

# NO SMALL TASK: CHANGING MATH, CHANGING MINDS

## RAISING EXPECTATIONS THAT ALL CHILDREN ARE CAPABLE OF LEARNING CHALLENGING MATHEMATICS

A case study commissioned by SciMath<sup>MN</sup>

Summary of Findings - June 2001



### GOAL:

The case study asks: What can be learned about implementing standards based mathematics curriculum materials from four Minnesota school districts in various stages of implementation? District administrators and principals describe their experience and what they learned in the process. Observations of teachers and parents provided additional perspective on the work.

### EARLY FINDINGS:

As dynamic, living, complex organizations, schools, like other dynamic systems, are subject to the principles of change. School leaders who employ an adaptive leadership model are able to create arenas where stakeholders examine their beliefs about education in the light of changing needs of children and society. Standards based mathematics curriculum materials demand adaptive leadership because beliefs about learning and the meaning of mathematics lie at the heart of any standards based mathematics adoption.

### I. OPEN UP THE PROCESS—

CREATE CLARITY AND COMMITMENT THROUGH DIVERSE PERSPECTIVES

District leaders emphasized the importance of paying attention to the details of an authentic process and did two things:

1) They created space for committee members to examine the research on how children learn alongside their own beliefs, and 2) they included diverse voices to help clarify thinking and learn what challenges may lie ahead.

- School leaders emphasized the importance of preparing for the implementation by taking stock of community attitudes, teacher readiness and district goals—Where are you? Where do you want to go?—Most said they wanted *all* students to be successful in math, be problem solvers, have non-threatening, hands-on learning, connect math to their lives, see math in other subjects, understand its big ideas.
- Know that adopting standards based mathematics curriculum materials is *more than adopting a textbook*. These materials have a research based underlying philosophy about teaching and learning that changes everything. Change takes time. *Do not rush!*
- Include on the math curriculum committee parents and community members *with a variety of perspectives*. Their presence clarifies everyone's thinking and helps leaders understand the variables within their respective stakeholder groups that may need attention.
- Educate all math committee members as thoroughly as the teachers on the committee. *Use a learning/inquiry model* as the committee moves through its work: Build on strengths, provide new knowledge, expose members to the curriculum-in-action, give "homework" that provides experience and becomes part of subsequent discussions.
- Leaders insisted that 1) committees identify criteria to guide their curriculum materials selection, 2) that *all members own the decision*, and 3) all members help bring the decision to the school board, teachers and parents; *this gave value to their work and fostered commitment*.

### II. BUILD TEACHER CAPACITY —

ORIENT PATTERNS OF PRACTICE TO FOCUS ON STUDENT LEARNING

Districts reported that higher levels of teacher acceptance produced higher acceptance by parents and community. Their ability 1) to use the inquiry model in professional development to focus on student math achievement and 2) to engage teachers with each other in conversation about their practice helped teachers rewrite cultural scripts learned over time.

- Teachers need time to develop new thinking and examine beliefs about teaching and about mathematics. In some districts, a slower, reflective process examining best practice and learning research *paved the way to understanding* the strategies that are central to teaching standards based mathematics.
- Districts took pains to increase the knowledge base of their teachers and make the mathematics curriculum visible. The pattern most districts used was to train pilot teachers thoroughly, give them ongoing professional support, and ask them to be a resource to the rest of the staff *during the pilot*. In the implementation years, all staff had significant professional training and ongoing support, and the piloting teachers continued to serve by providing peer-to-peer support.
- Some districts invited their piloting teachers to take on the role of teacher-leader: these leaders helped with curriculum review and related staff support. In the end, their influence *created a climate of collegial sharing*—teachers shared their classroom experience and engaged in an on-going refinement of their own teaching practice.
- Teachers reported that seeing experienced teachers model lessons, having opportunities to work face-to-face with each other, and having the necessary materials were *important aspects of their professional growth*.
- Study participants agreed that unless the mathematics programs are taught well and supported by parents, *significant improvement in student achievement will NOT happen*.

