

# Assessment-led Improvement

## Summary

This strategy builds on the principles of *standards-based improvement* through a gradual implementation sequence:

### **Assessment >> Transition units >> Full curriculum**

It is based on the power of rich assessment tasks as a tool for stimulating professional and system development. Such tasks, when used with specific rubrics and examples of student work, can communicate vividly to teachers and their students the essentials of the planned reform – in performance, content, process and pedagogy. This approach needs only modest resources in the initial phase. It gradually improves teacher understanding of standards-based mathematics, its value system, and its teaching style demands. It starts from structured discussion of a sequence of rich assessment tasks, their scoring rubrics, and examples of student work at all levels of performance. It moves on to look in more depth at the developments needed in instruction and curriculum. It thus provides a carefully paced constructive learning experience for the system and its teachers, as well as for their students.

- First introduced are **standards-based assessment tools for classroom use and annual tests**, initially ‘low-stakes’, with associated professional development that includes scoring training and uses of assessment to guide instruction.
- During the second phase, **transitional replacement units** from *standards-based mathematics curricula* are gradually introduced, with professional development on the new challenges they present to teachers. These units are chosen to be accessible while focusing on important gaps in the coverage of the currently used curriculum materials.
- Later the program moves on to the selection and adoption of a **full standards-based curriculum**, with associated professional development. The by-now-familiar assessment has meanwhile become a major part of the accountability system.

The logistic issues of timeline, cost and necessary prior capabilities for the whole multi-year implementation process are supported by a *curriculum change planning tool* that can be fitted to local circumstances.

## Challenges addressed

We have a mandate to align tests with standards

Teachers don't teach the curriculum

Our professional development efforts are not having much impact in classrooms

We have a mandate to implement a standards-based curriculum

## Background

Assessment that is aligned with the goals of an improvement program can provide a powerful stimulant and guide to everyone involved, helping them understand the changes and encouraging teachers to change their instruction appropriately.

However, if systemic change is to take place, those involved need the support structures and resources that will enable typical teachers and others to make the changes needed in their well-grooved professional practice. Professional development and good curriculum materials provide this support.

## Principles

The principles on which this strategy is designed are a:

**Substantial experience for teachers** and their students of all aspects of the new curriculum **through a carefully-paced three-phase professional development program**, taking at least two years before the full implementation of a new curriculum.

**Assessment-led professional development** in the first *exploration phase*, built around standards-based assessment tasks, with rubrics and selected student work, used by teachers in professional development sessions and formatively in their classrooms.

**Transition replacement units** from one or more target curricula in the second *transition phase* – these units are chosen to be accessible to teachers and students who are new to the program, while covering problem areas of the system's current curriculum.

**A third full implementation phase** that builds the new curriculum into an already-established program of continuing professional development.

## Implementing the strategy

The following exemplar schedule is given in some detail, so as to bring out the elements that need to be present in applying the above principles. Several caveats apply:

- The strategy will, of course, always be adapted to local circumstances and needs. *The MAC story* of shows how the *Silicon Valley Mathematics Assessment Collaborative* has developed a successful version of this approach.
- To simplify this description, we have set out a sequence of phases, as though all schools in the system would progress together. That is rarely the most natural way. Often it is better to build capability initially through a small group of schools (perhaps with outside project funding), later spreading the reform system-wide over a year or two. The plan below should be seen in that light – as the 'trajectory' that each school in the district will follow at an appropriate stage.
- For specificity and clarity, we have illustrated the tools needed for this strategy with specific tools that are known to work well. As usual, there will be others that could be used instead; the essential features that they need for this purpose are outlined for each type of tool at the end of this paper.

## The Exploration Phase – discovering standards-based mathematics

The following steps are suggested:

- **Introduce broad and balanced tests**, standards-based assessment, such as *Balanced Assessment in Mathematics: the tests*, across a range of grades, with no 'stakes' attached for the first year or two. Provide schools with Practice Tests as soon as possible; provide scoring training sessions on these tests, primarily as professional development for teachers, with emphasis on qualitative understanding

of the rubrics, and the ‘values’ they embody, rather than on scoring accuracy. Tell everyone that this assessment will be part of the accountability system later.

