

OPENING UP THE PROCESS

CREATING CLARITY AND COMMITMENT THROUGH DIVERSE PERSPECTIVES

PARENTS' COMMON SENSE

Not too long ago a suburban district math curriculum committee was presenting its recommendation to the district's Community Curriculum Advisory Council (CCAC). Before the presentation a teacher-facilitator recorded on chart paper the experiences with learning mathematics that she solicited from CCAC members in the group. The list included:

- *I thought math was scary.*
- *As girls we were told we didn't need to learn math.*
- *I loved geometry.*
- *Learning the theorems made no sense to me.*
- *I was afraid of my math teacher.*
- *Algebra was meaningless to me and so boring that I quit taking math.*
- *I liked math but was not encouraged to keep studying it (a woman).*
- *I remember standing at the blackboard and being afraid I'd make a mistake.*
- *I remember the long line at the teacher's desk waiting for help.*

Noting "this is not a very positive picture," the teacher asked participants to think of a child they cared about deeply, and then asked them to describe the kind of math experience they would want that beloved child to have. A new list emerged.

- *I want my child to have a non-threatening, challenging, creative experience.*
- *He needs to understand why everyone should know math.*
- *Math needs to be connected to reality, reality-based.*
- *Math should be more than pencil and paper; it should relate to other subjects.*
- *Kids need a deep understanding, to know why they are doing what they are doing.*
- *I want her to be successful in math.*
- *I think it's important for them to know what they can do with math later on in a career.*
- *Learn problem solving, develop the ability to think.*
- *Ability to work with others, and tackle big problems.*
- *To like math, to experience the joy of discovery.*
- *Be ready for their world—college or whatever comes after high school.*

The teacher-facilitator then observed that the community members present had just described a math experience that included most of the characteristics found in the standards-based mathematics curriculum they were about to recommend to the district.¹

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"The births of all things are weak and tender and therefore we should have our eyes intent on beginnings."

MICHEL MONTAIGNE

“Although virtually all students enter school mathematically healthy and enjoying mathematics as they solve problems in ways that make sense to them, most exit school apprehensive and unsure about doing all but the most trivial mathematical tasks.”

BATTISTA, 1999,
THE MATHEMATICAL
MISEDUCATION OF AMERICA'S
YOUTH, PHI DELTA KAPPAN,
P.426

In The Beloved Child exercise described above community representatives described their hopes for a mathematics curricula that would serve all children well. Not only did parents, teachers, community and school board members care about student success in mathematics, the beliefs they expressed bore close resemblance to the assumptions and methods intrinsic to standards-based mathematics and expectations from industry leaders². Yet, as more school curriculum leaders move to change their mathematics programs from a traditional model—one that historically leaves many children behind³—to a model that demonstrates greater success for all students, broad support from parents, teachers and community is not necessarily guaranteed. In fact, the standards-based curriculum materials some participants in this study chose met “stormy” receptions while others experienced backlash. This paradoxical response raises the questions, *How do district leaders reconcile common sense expectations parents and teachers express for mathematics education, with their loyalty to familiar traditional models of instruction? Where do leaders begin to lay the foundation for public support (understanding public to include parents and teachers as well as community members)?*

Data from participant narratives underlined the dynamic nature of schools as they work to improve mathematics education. As a living system, education is always in flux, and because education is not static, process becomes more important than structure. Evidence from participating districts indicated that adopting a standards-based mathematics curriculum required district leaders to pay close attention to their process. They first examined the conditions around them by drawing on multiple sources of information. Based on their findings they equipped math committee members with relevant knowledge about important changes occurring in the world of learning. With research-based criteria and a commitment to the decision by all committee members, district leaders were then positioned to guide their implementation through the uncertainties that lay ahead. Because standards-based curriculum materials challenge beliefs about how children learn along with assumptions about the nature of mathematics education, the first stage of implementation requires particular attention to process.

INITIAL CONDITIONS

TAKE STOCK OF ATTITUDES

District leaders described paying attention to parents, community and teacher attitudes, both before the adoption process began and throughout its decision making phase. While one district reported consistent, strong school board support, another knew

from its previous adoption that parents were unlikely to accept a program that did not have a student textbook. Sensitivity to these and other conditions were described.

• **KNOW WHERE PARTICIPANTS STAND** As one district leader said, “We did a reality check and knew that the change we needed to make was larger than we thought. The decision would affect the lives of teachers and students for a long time.” In that district, due to a failed referendum and statutory debt, new curricular adoptions had been on hold for some time. While this void provided the leaders with an opportunity to create a new process, it also raised a cautionary note: “We really paid attention to where the committee members were at,” she said. Both at the beginning and during their deliberations district leaders constantly looked for common ground, and in doing so made sure they were not just “going through the motions.” It was important to this leader that people voice their concerns and observations at all times, no matter whether they agreed or not with each other.

