

Silicon Valley Mathematics Initiative **Overview**

The Silicon Valley Mathematics Initiative (SVMI) is a comprehensive effort to develop conceptual understanding and high level mathematical skill in all students, kindergarten through algebra. The initiative is based on the central belief that improved student achievement is an outcome of improved instruction and improved instruction is an outcome of ongoing, comprehensive, intensive professional development.

The Silicon Valley Mathematics Initiative involves several inter-related components that include: 1) a formative and summative performance assessment system that is aligned with national standards; 2) pedagogical content coaching and 3) ongoing professional development, leadership training and networks.

Performance assessment:

The Silicon Valley Mathematics Initiative uses a performance assessment system as the cornerstone of the initiative. The 35 member school districts of the Silicon Valley Math Initiative, together with the Santa Clara Valley Math Project, formed the Math Assessment Collaborative in order to produce, score and report mathematics performance assessments at grades two through ten.

One of the guiding principles of SVMI is that quality math performance assessments will drive instruction and inform teachers and students of their progress towards meeting high mathematics standards. Teachers in the initiative regularly use formative performance assessments to inform their instruction. They often participate in formative assessment groups, where teachers collaboratively select, administer and score student performance assessments. They then engage in conversations to delineate and discuss students' understandings, misconceptions and areas in which more instruction is required.

In addition to using the formative assessments, teachers use a summative performance assessment given annually each spring. This assessment is aligned with national standards. It is developed by the Mathematics Assessment Resource Service (MARS), an NSF-funded international project that involves UC Berkeley, Harvard, Michigan State and the Shell Centre in Nottingham, England to develop the performance exams and scoring materials. The assessment is published by CTB/McGraw-Hill. Schools and districts use this exam as one of several measures of student achievement that include state-mandated high stakes tests. Teachers and administrators have found that the MARS exam provides a robust and accurate evaluation of student learning.

Each spring a new MARS performance exam is administered to member districts' students. Over 80,000 student assessment papers from grades two through ten are hand-scored annually, with each district scoring its own exams. SVMI provides scoring materials and a comprehensive, week-long training for member district scoring leaders. After this intensive training, local scoring sessions are conducted by member districts. SVMI collects the results and then returns the test results to the teacher in time for review

before the end of the school year; in this way, teachers can use them to inform their teaching. Five percent of the assessments are collected throughout the initiative and re-scored in a regional audit session.

SVMI contracts with an outside data analysis company to assist in collecting data and producing summary reports for each member district and for the initiative as a whole. In addition to producing district reports and individual student reports, SVMI also analyzes student results to examine student thinking and misconceptions.

Ongoing systemic professional development:

The initiative provides a comprehensive approach to improve mathematics instruction and learning. Professional development opportunities are designed to provide support for teachers, coaches and administrators.

Classroom teachers are provided with many professional development opportunities. The most widespread opportunity is the administration and scoring of the performance exams described above. The exams help establish a common understanding of standards by clarifying the level of standards in each grade and showing how that level changes across grades. Additionally, some teachers have the opportunity of in-class coaching or participating in lesson study. Teachers who have attended many workshops can participate in a special group that reads and discusses mathematical research and performs action research in the classroom.

A typical teacher involved in a district math group is often initiated into the professional development program during the summer training. The induction begins with a week-long intensive training that provides a strong foundation for continued growth throughout the school year. During the school year, the participant meets regularly with the district math within grade level, school or district groups and/or during regional professional development activities. In addition, teachers meet regularly with a district math coach for one-on-one lesson planning and in-classroom coaching. Teachers administer ongoing formative assessments to their students as part of their regular instruction, and their students' work is scored and examined in periodic group scoring sessions. Often monthly professional development meetings are scheduled after school where best practice strategies are discussed along with video or written case studies. Additionally, throughout the year coaches lead workshops for teachers that include developing cross-grade articulation, scoring student work, training in math content areas and discussing classroom videos.

In addition to professional development for teachers, the Silicon Valley Math Initiative provides monthly professional development for coaches and administrators. These monthly sessions may include reading research, bringing in experts, solving and discussing rich mathematical tasks, analyzing student work, and viewing classroom videos. Summer institutes are provided for emerging leaders, where participants look in-depth at a particular mathematical strand and principals and key district personnel attend training in instructional leadership, school change and math content knowledge.

A description of all available opportunities for teachers, coaches, principals and district administrators is attached (see SVMII Professional Development and Assessment Opportunities for Member Districts).

Pedagogical content coaching:

Pedagogical content coaching is a key element of the Silicon Valley Math Initiative. SVMII believes that content coaching is an effective strategy to help teachers learn best practices in teaching math. To that end, SVMII supports the cost of 22 district math coaches in the region. Intensive content coaching can improve instruction by helping teachers gain in their conceptual understanding of math and develop techniques to support all students. Through relationship building, a focus on student thinking, attentive listening and effective questioning the coach helps teachers to develop their own internal capacity to improve classroom practice.

The coaching model used in SVMII involves an ongoing process that includes pre-teaching conferences, in-class experiences and post-conferences. The focus of this kind of coaching is on students' thinking, understandings and work products. The pre-conference is a time for the teacher and coach to clarify the lesson and the key mathematics that will be taught in it. The pre-conference provides an opportunity for the coach to gain insights into the teacher's depth of mathematical knowledge. It can also provide an opportunity for the teacher and coach to discuss effective strategies for delivering instruction, to brainstorm possible challenges students may have and to discuss common misconceptions to address up front in the lesson. Additionally it provides the coach and teacher with a common focus for the observation that will follow.

