Supporting High-Quality Common Core Mathematics Instruction

The planning and implementation of effective and efficient mathematics instruction that meets the needs of every student requires broad support. It is an obligation of everyone, including administrators, teacher leaders, college and university personnel, community members, and parents. Each of these groups is an important contributor. The stakeholders at each school or school district form a support system that assists in the design, implementation, and evaluation of effective mathematics instructional programs. These stakeholders also serve an important function as advocates for a sustained focus on the achievement of the CA CCSSM by every student. This chapter addresses the roles and responsibilities of the stakeholders, in the development, implementation, and maintenance of high-quality, standards-based mathematics instructional programs.

A summary of the findings of the State Superintendent of Public Instruction's Task Force on Educator Excellence, contained in the 2012 report "Greatness by Design" is pertinent. This comprehensive report calls out to teachers, administrators, and other supervisors of mathematics instruction to take certain actions in response to the need for continual improvement of mathematics instruction in California. The table below contains the main recommendations from this report relevant to the support of a high-quality mathematics instructional program. (State Superintendent of Public Instruction's Task Force on Educator Excellence *Greatness by Design* [Greatness by Design] 2012, 5-6).

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Teacher Education is uneven in duration and quality. Some educators are given excellent preparation while others receive minimal. Education for and development of teacher leaders is more uneven in quality. Steps must be taken to ensure every teacher participates in a high-quality preparation program and that mechanisms for developing leadership exist and are supported.
Mentoring for Beginners is decreasing. Fewer and fewer teachers are receiving the benefits of high-quality mentoring in California, due to several factors, not the least of which is a decrease in funding for such purposes. New teachers need to be supported through the difficult transition in their first few years of teaching.
Professional Learning time and opportunities are sorely underfunded. California teachers have little time for collaboration or learning—usually only about three to five hours per week of individual planning time. Opportunities for professional learning and teacher collaboration must be seen as an integral part of the teaching profession.
Evaluation is frequently spotty and rarely designed to give teachers and administrators the feedback and support that would help them improve or provide a fair and focused way to make personnel decisions. Evaluation efforts should be focused on helping teachers grow and improve, as opposed to being used to reprimand.
Leadership Pathways are by and large poorly defined and poorly supported. There are few opportunities for expert teachers to share practices with their peers or to take on leadership roles. Most teachers are still isolated from each other, teaching in egg-crate classrooms and performing the same functions as they did when they first entered. A

teaching profession has not yet evolved that regularly supports the spread of expertise. This needs to change if high-quality mathematics instruction is to be available to *every* student in California. Inequities due to quality of instruction can be lessened through professionals working together.

In addition to the sweeping findings of this report, it is evident that substantial professional learning for teachers will be needed to successfully implement the CA CCSSM. While no single district or school has the absolute power or resources to address all of these concerns, both the mathematics teaching community and stakeholders in the mathematics instruction of every student in California should consider these issues as major roadblocks to true progress. It is time for school and university educators around the state to combine their efforts and unite behind a common goal of improving mathematics instruction for all California students.

Administrative Role and Support

The role of school board members, district administrators, and school administrators is crucial to the success of any mathematics instructional program. Setting and clearly articulating high expectations for instruction by all teachers and learning by every student is the foundation of a successful program. It is also essential that administrators express a positive attitude toward mathematics and an appreciation for its importance in the future of every student. One of the most important jobs of principals and administrators is to help create a system of collaboration among teachers for developing

CA CCSSM instructional practices, recognizing that this process will take time and support.

District and school administrators, as well as school board members, need to understand what high-quality mathematics instruction looks like in order to effectively support programs of instruction. This includes

- Knowledge of the Standards for Mathematical Practice contained in the CA CCSSM, as well as the Standards for Mathematical Content.
- An understanding of the role the Standards for Mathematical Practice play and how they contribute to establishing effective mathematics learning environments.
- An understanding that the Standards for Mathematical Practice are on an equal footing with the content standards in the CA CCSSM. In particular, if students are not engaging in the mathematical practice standards, then the CA CCSSM are not being fully implemented.