- **Bring the students on board**, by teachers giving them the same scoring training in class and having them score their own work on the Practice Tests. This is a beginning of their being aware of their own strengths and weaknesses – and of their responsibility for fixing the latter. (Increasing student understanding and responsibility, by involving them in ‘teacher roles’, is a key element in any successful strategy for improvement.)
- **Introduce rich tasks to the curriculum** by, once every two or three weeks, basing a lesson on a task that is similar to those in the assessment, such as those in the *Balanced Assessment: classroom packages*. These are designed for in-class use, with longer tasks than in the tests, covering similar aspects of mathematics. Work on the tasks is followed by discussion of student work at various levels (that provided in the packages and variants from within the class).
- **Begin to shift the balance of responsibility for learning** in the classroom. This pattern of discussion of student work on substantial and interesting tasks advances a major element in standards-based reform – getting students to accept much greater responsibility for their own learning, and for that of their peers. *Revising the ‘classroom contract’*, the implicit understanding between teachers and students as the roles each will play, is an integral part of all standards-based improvement. In this gradual process, students will grow to accept that it is their job not only to try to get a good solution to each task but also, in discussion, to find out together how good it is (instead of asking the teacher or looking in the book).
- **Introduce the annual tests.** About 4 months after the Practice Tests, go through the same process with the current year’s tests; as teachers’ and students’ understanding grows of what mathematical performance means, student performance will improve.
- Provided a program along the lines set out here is *strongly implemented*, progress will continue year-by-year, with the annual tests offering the positive evidence that most accountability systems demand. (Weak implementation, not surprisingly, shows little effect.)
- **Introduce professional development.** Quite early in the above process, teachers will begin to ask for more guidance on how to develop in the classroom their students’ ability to tackle the wider range of mathematical performance that broad, balanced assessment presents. They will also want to know how to link this new work to their current curriculum. All the teachers involved, not just the enthusiasts, will have this motivation for further professional development.
- *Professional development for and through performance assessment* helps develop teachers’ ability to understand better their students’ thinking, so that they can more effectively guide their own instructional decisions. Such activities enhance teachers’ knowledge – of the subject matter and of sound instructional practices – and their disposition to act in ways that benefit the learning of all students. They should be a regular element in every ongoing professional development program.

Everyone is now becoming prepared for the second phase – moving the focus to curriculum.

## The Transition Phase – enhancing the curriculum

So far, teaching will largely have been with the curriculum and classroom materials that are current in the system at the beginning of the reform. Traditional curricula have a narrower range than the demands of the standards, and of assessment aligned with them. The time

comes (within a year or two) for this mismatch to be tackled. The following steps are suggested:

- **Review the priorities of teachers.** By this stage, teachers will be asking for more help in handling these new aspects of mathematics in their classrooms. Review in discussion which of these aspects seems most pressing, and also which are likely to be easiest to handle. Make choices of which to tackle first.
- **Import some good transition units.** In the light of this review, replace some units in the current curricula with richer *standards-based transition units*, selected from the NSF curriculum projects and from other good sources. For such enrichment materials the funding needed is modest. As teachers succeed in handling these units, they are acquiring the skills they will need for a move to a full standards-based curriculum.  
These units must be a replacement, not an addition to the burdens of already-overloaded teachers. If there is no obvious direct substitution of the new unit for a specific chapter or two in the current textbook, the review chapters of standard texts are a good place to cut, since such re-teaching is generally ineffective as remediation.
- **Refocus the professional development.** Teachers will need specific support in teaching these new units. The teaching strategies, knowledge and skills, that they have developed in the assessment-focused professional development are relevant for the new curriculum elements, but there will be others. The publishers of each of the *standards-based mathematics curricula* offer support for professional development, which will complement and enhance the skills of local professional leadership.
- **Review the whole curriculum.** As teachers become comfortable in handling this sequence of transitional replacement units, they will become increasingly aware of the mismatch between the current curriculum and these units, with their broader view of mathematics. Maintaining the coherence of the whole curriculum is an increasing challenge. They are now prepared for the third phase – a move to a full standards-based curriculum.
- **Explain to parents and the community.** Whenever new activities are introduced to the classroom, parents want to know why. They will be concerned that this is not "the mathematics we learned at school". A few of them will be vocal, even hostile, in their concerns. Parents meetings should be structured to show that "basics" are not enough to develop the capabilities in mathematics that modern life demands, and that the new curriculum activities are both demanding and achievable. Designing such meetings is not easy; *parents meeting kits* related to the new curriculum elements can help to ensure successful and enjoyable meetings.

