

Assessment-led improvement:

The MAC model

a 'story' of assessment-led improvement

Background and vision

MAC, the Silicon Valley Mathematics Assessment Collaborative, grew out of the California Math Renaissance, which focused on reform through good curriculum. There the:

- workshops went well but there was not much sign of change in classrooms ("Wouldn't work with my students".....)
- curriculum replacement units were each too big a bite for teachers to swallow
- coaching was so expensive

Catalysts for an assessment-led task-focused approach included:

- **Balanced Assessment tasks**, with their clearly defined rubrics, raised issues of what we value in mathematical performance that stimulated teachers to realize their need to teach differently
- The wish to help their kids do better >> demand for support of change, including professional development and good curriculum
- **TIMSS G8 Geometry videos**, and the contrast they show of Japanese v US styles, with 5-7 topics in depth v 35 topics superficially
- **Assessment is recognized by Superintendents**, and teachers, as important

These provided the vision on which MAC has been developed, and 'sold' to districts – currently more than 30 of varied size, prosperity,....

Getting started – design principles

In 1996 formative classroom assessments with Balanced Assessment and New Standards tasks became a focus of professional development, working with various districts in Silicon Valley.

Each task provides a common experience for teachers to work and discuss, and a common universe of discourse for examining student work from their own and other classrooms.

In 1998-99, groups of teachers worked to define core ideas across the grade range 3-10. Initially it seemed, for example, that all grades thought

geometry = area + perimeter only

MAC Core Ideas was developed as a framework to define and organize progression.

In that year, MAC began to work with MARS, which provided

- Balanced Assessment tasks from MARS books – these illustrate standards
- Balanced Assessment tests, which define levels of difficulty to match working of the core ideas, what is acceptable performance at a grade level, how strands, mathematical demands, and student expectations deepen and change across grades.

The tests were developed for and with MAC (later, some were published by CTB)

Discussion of the task and rubrics, with specific student work selected to raise important issues in the mathematics, forms the focus of MAC Professional development. This is where:

you get conflicting views, resolved through discussion
change in classrooms happens

because the discussions of student difficulties are used to bring out issues of instruction.

There is subtle interplay between three elements:

task, rubrics, student work

All three are essential.

A style of reporting on test performance was developed to meet a key goal:

– **to be useful, and user friendly for all stakeholders.** For example:

teachers see that

- each task and rubric relates to their curriculum
- selected student work exemplifies the range of performance
- common student errors, lead to areas of focus for professional development sessions and/or school site meetings, research review for ideas on new/ different instructional strategies or materials, emphasis for coaching sessions.
- implications for instruction, brought together in the *MAC Tools for Teachers*

superintendents see

- the value of a performance exam – an additional broad-spectrum measure;
- good performance on Balanced Assessment >> good performance on high-stakes test (but not vice versa)
- improving performance requires a professional development system – and that this design around
tasks + rubrics + student work
provides a program that is focused on student-thinking;
- value for money – the professional development resource needed is moderate.

Districts working together can achieve a much more effective professional development of MAC. It has strengths including:

- the scale allows outside support to be brought in economically
- working together (and helping each other out) helps build communication and understanding.
- takes 'heat' for any controversial decisions off district leaders and on to the Collaboration.
- social pressure to be part of a successful enterprise that attracts high-income districts, among others.

The annual program

The essential elements through the year are:

Summer Institute, with 5 follow-up meetings

At the Summer Institute district teams of coaches and teachers (1:5) work together on a variety of professional development activities in full sessions, and in varied break-up groups for:

- grade levels
- district teams
- coaches on coaching

During September to January, there is one follow-up meeting for each strand. These are MAC-wide, run by MAC leadership under the Director of MAC (*Linda Fisher*) – numbers require several sessions for each meeting (topic?).

The program is based on findings on what students know from the annual tests, and those tasks provide the focus.

Tools provided include: *Problems of the month*, *Professional reading materials*, *Classroom planning calendar*. This last includes suggestions for tasks to be given, about one per month, by each teacher to their own students, and discussed in depth in the classroom, with their coaches, or at grade-level or school planning meetings

In January

MAC receives the final master pdf files of the tests from MARS. Just in time for printing, MAC sends masters to each district.

February

Scoring leader training is provided for teachers who have never *led* a scoring session. (Currently about 200 scoring leaders are needed each year) Usually each district has a team of about 5 to 7 scoring leaders. Smaller districts score together to lessen the number of scoring leaders needed. (for efficiency?)

Practice tests are taken by each student, and discussed in the classroom, so that the students' understanding of the broad value system of standards-based mathematics is linked directly to the style of tasks in the tests. (*The need for adaptability* in solving mathematics well is not immediately understood; many teachers expect the tasks in the live test to be closely similar to those in practice tests, rather than a different sample from the great variety of possible tasks (sample space for the strand or for task demands such as design or investigation). Another challenge is that districts are using different curriculum materials and the test does not match the exact language of any one program. This is deliberate, looking at transference of knowledge, but is a difficult idea for teachers to understand. This challenge is met through the professional development program and growing experience of the range and variety of tasks)

There is also a further challenge, *Teachers have a norm of 90% for passing. It is a challenge for them to see that task are not designed to fit this percentage model of acceptable performance but to measure a range of performance so that even the best students are appropriately challenged*

early March

Annual test is taken by each student

Training the MAC trainers, an elite group of about 12 coaches, on the scoring rubrics for this year's tests takes place.