Some resources that may help administrators understand the implications of the CA CCSSM for teaching include:

1. Inside Mathematics (practice standards by grade [videos]): http://www.insidemathematics.org/index.php/mathematical-practice-standards
2. The Mathematics Common Core Toolbox (PARCC prototyping project): http://www.ccsstoolbox.com

3. Implementing the Mathematical Practice Standards (browse illustrations): http://mathpractices.edc.org/browse-by-mps
4. Mathematics Assessment Project (Standards): http://map.mathshell.org/materials/stds.php
5. Kansas flip charts: http://katm.org/wp/common-core/

Administrators may need to seek out their own opportunities for learning more about the CA CCSSM by attending professional workshops, conferences, or professional learning opportunities for teachers along with their staffs. Administrators must become informed instructional leaders for mathematics education. They should also rely on teacher leaders at their school sites or within their districts to offer support and knowledge of such practices. In addition, administrators must be aware of the multiple assessment strategies that can be utilized in the mathematics classroom and have a balanced approach towards assessing the effectiveness of mathematics instruction. They understand that the results of multiple assessment strategies reflect an accurate understanding of student learning and that a student's score on a single test does not necessarily give an accurate picture of such learning. In the same vein, a short walkthrough of a classroom performed once a year is typically insufficient to accurately judge the effectiveness of instruction. To this end, district and school administrators themselves should participate in ongoing professional learning on the topic of mathematics education and assessment of learning.

Administrators convey high expectations for mathematics instruction by working with teachers as they plan, develop effective questions, and observe, and provide constructive, informative feedback while the teachers are implementing their plans. Frequent mathematics lesson or mathematics class observations allow the school administrator to provide those who teach mathematics with relevant feedback regarding their instructional practices. They engage with students and teacher to glean a full picture of which practices the teacher is employing and which practices are effective.

The Standards for Mathematical Practice play a crucial role in any CA CCSSM classroom. Administrators may be unfamiliar with these practices and many would benefit from their own professional learning experiences that are centered on the CA CCSSM. The Standards for Mathematical Practice describe ways in which students engage in mathematics to develop deep conceptual understanding and procedural fluency. As students grow in mathematical maturity, evidence of the Standards for Mathematical Practice changes but the essence stays the same. Students should be actively engaged in doing meaningful mathematics, discussing mathematical ideas and reasoning, applying mathematics in interesting situations, and discovering new mathematical ideas through modeling the world around them. The Standards for Mathematical Practice appear in different forms depending on the grade level of the classroom, but in any classroom, they represent the ways in which students engage in *doing* mathematics and play a core role in instruction. (Adapted from Massachusetts Department of Elementary and Secondary Education [Massachusetts] 2011, 9).The

Standards for Mathematical Practice are also described in the “Overview of the Standards Chapters” in this framework.

The table below lists the Standards for Mathematical Practice and provides a few examples of what implementation of each practice could look like in the classroom.

Standards for Mathematical Practice	Students:	Teachers:
1. Make sense of problems and persevere in solving them.	• Analyze information and explain the meaning of the problem • Actively engaged in problem solving (Develop, carry out, and refine a plan) • Show patience and positive attitudes • Ask themselves if their answers make sense • Check their answers with a different method	• Pose rich problems and/or ask open-ended questions • Provide wait-time for processing/finding solutions • Circulate to pose probing questions and monitor student progress • Provide opportunities and time for cooperative problem solving and reciprocal teaching
2. Reason abstractly and quantitatively.	• Represent a problem symbolically • Explain their thinking • Use numbers and quantities flexibly by applying properties of operations and place value • Examine the reasonableness of their answers/calculations	• Ask students to explain their thinking regardless of accuracy • Highlight flexible use of numbers • Facilitate discussion through guided questions and representations • Accept varied solutions/representations
3. Construct viable arguments and critique the reasoning of others. Students build proofs by induction and proofs by contradiction. CA 3.1 (for higher mathematics only).	• Make conjectures to explore their ideas • Justify solutions and approaches • Listen to the reasoning of others, compare arguments, and decide if the arguments of others makes sense • Ask clarifying and probing questions	• Provide opportunities for students to listen to or read the conclusions and arguments of others • Establish a safe environment for discussion • Ask clarifying and probing questions • Avoid giving too much assistance (e.g., providing answers or procedures)
4. Model with mathematics.	• Apply prior knowledge to new problems and reflect • Use representations to solve real life problems • Apply formulas and equations where appropriate • Ask questions about the world around them and attempt to attach meaningful mathematics to the world	• Pose problems connected to previous concepts • Provide a variety of real world contexts • Use intentional representations • Provide students the space to ask questions and pose problems about the world around them
5. Use appropriate tools strategically.	• Select and use tools strategically (and flexibly) to visualize, explore,	• Make appropriate tools available for learning

