Williams Uniform Complaint Procedures
- BP 5145.3 – Nondiscrimination/Harassment
- BP/AR 6143 – Courses of Study
- BP/AR/E(1) 6161.1 – Selection and Evaluation of Instruction Materials
- BP 6161.11 – Supplementary Instructional Materials
- BP/AR 6163.1 – Library Media Centers
- BB 9000 – Role of the Board
- BB 9310 – Board Policies

Resources

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Endnotes

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