More detail on the activities in this phase can be found in the alternative strategy *Professional development-led improvement*.

## The Full Implementation Phase – consolidating success

The activities set out above for the first and second phases provide a sound and digestible introduction to continuing professional development. After a few years, everyone in the system will have built a basis of experience and confidence for further steps, notably to:

- **Introduce a full standards-based curriculum** and associated materials.  
This is often a major administrative challenge; however it becomes steadily easier to carry through as standards-based reform and its assessment are accepted in the system during the first two phases. The old classroom materials do not support the now-familiar broad range of assessment tasks, and the learning activities needed to develop mathematical performance. This provides a strong argument for a new

curriculum, which transition units only partly meet. Their gradual introduction in the second phase gives time for financial planning, as well as for familiarization with the standards-based approach. Now is the time for one of the comprehensive standards-based mathematics curricula.

Curriculum-led improvement discusses in more detail what is involved in this phase, for which teachers and the system as a whole will now be well prepared.

Nonetheless, the challenge to teachers of absorbing a new curriculum into their practice in an effective way must not be underestimated. It generates a need to:

- **Broaden professional development.** By this time, a program of professional development is an integral and funded part of the professional life of teachers and their leaders. It can now be focused on delivering the new curriculum. The sound foundation already established with the transition units will smooth the introduction of the new curriculum.  
Teachers learn to help students to focus on and discuss their own and each other's errors, and to understand and correct their misconceptions. This diagnostic teaching approach is much more effective than review and re-teaching.

This is the way to begin, but broader professional development needs to be seen as an ongoing element in the professional lives of teachers. It should address the teachers' subject knowledge in the context of the classroom and student understanding, as well as all aspects of pedagogy. Assessment related activities would continue to play an effective part.

## Strengths

The strengths of this approach include:

- Assessment tasks, with scoring rubrics and examples of student work, show directly the new performance goals of the reform. They provide the core of a compact, vivid and digestible form of professional development, which gradually brings out the essentials of the reform.
- The resources needed build gradually along with direct experience by all concerned, allowing space for resource planning and ongoing program evaluation.
- This approach builds understanding of the new demands at a tolerable pace, allowing time and 'space' for reflection, discussion and absorption before the full load hits.
- It avoids the shock effect of asking teachers to change, often in a profound way, every mathematics lesson that they taught to a class in the previous year.
- It avoids the low-quality implementation that often results from such a sudden change with, for example, units taking far longer than planned, unfamiliar content, and new essential teaching strategies not sufficiently absorbed.
- It reduces the intensity of professional development needed to adequately mitigate these effects, by building up over several years.

## Likely challenges

- The several-year timescale for full implementation is longer than the current planning horizon in some school systems, so the program may be interrupted.
- This strategy enables early evaluation by all concerned of many aspects of the new program, and this may lead to premature rejection rather than encouragement.
- State tests are too narrow, and dominate the scene.
- We experience frequent changes of administrative leadership and/or school board leads to program abandonment mid-way. Continual change at the top undermines the long-term programs that are needed for real progress. Professional development

support does not grow to meet the needs of full implementation of the new curriculum.