	and compare information • Use technological tools and resources to solve problems and deepen understanding	(calculators, concrete models, digital resources, pencil/paper, compass, protractor, etc.) • Embed tools with their instruction
6. Attend to precision.	• Calculate accurately and efficiently • Explain thinking using mathematics vocabulary • Use appropriate symbols and specify units of measure	• Recognize and model efficient strategies for computation • Use (and challenging students to use) mathematics vocabulary precisely and consistently
7. Look for and make use of structure.	• Look for, develop, and generalize relationships and patterns • Apply conjectures about patterns and properties to new situations	• Provide time for applying and discussing properties • Ask questions about the application of patterns • Highlight different approaches for solving problems
8. Look for and make use of regularity in repeated reasoning.	• Look for methods and shortcuts in patterns in repeated calculations • Evaluate the reasonableness of intermediate results and solutions	• Provide tasks and problems with patterns • Ask about possible answers before, and reasonableness after computations

Adapted from: "SMP Student Teacher Indicator." Howard County Public School System • Elementary and Secondary Mathematics Offices • Draft 2011

Administrators play an important role in supporting teachers during the time of transitioning to a CA CCSSM classroom and beyond. The Standards for Mathematical Practice represent a different vision of what students are doing in classrooms. They may be investigating mathematical concepts with manipulatives for an entire class period or working on the same mathematics problem for a substantial amount of time. Parents may not understand this style of instruction and these new expectations for California students and administrators will need to provide opportunities and support for teachers to introduce and explain the CA CCSSM during interactions with parents.

Mathematics Professional Learning for Teachers

In order to support California mathematics teachers in providing highly effective mathematics instruction to their students, professional learning opportunities that deepen mathematics teachers' content knowledge and provide effective instructional strategies must be made available. The content of such programs must be aligned with the goals and standards for teaching mathematics in California. As the report "Greatness by Design" notes, California must rebuild a professional learning system grounded in the following principles: sustained, content-embedded, collegial and connected to practice, focused on student learning, and aligned with school improvement efforts (Greatness by Design 2012, 16). Below are some important features of professional learning programs for teachers of mathematics.

Content of Professional Learning Programs

For a mathematics program to be effective, it must also be taught by knowledgeable teachers. According to Liping Ma, “The real mathematical thinking going on in a classroom, in fact, depends heavily on the teacher's understanding of mathematics” (Ma 2010). A landmark study in 1996 found that students with initially comparable academic achievement levels had vastly different academic outcomes when teachers’ knowledge of the subject matter differed (Milken 1999). The message from the research is clear: having knowledgeable teachers really does matter; teacher expertise in a subject drives student achievement. “Improving teachers’ content subject matter knowledge and improving students’ mathematics education are thus interwoven and interdependent processes that must occur simultaneously” (Ma 2010; Massachusetts 2011, 10).

Professional learning for mathematics teachers must address teacher content knowledge of the specific topics taught at their grade level(s), as well as mathematics relevant to prior and later grade levels where appropriate. Research over the past decade has shown a positive correlation between teacher content knowledge and student learning (Hill and Lubienski 2007; Hill, Rowan, and Ball 2005), and the required content knowledge of teachers at each grade level has changed significantly with the adoption of the CA CCSSM. These changes in content must be taken into account when designing professional learning programs for teachers. Specific guidelines will be provided below for the mathematics content knowledge at various grade spans that might appear in such programs.