• **ASSESS TEACHER READINESS** In several participating districts, long-term association with the Minnesota Council of Teachers of Mathematics (MCTM) and Minnesota’s Best Practice Network created a critical mass of teachers already well-versed in the national mathematics standards. These districts had well-prepared teachers ready in the wings to take the lead in adopting standards-based mathematics. Because teacher readiness is a critical factor, the data suggests, that in districts where the majority of teachers might lack current background on mathematics education, or whose mathematics preparation is minimal or out-dated, those planning to adopt a standards-based curriculum will want to bring teacher knowledge and skills up to date before moving ahead. New initiatives have little possibility of success when teachers lack the knowledge and commitment required for competent implementation (Darling Hammond, 1997, p. 216).

• **ANALYZE THE DATA** One district began the deliberation process with a formal examination of data from their MAT 7 and Minnesota Basic Standards Test (BST) scores, and the recommendations the district received from its North Central Accreditation evaluation. Committee members matched the data with parents’ and teachers’ expectations, as well as with the goals expressed in state and

In a planning session one district identified these factors as they prepared for their standards-based mathematics adoption:

DRIVING FORCES

- Math accessible to all students
- Standards Movement - National and Minnesota Education Commission of the States
- NCTM and MCTM leadership
- SCANS Report
- Parents value math as a gateway
- Wanted community united behind success for all kids
- Living our motto - Striving for Excellence
- Staff wanted the kids to be excited about math

PRE-DETERMINED ELEMENTS

- Accelerating change is a fact
- Technology has changed jobs and work
- Change scares many
- We live in a ‘right answer’ culture
- Everyone wants evidence of results
- Need to prepare students for post secondary schools
- Four focus areas in math make sense to most
- Whole math department is behind the change
- District has good reputation in mathematics
- We are confident of our direction

UNCERTAINTIES

- Apprehension and fear—will they get in the way?
- Community perception of lack of communication
- People’s various meanings for mathematics
- Unsure of credibility with the public
- Math as elitism—reliance on math to sort students
- How do we ease parent fears of feeling “dumb”
- Some “gifted” students struggle with open-endedness
- General confusion about standards is a problem
- Emotional reaction to change may preempt rational thinking
- Uncertainty about retired math teachers views and their influence on the community

national standards. Having this data solidly in hand, the committee could identify its priorities and back them up with facts. “When learner outcomes were weighed against the diagnostic evaluation and our BST scores, we had a solid case to bring to our curriculum advisory committee about the direction we should pursue,” the district leader said.

INCLUDE REPRESENTATIVE VOICES IN A REFLECTIVE PROCESS

In most cases, district leaders were very explicit about the value of having multiple perspectives represented on their committees, even if it slowed their process down. Productive math curriculum committees included teachers from all buildings, parents, as well as community participation, making sure invited members brought a range of perspectives to the table.

- **INCLUDE COMMUNITY/PARENT REPRESENTATION** Districts reported different ratios of community-to-district participation. In one district almost 80% of the committee were parents or community members. In another they were about half and another less than a third. One district administrator recalled sending committee members back to the table because they did not have sufficient parent representation. He said, “We need an authentic process. In this district we need to be sure parents really understand what we are deciding and we need to hear their criticism. I don’t care how long it takes.” They had learned from an earlier, contentious grade 6-12 mathematics implementation that “parents wanted a lot of proof from teacher experience” and that teachers needed to be able to back up why, beyond testing results, they supported a particular program. He told the committee, “We want no lazy answers.”

- **CLARIFY THINKING** This same administrator noted that having a range of views forced committee members to clarify their thinking. Listening to the concerns, questions, and hopes of committee members is valuable foundational work and early preparation for communicating with larger interest groups later on. He said, “The extent to which we have recruited to include the critics inside the process is important. Getting them on board may have slowed down the process, but we haven’t lost time.” He found that listening to all stakeholders resulted in having more teachers on board and a greater understanding of the issues parents bring. Over the course of their many conversations district leaders and committee members became familiar with typical questions and concerns parents and community members might raise and, consequently, were prepared to address those concerns in meaningful ways. From a different district, one committee member reported that once the committee got started, the administrators were open to

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“Employers and college professors still remain dissatisfied with skills of young people, while teachers and students suggest that many schools still haven’t adopted the policies advocated by reformers. Parents are generally content, but their perceptions of their children’s skills are much more optimistic than those of, say, employers.”