### III. RETHINK BUILDING LEADERSHIP—

#### STRENGTHEN RELATIONSHIPS THROUGH LEADERSHIP AROUND LEARNING

Creating a coherent instructional model centered on learning challenged district leaders who also managed increasingly complex buildings. 1) As the boundaries of instructional leadership blurred, principals entered into partnerships with teachers. 2) They also reduced isolation by bringing their own mathematical content knowledge forward and, through their presence, kept everyone focused on student mathematical proficiency. Every gathering provided leadership learning.

- Principals and district leaders described a wide variety of district building structures, size, as well as changing demographics and uncertain financial realities. These variables complicated their leadership roles, *making each situation unique*. Leaders needed to be both “in the dance” and “observing the dance.”
- Principals recognized that in order to support and evaluate teachers, they themselves needed 1) to understand the math curriculum and 2) to align their supervisory patterns with current thinking about relationships in learning communities. *When staff know that principals understand, learning communities become possible.*
- Participants also expressed wide agreement about the need to bring parents along from the start of the pilots. Just as the teachers did, parents needed access to new knowledge, opportunities to examine their beliefs, and experiences with the new curriculum materials on an ongoing basis. *A one-shot parent math night is not enough.*
- Elementary school parents asked for ways to help their children with math homework, to understand how the games reinforce basic math skills, or how challenging problems develop higher level thinking. In secondary schools, *in addition to homework meetings* for parents, math teachers held sessions to bring parent skills up to date (e.g. using graphing calculators, and introducing statistics and simple discrete math).
- Support is gained when people understand large ideas as they apply to themselves; *acceptance unfolds gradually through horizontal connections people make with each other around the issues.*

### IV. ALIGN GOALS, AND RESOURCES —

#### FOSTER NETWORKS OF SUPPORT FOR STANDARDS BASED MATHEMATICS.

Because standards based mathematics curriculum materials were so successful in framing best practices, district leaders were able to use their mathematics adoption to create a common vision for learning aligned with state standards. They 1) focused their professional development resources on mathematics, understanding there would be spill over in other areas of learning, and 2) they kept community leaders and parents in the loop about the changing needs of students, and did it often.

- District leaders were sometimes surprised by the reactions to the proposed adoption from some parents and segments of the community. Leaders across the country understand that people perceive the role of mathematics in a variety of ways, and, for some, the changes in new materials conflict with those basic ideas. Efforts to bring community leaders into the adoption conversation early are strongly encouraged.
- With graduation standards gaining acceptance as the state’s education goal, there is added impetus to adopt standards based curriculum materials that ensure the math standards are met *within the design of the materials themselves.*
- Because standards based mathematics curriculum materials are so successful in framing best practice teaching methods in very concrete lessons, some districts used the implementation to help staff develop a common vision for teaching and their role in facilitating student learning. District goals and building improvement plans focused on mathematics, and district dollars were directed toward the math implementation because of its larger pedagogical implications.
- In a time when schools are being held to higher levels of accountability, education leaders need to stand their ground for what they have learned it takes to educate children. *District leaders must magnify their efforts by aligning resources with large community goals while they keep student needs and successes in public view.*



The storminess that currently surrounds public schools results from a struggle between the assumptions of one educational era and the emerging expectations of another. At every opportunity, district leaders need to give their publics a clear picture of what public education looks like today, how the task has changed, what we now know about how students learn, and the demands an increasingly technological world will make on student achievement goals. At a time when public engagement in education is low, school leaders need to bring people together in multiple productive associations that lead them to assume responsibility for supporting a mathematically literate generation.

Educators argue for lasting improvement in student achievement as seen in student performance and demonstrated levels of understanding. In order to be heard, school leaders are creating arenas at every level in their districts where stakeholders examine their beliefs about education in the light of changing needs of children and society. If people are to support standards based mathematics, the meaning of math must be cast in terms they understand from experience...and they must hear the message often.

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