The Standards for Mathematical Practice (MP) represent a shift towards students "doing mathematics" in the classroom, and as noted in *The Mathematical Education of Teachers II*, teachers "must not only understand the practices of the discipline, but how these practices can occur in school mathematics and be acquired by students (p.8)." In order for teachers to develop an understanding of the Standards for Mathematical Practice and their implications for mathematics instruction, they should engage in solving problems through using the mathematics practices. Intensive content-focused professional learning workshops—such as Saturday meetings or multi-day summer workshops—provide a forum wherein teachers can do this. For example, professional learning should:

- Engage teachers in the posing and solving of problems, requiring teachers to make sense out of problems and learn to persevere in solving them (MP.1).
- Encourage teachers to explain their reasoning and to make conjectures and critique each other's reasoning in a safe environment (MP.3).
- Allow teachers to learn which tools are appropriate for the mathematics at hand and gather experience with the use of those tools in the classroom (MP.4).

Professional learning programs that incorporate teacher collaboration across schools or districts can draw on successful experiences of other teachers in teaching the Standards for Mathematical Practice.

In addition to a teacher's grade level mathematics content knowledge, contemporary mathematics education research points to the importance of teacher acquisition of a specific body of content knowledge for teaching mathematics, often referred to as *pedagogical content knowledge* (See Hill, and others 2007 for a comprehensive discussion of this idea). This body of knowledge includes understanding problem solving strategies that arise through student thinking, knowledge of multiple representations of mathematical concepts (e.g. multiple representations of fractions), comprehension of the relationships that are embedded within content areas, an understanding of common student thinking and misconceptions, knowledge of specific teaching strategies for different topics, and knowledge of ways to differentiate instruction, among others. Of note are strategies for involving students in classroom discourse as a means to teaching with the Standards for Mathematical Practice and formative assessment strategies that serve to inform teachers as to the efficacy of lessons, units or modules, and the extent of student understanding. Mathematics instruction that pays attention to the needs of specific populations, including students with disabilities and English learners, is crucial to providing high-quality mathematics instruction for *all* California mathematics students. To the extent possible, mathematics professional learning for teachers should be attentive to these areas and should rely on the most current materials and research in regards to this specified knowledge for teachers.

Suggestions for the mathematics content for teachers of various grade bands are given below, referred to by the domains and conceptual categories in the CA CCSSM. These are based on the recommendations found in two documents, *Gearing Up for the Common Core State Standards in Mathematics*, and *The Mathematical Education of Teachers II*:

- Grades K-2: Counting and Cardinality, Number and Operation in Base Ten, Operations and Algebraic Thinking.
- Grades 3-5: Number and Operations—Fractions, Numbers and Operations in Base Ten, Operations and Algebraic Thinking.
- Grades K-5: Measurement and Data, Geometry.
- Grades 6-8: Ratios and Proportional Relationships, The Number System, Geometry, Statistics and Probability.
- Grades 9-12: Functions, Modeling, Integrating Mathematical Ideas.

The "Progressions for the Common Core State Standards in Mathematics" documents (http://ime.math.arizona.edu/progressions/) are useful tools for teachers to study when exploring these topic areas, and can be used as starting points for content-based professional learning programs.

School administrators and their teachers should strive to develop an understanding of students and their culture to enhance mathematics instruction. Teachers have the potential to behave as institutional agents with the capacity and commitment to provide institutional resources and opportunities to students (Stanton-Salazar 1997). Teacher-

student relationships have the potential to contain *social capital*, i.e. forms of support that help students become effective participants in the school system (Bourdieu 1977, 1986; Stanton-Salazar 1997). In the context of school, teacher-student relationships include student learning and achievement (Katz 1999). Katz (1999) also states that two essential tenets of productive teacher-student relationships are high expectations and caring for students. Many students place a lot of emphasis on care and respect. When relationships developed between teachers and students become supportive, these relationships have the potential to alter students' lives in positive ways (Stanton-Salazar 2001). This notion of teacher-student relationship is derived from the social capital framework, which was cultivated by Bourdieu, in order to examine the role of relationships between institutional agents and their students (Stanton-Salazar 2001).

