

**Teachers** represent the most important factor influencing student achievement, outside of family income and parental education levels. **CSET is investigating:** 1) What highly effective teachers are doing in the classroom to make a difference for students and 2) How to share that expertise. Our approach is to **target** research and professional development (PD) efforts on the **teaching strategies** we know can **improve student learning** and to **build on-line resources** to distribute this work

**THE NEED** Despite the importance of mathematics PD, few programs have been implemented on a large scale, and little attention has been paid to investigating the factors that **make a program successful, scalable and sustainable**. The CSET Instructional Leadership Model of Mathematics Professional Development project (**ILMPD**) is created to address this need. Our research and development team is refining and testing a model for preparing school-based teacher leaders to facilitate the Problem-Solving Cycle (**PSC**) mathematics PD program. The ultimate goal of the project is to improve student learning, including raising student achievement in Algebra. The project will also contribute to theory and practice in two needed domains: preparing teachers to provide mathematics PD and implementing effective mathematics reform in urban settings.

**THE SETTING** We are working with approximately half (6) the **middle schools** in **San Francisco**, a large urban district notable for its organizational complexity and variety of student cultures and languages. In preparation for rolling out the PD during the 2011-2012 school year, we are working with district and school administrative personnel and two Math Leaders (**MLs**) from each school.

**THE APPROACH** We focus on **teacher quality** as a key catalyst to improve student achievement. MLs are first trained to utilize and facilitate the Problem-Solving Cycle, and then they provide PD for math teachers in their schools. Training also includes careful attention to the unique contexts of the schools where the PD will be implemented.

**THE MODEL** The Problem-Solving Cycle is a model of mathematics professional development designed by a team at the University of Colorado as part of the Supporting the Transition from Arithmetic to Algebraic Reasoning (STAAR) project (Jacobs et al., 2007; Koellner et al., 2008). It is a long-term approach to PD, with three goals: 1) increasing teachers' knowledge of mathematics for teaching; 2) improving their instructional practices; 3) fostering student achievement gains. Each cycle is a series of

interconnected PD workshops organized around a rich mathematics task<sup>1</sup> which enables teachers to share a common learning, planning and teaching experience. The model is designed to accommodate one cycle of the PSC per semester (two per academic year; see Figure 2).

**THE COMPONENTS** The Mathematics Leadership Preparation model (**MLP**) model has three major components: 1) introduction to the PSC; 2) a summer leadership academy; 3) multiple cycles of structured guidance for MLs who will be facilitating the PSC.

- a. As a first step in the preparation process, members of the CSET project team who are experienced with the PSC model train MLs in one full rotation of the PSC. As participants in the PSC, the MLs gain first-hand experience of how the model works, observe how it is facilitated, and reflect on their own learning. (In our current project, they also provide feedback to the project team about how the activities support their practice and ways the support could be improved. This feedback will be incorporated into the second component and future refinements of the PSC model.)
- b. In the second component, MLs participate in a one-week summer leadership academy during which they transition from their role as participants in the PSC to PD facilitators. The academy focuses on core principles and practices for facilitating PSC workshops. MLs reflect on their experiences as PSC participants, participate in multiple PSC simulations (mini-cycles), and develop a general plan for implementing the PSC with the mathematics teachers in their schools.
- c. In the third component, members of the project team provide on-going, structured guidance as MLs facilitate multiple cycles of the tasks with the other math teachers in their schools. During each rotation, MLs attend 3 preparation meetings led by the CSET project staff.

**THE DATA** In preparation and support for future PD leaders, we are collecting **extensive qualitative and quantitative data**, including:

- Interviews and focus groups with district and school administrators to establish priorities for the PSC professional development
- Video recordings and detailed field notes for the workshops conducted for the MLs
- Video recordings of the PSC workshops conducted by the MLs
- Video recordings of math lessons conducted by the MLs and case study teachers
- Multiple interviews with the MLs to document their reflections about the preparation and support they receive to conduct PSC professional development

- workshops, their PSC workshops, and their PSC classroom lessons
- Pre and post-assessments of the MLs' and teachers' mathematics knowledge for teaching
  - Mathematics scores on the CST and district benchmark assessments for all middle school students for each year of the project.

**THE RESULTS (...so far)** The data collected in year one show:

- a. District leaders have named this CSET program as *the* district middle school professional development program
- b. School leaders have restructured the PD time at each site to incorporate the PSC model roll-out with *all* of their math teachers over the next two years. (For schools to take this step is relatively rare and speaks to the success of the CSET work to help district and school leaders understand and see the importance of the model. For example, the district agreed to send their math-content specialists to all PD sessions this year.)
- c. Math leaders improved their execution of core instructional practices and their understanding of teaching mathematics to English learners (ELs)
- d. School leaders report the positive impact of the PSC on their school's approach to teaching mathematics and PD for math teachers