PUBLIC AGENDA ONLINE ALERT:
“REALITY CHECK 2000,”
www.publicagenda.org

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DISTRICT ADMINISTRATOR

hearing negative comments. “They encouraged frank discussions and wanted to hear all our thoughts. So, within that framework, I thought we had a lot to say. The voice of the committee was very strong and I think we made a really good choice,” he said.

• **LEVERAGE INFLUENCE** Some district leaders openly recruited members—parents, teachers and principals—who were skeptical about standards-based math curriculum materials. Because these individuals were respected by their peers, they had a great deal of influence and their endorsements carried significant weight. One teacher said, “I know I was asked to be on the committee because I was not supportive of the new curriculum materials that were out there.” She said because she understood how important the committee’s decision was, however, she took her role seriously and promised to keep an open mind. Both her observations of other classrooms using standards-based mathematics and her own experience piloting convinced her that children were capable of doing much more in mathematics than she had ever imagined. Ultimately, it was seeing her struggling children begin to enjoy mathematics that changed her mind. Her endorsement of the new curriculum created a level of trust among teachers who were not part of the committee decision. Similarly, a principal whose building enjoyed high math scores on nationally normed tests was not at all interested in changing much. In the end, however, the research and the convictions of his teachers helped him rethink his position. Eventual support from formerly skeptical committee members increased confidence in the process throughout the district and reduced resistance to the committee decision.

The data suggests that process is important. In planning the committee’s work, district leaders’ awareness of community attitudes helped them fashion their process into something more than “going through the motions.” They found that members needed current knowledge about mathematics and mathematics education and that data provided a useful starting point. Including diverse perspectives on the committee not only ensured that parent and community concerns would be heard, but also helped district leaders anticipate problems that might arise later. They understood that without difference, one-dimensional thinking prevails and the possibility of overlooking important factors increases⁴. In the end, because adoption of a standards-based mathematics curriculum was a situation that required decision and action, the committee work presented leaders with opportunities to identify the guiding principles within their communities. “Values are shaped and refined by rubbing against real problems...different values shed light on the different opportunities and facets of a situation” (Heifetz, p.23).

Observations:
MATHEMATICAL THINKING:

“ They are demonstrating their thinking through hands-on activities, where as before it was paper/pencil too frequently. They help each other as they comfortably work in in pairs. It is less intimidating which means better thinking is going on.”

5TH GRADE TEACHER

“What impresses me the most about the program is how it captures student attention. They understand concepts better because they are doing investigations and problem solving. Also, students must communicate more in the program. It’s great to hear the critical thinking they are doing. The lessons incorporates what the research has been telling us about how middle school students learn.”

MIDDLE SCHOOL TEACHER

“They are communicating their mathematical thinking both verbally and in writing. I see them willing to take risks using trial and error. I enjoy their collective intelligence as they build on each other’s thinking. They seem more confident in their problem solving. This is very exciting.”

5TH GRADE TEACHER

“Finding curriculum materials that fit the needs of middle school students is critical to their success. The standards-based program we chose does just that. It connects mathematical concepts as well as provides balance in skill development.”

PRINCIPAL, MIDDLE SCHOOL

PROCESS OVER STRUCTURE

MORE THAN CHANGING A TEXTBOOK

Reform mathematics curriculum materials have a research-based underlying philosophy about teaching and learning that changes everything. Administrators described their commitment to providing committee members with background and relevant experiences as a necessary precondition to their curriculum decision. While committee members cared about children’s learning, not all of them had access to or familiarity with current research on learning and mathematics. District leaders used several approaches to help committee members pay attention to their own thinking. Among other things, they decided to:

- **INVOLVE COMMITTEE MEMBERS IN LEARNING ACTIVITIES** Providing learning experiences helps committee members reexamine their understanding of teaching and learning as well as the scope of mathematics. Members need to ask themselves what mathematics is and why math education needs to change.⁵ One teacher said, “A lot was expected from the committee. Our involvement was not just in meetings, but doing things outside of the structure. We also had to read articles and curriculum materials.”

- **OBSERVE CLASSROOMS** Send members to visit classrooms where standards-based mathematics is well established, and allow time to talk with teachers and students about their experiences with the new curriculum. Several committee members reported that seeing the progress of students in classrooms using standards-based curriculum materials was an important factor in their thinking. “The sessions with classroom teachers demonstrating the curriculum were the ones that helped me a lot. It was seeing the curriculum in action that made the difference,” said one teacher whose sentiments were echoed by many others. The classroom visits provided teachers with another picture of how mathematics could be taught, and without this new picture, it was difficult to give up the old one.