Finally, the mathematics supervisors who provide mathematics professional learning opportunities for teachers should be well versed in the relevant mathematics content knowledge, knowledge of students and instructional strategies, and classroom issues that teachers face. Strong partnerships are encouraged between schools, districts and county offices of education, and mathematics education and mathematics faculty from nearby institutions of higher education. All have a stake in the mathematics instruction of California students, and all have something to offer to professional learning programs for teachers.

Forms of Mathematics Professional Learning Programs for Teachers

The forms of mathematics professional learning programs for teachers vary, but there are some common characteristics of effective professional learning programs that should be attended to when designing such programs. Professional learning programs for teachers should include mathematics content instruction for teachers as well as effective and appropriate pedagogical strategies for the classroom. Professional learning programs for teachers should be sustained, with a focus on long-term goals. A one-shot, single-day workshop is unlikely to have a lasting effect on classroom instruction without consistent and long-term follow-up and support. Both research and the collective experience of thousands of teachers, administrators and teacher educators in California confirm this (Darling-Hammond, and others 2009; Blank and de las Alas 2009).

Below are some of the common models of lasting, supportive professional learning programs:

- *Summer intensive workshops or university courses for teachers*. One- or two-week summer professional learning institutes allow teachers to focus solely on the development of their content knowledge and knowledge of instructional strategies. Various types of multimedia resources allow teachers to examine mathematics teaching in a collaborative environment and develop plans for implementation during the school year. However, summer workshops are most effective when paired with follow-up programs.

- *Teacher collaboration (coaching, math circles, professional learning communities*). Site-based professional learning engages teachers in real time study of their practice. A lone teacher has a difficult road ahead if he or she wishes to implement new strategies in his or her classroom without the support and understanding of colleagues. Teacher collaboration has been a feature of successful professional learning programs that serves to help teachers make larger-scale changes in mathematics instruction at their schools. Such efforts will be needed with the implementation of the CA CCSSM.
- *Lesson Study.* The challenges to collaboration include a tradition of autonomy in classrooms, time and scheduling constraints, lack of supportive leadership, and pressure for individual accountability. One innovative way that provides a structure for teacher collaboration is the *Lesson Study Model*. Lesson study, adapted from Japan, is a form of long-term professional development in which teams of teachers collaboratively plan, observe, analyze, and refine actual classroom lessons. Each lesson study cycle consists of three phases: planning a lesson, observing student reactions to the lesson, and then analyzing those reactions. Because the focus is on the effectiveness of a lesson itself and what students learn, rather than on an individual teacher's performance, the method helps reduce the anxiety and resistance to being observed that some teachers feel. To watch a full lesson study cycle, visit http://www.devstu.org/lesson-study.
- *Fostering of Teacher Leadership.* Teachers can be encouraged to utilize their expertise in formal or informal leadership roles. Teachers who attend workshops or

conferences should be given the opportunity to share what they have learned with peer teachers. A teacher who shows commitment to professional learning can become a mathematics coach or start a lesson study group at his/her school. Teachers may participate on a textbook committee, take a role in designing benchmark assessments, or be part of the school or district academic planning team. Many teachers are unaware of the leadership roles they can play in their school or district unless they are encouraged to take on such roles.

A final feature of effective mathematics professional learning is school-wide administrative support. Teachers face many pressures in the classroom that may make them less willing to take risks when it comes to implementing new instructional techniques or using new materials. If principals and other administrators support teacher efforts to improve their instructional practices, then such changes are more likely to be integrated into classroom practice.