The class session that follows the pre-conference serves as a data collection experience for the coach. The post-conference is critical for teacher growth. During the post-conference the coach provides feedback for the teacher, shares information and encourages the teacher's reflection. It is also an excellent opportunity for joint examination of student thinking and student work that occurred during the lesson. Conversations around students' understandings and products help to generate ideas, raise issues and develop next steps for re-teaching to encourage student growth. The coach helps keep the focus on ensuring that all students are making progress. The post-conference provides an opportunity to assess learning, inform instruction and adjust educational plans.

More detailed information about content coaching is included in the document SVMII Pedagogical Content Coaching.

SVMI Professional Development and Assessment Opportunities for Member Districts

Throughout the year SVMI provides a range of professional development opportunities for teachers, coaches and administrators in member districts. There are four general areas of focus for these meetings: network infrastructure,, coaching,, content knowledge and pedagogy,, and performance assessment.

Network Infrastructure

MAC General Meetings: SVMI provides information and policy meetings three times a year for district administrators and math coaching leaders in member districts. The meetings focus on student achievement results and issues related to quality math instruction. The fall meeting includes discussion of the findings of the previous MARS exam and distribution of final reports. The winter meeting includes distribution of the MARS exam for the coming spring. The spring meeting includes preliminary findings of the spring exam.

SVMI Review Meetings: Once each year the SVMI Director meets individually with the administration and math coaching leaders of each district to discuss progress on the district's mathematics professional development plan. Each district evaluates its progress using a rubric for district math programs. They review assessment results and reflect on successes of their plan. The district discusses challenges and areas to focus on in future year plans.

Coaching

Leadership Institute: This professional development series provides mathematics leadership training for math coaches and site math leaders. Districts send teams of three for this intensive institute (12 – 15 days spread throughout the year) on content knowledge, pedagogy, leadership skills and issues of equity.

Coaching Institute: This summer mathematics professional development institute is designed for district teams comprised of a math coach and either five teachers receiving coaching or five site leaders. The focus is on developing math content knowledge for powerful mathematics classes and building a community of professional learners.

Math Network Meetings: Professional development is provided at these networking meetings for coaches who work together to investigate, explore and reflect on improving mathematics instruction through content development, math coaching, facilitating professional development, and use of formative assessment tools. Meetings involve a variety of support for math coaches including featured speakers, collaborative discussions, educational research, content development and coaching strategy sessions.

Content Knowledge and Pedagogy

SVMI Professional Development: Five times during the year teachers participate in mathematics professional development to improve their content knowledge and use

assessment results to inform instruction and improve pedagogical strategies at their grade levels.

SVMI Intensive Seminar: Selected classroom teachers interested in improving their craft as teachers and deepening their understanding of teaching through classroom analysis and reflection take part in professional development and action research.

Principal as Instructional Leader Seminars: Professional development for principals and other administrators takes place twice a year in order to support quality mathematics instruction and improved student achievement. Meetings are designed to develop a collaborative relationship with site administrators and math coaches around commonly held high expectations and best teaching practices.

District Partner Observations: Each member district partners with two other member districts to conduct observations in each other's schools. During these visits participants look for best practices and strong mathematics programs. Each district takes turn hosting a visit with the other two districts as peer observers.

Performance Assessment

MARS Performance Assessment Training: SVMI provides performance assessment scoring training for scoring leaders from each district. Districts send one to five people per grade level. Those who have not previously led scoring sessions have two initial days of training. All scoring leaders then attend four days of training to thoroughly understand the rubrics for the exams for that year.

SVMI Tools and Resources for Member Districts

MARS Performance Assessment Exam: SVMI sponsors a summative math performance exam for grades 2 through 10. Each year the exams are new. The exam involves 5 tasks drawn from the initiative's 5 Core Ideas written for each grade/course. It is designed to be administered for approximately 60 minutes during the first two weeks in March. Each task is then hand scored within each district using MARS rubrics. Student results are reported in 4 performance levels. The data is collected and reported to SVMI. Five percent of the scored papers are audited by SVMI for reliability. Individual student reports are available for district distribution to parents. SVMI provides each district with a comprehensive final report that includes disaggregated data by demographics, schools and grade levels as well as STAR test correlation.

Problem of the Month: SVMI provides rich problem solving materials to promote the teaching of non-routine problems school-wide. The problems of the month are a set of six closely related problem situations that differentiate levels of mathematical content and complexity in order to provide a floor for all students and no ceiling. Principals and teachers are strongly encouraged to promote problem solving as a central activity in math class. The materials include instructional materials and detailed resources for the instructor to support implementation.

Formative Assessment Program: SVMI provides formative assessment materials for the purpose of informing classroom instruction. SVMI makes available to each member district a bank of tasks and rubrics (30-35 per grade level) for teams of teachers to use as part of their instructional program. Tasks are selected and administered in classrooms and then scored by teachers in small groups in order to inform learning and teaching. Professional development is provided with the tasks.

Tools for Teachers: SVMI produces an annual document entitled *Tools for Teachers*, which provides an analysis of student thinking, understandings, errors and misconceptions derived from the MARS performance assessments. At each grade level (2 – 10) every task from the MARS exam is analyzed. The analysis draws from large samples of student responses from across the initiative. *Tools for Teachers* features overall findings, detailed analysis, sample student work and a range of suggestions, strategies and questions for teachers to use to inform and improve instruction. This analysis and documentation provides the basis for planning professional development experiences for teachers, teacher leaders, and math content coaches.