MAC trainers training the district scoring leaders – those who actually lead and are responsible for the scoring in their district.

by 20th April

District scoring of student papers is complete, along with data entry and sending a 5% sample (one paper from each folder of 20) to MAC, for

- monitoring, and, particularly,
- providing samples of student work for *MAC Tools for Teachers* and for
- professional development.

Student papers are returned to teachers for use in the classroom.

by mid-May

Districts get

- cut scores – these are fixed to match previous years' tests by the Mathematics Board for Balanced Assessment, using a process of structured professional judgment. This is based on three kinds of information from a *standardizing sample* of students: the standards tested by each task; the chief assessor's report on student performance; the distribution of scores on each task and on each test as a whole. The final boundaries of this ("modified -Angoff") procedure are based on independent holistic judgments of a sample of student papers around the provisional boundary.
- information about the task in performance, based on the 5% MAC sample

by early June

Reliability check MAC audits the papers, re-scoring the 5% sample to provide feedback on the reliability of scorers to each district.

Individual student reports MAC writes an analysis of performance on the test and from it, based on each student's task scores, a likely pattern of errors and misconceptions is computer-generated within each district. These reports raise the profile of the tests for teachers, principals and parents.

during June

Plan and prepare for the next Summer Institute. The development of the next *MAC Tools for Teachers* is a major element in this.

The structure of the district teams

Coaches (one or two per district according to size/commitment to improvement) These are mathematics leaders, mostly released by their district full-time from other responsibilities. (Outside funding for some of the coaches can be helpful, particularly the early stages of a districts participation while confidence builds)

MAC leadership institute uses 15 days during June-August for the personal professional development of the coaches – other potential leaders from the districts may also attend. Mathematics content knowledge, and students difficulties with it, is a primary focus.

Each coach brings the teachers they will be coaching to the Summer Institute, where they themselves have break-out groups on:

- coaching methods and techniques
- analyzing student work from the MARS test

The coaches professional development continues in monthly sessions. They also attend the follow-up meetings with their teachers, where they act as facilitators promoting rich discourse.

The pattern of professional development

This ranges in intensity, providing support for all and offering progression, so that:

- all teachers **administer the test** and use the outcomes in their classroom;
- many teachers **take part in the scoring**, which is itself intense professional development;
- a subset of the scorers **attend summer institutes, and receive coaching**;
- some among these **become coaches**;
- **the MAC trainers form the core team**, leading some of the professional development meetings.

Principals attend meetings focused on 'The Principal as Instructional Leader'. Such meetings happen about three times a year.

MAC and the system leadership

MAC meets with the districts in the Collaborative four times per year. The district curriculum directors attend most meetings.

- *Fall*: the *Final Report* and *MAC Tools for Teachers* are distributed at the meeting and briefly discussed.
- *January*: At the Superintendents' Meeting MAC gives a "state of the union" report to superintendents, and any officers they bring with them – often a curriculum person, a principal, and a coach.
- *February*: MAC distributes hard copy of the examinations and rehearses guidelines for district administration.
- *May*: MAC announces cut scores, defined by MARS Mathematics Board on which MAC is represented, and shows sample data from the 5% sample.

MAC is a collaborative so there may be policy issues to discuss and to vote on.

Once a year, usually in May, the Director of the Silicon Valley Mathematics (*David Foster*) Initiative meets for about 90 minutes with a small team from each District separately. The

focus is discussion of the District's program, and their self-evaluation using the *District Math Program Rubric* that MAC provides. The MAC results are reviewed.

Critical Players and how they effect change:

The common thread is having a shared-vision and being able to take risks. Change causes some tension and stress; someone in the district needs to be willing to deal with the disequilibrium of trying something new.

Classroom teachers: The most important player is always the classroom teacher. In districts where the classroom teacher is involved in the scoring process, discussing the rubrics, and conversations about what they saw in student work, there is more buy-in and change than in districts where papers are scored by a select few or farmed out to other people for scoring.

Principals: In schools with a strong principal, data shows there is a corresponding improvement in student achievement. These typically roll out a *Problem of the Month*, allow time for looking at student work, etc.

Coaches: Coaches make a huge difference in the summer institutes and professional development sessions by focusing the discourse in the small groups and really probing teacher's mathematical thinking and pedagogical beliefs. They also make a huge difference in the classroom. In a small study, of students who went through 4 years of schooling with no teacher who had received coaching, only 33% met standards. If a student was in a classroom with teachers who had been coached for 3 out of the 4 years more than 90% met standards.

Administrators: Coaches and teachers can't work in isolation. They need the support of an administrator who will allocate time and resources to the professional development, work with principals to make this a part of the district culture, examine the data and work with teacher leaders to gain access to key schools for coaching and professional development.