Induction and Support for New Teachers

Induction and support for new teachers should be given special attention in California schools. As of the writing of this document, the research of Ingersoll and others indicates that the recruitment and retention of mathematics teachers is of crucial importance nationwide. Data show that large numbers of teachers report dissatisfaction with their jobs due to feelings of isolation, a lack of school-wide support and collaboration, and a lack of effective professional learning. Research indicates that this

situation can be alleviated to a large degree by the implementation of effective support programs specifically tailored to new teachers (Ingersoll 2010). Features of such programs are similar to those described above, but also include:

- Mentoring by knowledgeable, effective, reflective, and experienced teachers in the same grade level and content area as the novice teachers.
- Content knowledge development to draw connections between the university mathematics courses that novice teachers just completed and the mathematics they are now required to teach.
- Classroom strategies specifically tailored to classroom management issues and difficulties with engaging students in the Standards for Mathematical Practice.

Evaluation of Instruction

As described in "Greatness by Design," successful evaluation systems for teachers should provide useful feedback over time while also identifying those who are struggling, and providing intensive assistance and removing those who do not improve. The report recommends that evaluation systems should (Greatness by Design 2012, 17):

- *Be Based on the California Standards for the Teaching Profession* and used to assess educator's practices, from pre-service preparation to induction and throughout the remainder of the career;
- *Tie evaluation to useful feedback and to professional learning opportunities* that are relevant to educator's goals and needs;

- *Assess the Extent to which Instruction aligns with the CA CCSSM*, including focus on both mathematics content and the Standards for Mathematical Practice;
- *Combine data from a variety of sources*, including valid measures of educator practice, student learning, and professional contributions, which are examined in relation to one another;
- *Include both formative and summative assessments,* providing information to both improve practice and to support personnel decisions;
- *Differentiate support* based on educator's level of experience and individual needs;
- *Build on successful Peer Assistance and Review models* for educators who need assistance, to ensure intensive, expert support and well-grounded personnel decisions;
- *Value and promote collaboration*, which supports whole school improvement; and
- *Be a priority within the district,* with dedicated time, training and support provided to evaluators and those who mentor educators needing assistance.

Expanded Learning Time

The *Common Core State Standards System Implementation Plan for California* developed by the California Department of Education (CDE) recommends that districts "integrate the CCSS into programs and activities beyond the K-12 school setting" and suggests "professional development to district administrators, school principals, and after school program directors on how to collaborate to incorporate into after

school/extended day programs activities that enrich and extend the CCSS-related learning initiated during the regular day."[1]

What is Expanded Learning Time?

Expanded learning time is an approach to enhance and integrate active learning experiences beyond the traditional school day – through after-school, before school, summer, and extended day, week or year – to reduce the achievement gap and improve student success.[2] These strategies utilize time outside of the classroom as a unique opportunity to address the academic, social, emotional, and physical needs and interests of students through individualized and engaging learning that results in improved student achievement. Programs should be high-quality, include community partners, be results-driven, and flexible to student and community needs.

According to a report by The Forum for Youth Investment (Devaney and Yohalem 2012), specific opportunities for the traditional education and expanded learning partners to collaborate effectively on common core implementation could include:

- Increased alignment and communication between the school and after school staff about learning supports and opportunities.

[1] The terms extended learning programs and expanded learning programs are used interchangeably and broadly refer to the learning times and experiences outside of the regular school day and year, e.g., before school, after school, intersessions, and summer. CDE has chosen to use the term "expanded learning time."
[2] This is the working definition of expanded learning time as of December 2012 and adopted by the California Department of Education After School Division. This definition was developed in collaboration with *The Partnership of Children and Youth*.

- Increased alignment around skills and knowledge emphasized in the common core, rather than content standards.
- Awareness-raising and knowledge-sharing between school and after school staff.
- Increased joint training, professional development, and planning time.
- Supporting communication strategies on the role and implementation of common core with parents and community partners.

The underlying principles as outlined in the definition of expanded learning time referenced above explicitly reinforce and complement key aspects of Standards for Mathematical Practice such as making learning relevant, project-based, and engaging.

As supported by the bullets above, as a first step school staff and administrators could invite expanded learning providers to specific school and community meetings and trainings, and then develop plans for more intentional alignment. This may also include sharing resources and materials on common core implementation and the CA CCSSM. Additional resources and partners for schools and school staff include a range of expanded learning technical assistance providers, such as county offices of education and contracted entities that can facilitate local partnerships and share best practice programming around common core implementation. Given the demands of common core implementation, it is opportune to better understand and test out intersections in programming and skill development between the traditional school day and their expanded learning partners.