- Teachers don't teach the curriculum concerns grow when new standards-based curriculums may have been implemented poorly.
- Math Wars backlash from parents or outside opponents.

## Tools

The following tool types are essential elements in enabling this strategy to succeed. In addition to standards that describe the learning and performance goals, the strategy needs tools. These tools need to be ‘well-engineered’, i.e., imaginatively designed and carefully developed so that they work as intended in realistic circumstances of personnel and support. There are other tools that support implementation, and help those involved overcome the barriers and setbacks that always arise.

- **Standards-based assessment materials**, summative and formative, are an essential tool for any standards-based implementation strategy. Here they play a key catalytic role. The assessment tasks must cover the broad range of performance goals that the standards imply, typically involving linking topic content to greater depth of knowledge, longer chains of reasoning, non-routine problem solving and connections, and communication. Materials must be open – to be freely used in class and in professional development. Balanced Assessment in Mathematics: the tests and the New Standards Reference Examinations are among the available standards-based assessment resources suitable for this purpose, as are Balanced Assessment: classroom packages.
- **Standards-based classroom teaching materials** are likewise essential tools. The learning activities must cover the full range of mathematical understanding and performance that the standards imply, typically involving linking topic content to greater depth of knowledge, longer chains of reasoning, non-routine problem solving and the connections it depends on, and to communication of results and reasoning to others. The standards-based mathematics curricula that were developed with NSF-support are among those suitable for this strategy. They also provide support for professional development and communication with parents.
- **Standards-based professional development materials** to support professional development leaders are a third key tool. Most leaders will value and benefit from the materials that are usually available from the curriculum and assessment providers, since these are carefully linked to the classroom activities that the teachers will lead. Professional development for and through performance assessment provides support from the assessment perspective.

**Planning tools** that enable systems to make realistic estimates of costs and personnel needs over a rolling five year period – your system will have such tools.

## Other considerations

### Evaluative evidence

There is evidence on the influence of assessment on learning from around the country and the world that the range of tasks in high-stakes assessment has strong influence on the balance of classroom learning activities, both for better and (more often) for worse – this emphasizes the importance of making well-aligned assessment an integral part of any improvement program. Specifically, MAC is a well-engineered example of an assessment-led improvement program, with a substantial amount of evidence on its system-wide

effectiveness. Anyone thinking of this approach would learn much from the details of their work.

There is evidence on curriculum effectiveness that shows gains in student performance on traditional tests (and massive gains on more balanced tests of mathematics), built on improved understanding and motivation. For each of the standards-based mathematics curricula, there is a significant amount of research on effectiveness.

### **Development status**

Draft in development by the Toolkit team in consultation with many of those involved in assessment-led standards-based improvement programs.

Comments please to **team@toolkitforchange.org**

### **'Stories'**

Assessment-led Improvement: the MAC model

**We are seeking further accounts of experience in implementing strategies like this  
If you might be able to help, please email [team@toolkitforchange.org](mailto:team@toolkitforchange.org)**

### **Planning essentials**

These include a long and short term plan that has active commitment, personal and financial, from the school system management structure, and a core of people equipped for leading professional development for and through assessment and building system capacity before and during implementation

### **Budget issues**

These include the year-by-year costs of assessment materials, professional development, and curriculum materials, growing during implementation, and of effective communication with the community on the nature, goals, effectiveness and progress of the program. The curriculum change planning tool will enable you to make sensible estimates of the likely costs.

### **Benefits**

Growing teacher professionalism. Gains in student performance on traditional tests (and massive gains on more balanced tests of mathematics). Improved understanding of mathematics, by students and teachers. Improved student motivation.

### **Implementation pitfalls**

Change of superintendent and/or school board may lead to program abandonment mid-way. Professional development support does not grow to meet the needs of full implementation of the new curriculum. Teachers don't teach the curriculum. Math Wars backlash from parents or outside opponents. Pressures on schools because state tests are too narrow