College, University and Professional Support

The support of college and university personnel for high-quality mathematics instruction is also crucial. Personnel from institutions of higher education support K–12 mathematics education by joining in partnership with their local schools. By becoming more involved with these other institutions of learning, college and university personnel become more aware of the research that needs to be done in the school settings. Armed with research conducted in their profession, college and university personnel can be strong advocates of high-quality mathematics instructional practices.

Teachers who are well prepared to teach mathematics are vital to the success of mathematics education in California. The adoption of new mathematics content standards and the forthcoming changes in assessment require many teachers to gain new knowledge and alter classroom practices. Even experienced teachers need support in learning and instituting new curriculum and instructional strategies, and new teachers and teacher candidates need even greater support in learning to teach mathematics as they acquire the fundamentals of teaching. Colleges and university personnel can provide support for those teachers through school visits and through the learning opportunities offered by higher education.

In addition, the introduction of new mathematics standards means that the curriculum of college teacher-preparation courses that address mathematics must change to reflect new content and the Standards for Mathematical Practice. Developers of teacher

preparation programs must take the initiative to create programs that ensure knowledge of the CA CCSSM through appropriate coursework and pedagogical preparation to teach higher-order thinking and performance skills for students, in addition to culturally and linguistically responsive pedagogy (Greatness by Design 2012, 29). Teacher credentialing programs should include a focus on implementing the CA CCSSM.

Local county offices of education are linked with the California Department of Education and can provide resources for the implementation of the CA CCSSM and professional learning for instruction. County offices of education have access to the latest CA CCSSM resources and can provide support for administrators in understanding the CA CCSSM and opportunities for collaboration among schools.

Finally, local, statewide, or national professional organizations, such as the California Mathematics Project (http://csmp.ucop.edu/cmp), which has numerous regional sites, the California Mathematics Council (CMC), local affiliates of CMC, the National Council of Teachers of Mathematics (NCTM), and the National Council of Supervisors of Mathematics (NCSM) can all play a role in the support of schools, administrators and teachers in transitioning to the CA CCSSM.

Community and Parent Support

Although the school is the primary learning environment for formal mathematics, the home and community also play significant roles. Only through the cooperation of the

school, the home, and the community can students become fully prepared for a lifelong appreciation of mathematics. Mathematics can have a place outside of the classroom, in mathematics clubs, through local and national mathematics competition teams, and through school mathematics activities that promote parent and family involvement (e.g. "Family Math Night").

Schools and districts can create formal and informal partnerships with a variety of public and private organizations, agencies, and businesses to seek support and participation in the mathematical education of California's children. Many private companies and organizations have education departments that seek opportunities to work with youngsters. Schools are encouraged to (1) use community resources to provide the additional adult support and instructional materials that students need to meet their mathematics education requirements and (2) start to develop students' ideas about the workforce, careers, and their relationships to their communities with regards to mathematics.

Parental involvement in the mathematics education of their children can take many different forms. Some parents may show their support by voicing to their children consistent respect for the value of education in general and mathematics specifically. Parents help their children with homework or projects and take an active approach in their learning when they can. They mirror the appreciation for reasoning and learning mathematics they wish to see in their children. Parents may volunteer in the classroom

or serve in an advisory capacity on an appropriate committee. They may attend mathematics nights and workshops that are sponsored by the school or district. Regardless of how parents or family members support education, they are always made to feel welcome at their children's schools and know that their contributions are valued and appreciated.

Parents and families need to be advised of school district goals and plans for mathematics education programs. They are informed about the CA CCSSM and the grade- or course-level expectations for their children and how to support their children's achievement of the standards, including their children's understanding of the Standards for Mathematical Practice. In particular, parents are informed as to how the adoption of the CA CCSSM represents a change in mathematics instruction to one that is focused on students actively participating in the reasoning and discovery involved in learning mathematics. A community effort will be needed to propel California schools forward as they transition to the CA CCSSM.