- **BUILD TIME FOR EXTENDED DISCUSSIONS IN COMMITTEE MEETINGS** Because any adoption of standards-based mathematics curriculum materials involves examining beliefs about mathematics and learning, it is important to allow committee members time to talk about what they are thinking. In one district, the professional development leader found that once committee members had aired their questions and concerns thoroughly, they were then ready to look more openly at the options before them. First they needed to be heard, and then encouraged to move on. She is also fond of saying, “The one who does the talking is the one who does the learning.” Committee members are in a learning mode during the first stages of an adoption. Because most district leaders expected the

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“Students must link their informal knowledge and experience to mathematical abstractions. Manipulatives, when used well, can provide such links.”

KILPATRICK, J., SWAFFORD, J.,
FINDELL, B. (EDS.), 2001,
ADDING IT UP: HELPING CHILDREN
LEARN MATHEMATICS, P. 9.

committee members not only to make the curriculum decision, but also to bring it back to the groups they represented, it was important that members have time to articulate their thinking aloud. Besides helping participants reach a consensus, group discussions helped committee members grow comfortable explaining their thinking to their colleagues and others.

- **PACE THE WORK FOR A REFLECTIVE PROCESS** Decision making is an unfolding process that requires attention to the needs of committee participants for information, opportunities to discuss differences, and time for reflection. Decision making’s back and forth pattern allows participants to check and recheck their thinking as they uncover new information. Several districts found they needed to rework their adoption schedules because committee members needed to have additional information. One staff developer said, “This meant that we needed to pay attention to the committee members. Where were they in terms of their learning? The big picture? What did they really know about teaching and learning? So we needed to plan what we would do to support the committee.”

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CURRICULUM DIRECTOR

USE A LEARNING MODEL

The challenge facing district leaders was to create a process that would permit members to change or expand on their beliefs both about the nature of learning and the meaning of mathematics education. The narrative data describes elements of adult learning they employed.

- **KNOWLEDGE-BASED DECISIONS** From the start, study participants suggest positioning the change in curriculum and in the teaching methods as a movement forward, not a criticism of the past. Just as new information constantly forces people to adapt in other parts of their lives, in education, the explosion of research on how students learn will naturally impact a teacher’s classroom practice. One district administrator said they set out to provide their committee with enough background to give them a depth of understanding. She believed they would in turn be able to “articulate what they knew and use it in forming their decisions.” The new knowledge forced committee members to examine and refine their beliefs. Ultimately, the leadership was counting on members to find their own answers to their own questions.

- **TAKE ADVANTAGE OF STRUCTURED OPPORTUNITIES** Several districts took advantage of SciMath^{MN}’s Teacher Academy in the summer of 1999, a week-long professional development opportunity. The academy brought in specialists in mathematics education, teachers who could demonstrate the structures and methods of the various standards-based curriculum materials funded by the National Science

Foundation (NSF) that also met the requirements of Minnesota’s Graduation Standards. District committees met to process what they had observed. In addition, the Academy had a track for administrators where they could discuss challenges they might experience during the implementation and listen to suggestions from other administrators. Referring to this and other preparation district administrators provided his math committee, one principal said, “I don’t know how it could have been any better. I literally watched people change their philosophy.” Other opportunities provided by SciMath^{MN} and Minnesota’s Department of Children, Families & Learning included Math “Drive-In” Conferences and other work done by Minnesota’s Mathematics Best Practice Network where information on standards-based curriculum materials was brought out to various parts of the state.

- **USE HOMEWORK AND ASSIGNMENTS** Some districts designed committee meetings to build on the strengths of the members’ knowledge. “We believed we needed our committee members to be stars... so we needed to structure the process in a way that built on their strengths.” At the end of monthly meetings, they assigned “homework” to committee members—things to do in their buildings, or, things to read and think about. At the next meeting they came back and talked about their experiences, or what treading, and what they thought should be done next. In this way committee thinking was growing out of the members’ own knowledge and experience and the connections they made to the decisions before them.

- **MODEL INQUIRY** Since standards-based mathematics curriculum materials describe a new role for teachers—that of facilitator and coach—curriculum directors found that besides using an inquiry process, they needed to model being both a coach and facilitator. “The teachers needed to see us change as a result of their input; they needed to see us learn right along with them,” said one staff developer. The curriculum director added that, “everything we did had to be consistent with our understanding of learning....We modeled what we wanted to see happen.”

While typical curriculum adoption models of the recent past could follow somewhat linear, prescribed timelines, the standards-based mathematics curriculum materials chosen by these districts could not. As one district leader said, “We needed to honor what had already taken place. Our teachers were deeply involved in MCTM and already were looking at a standards-based approach.” Because so much was in place, the district thought theirs would be a one-year adoption. But by December, “as the implications became apparent, we realized this was bigger than adopting a text,” she said, as she and other leaders reworked their plan to accommodate their new understanding.

The changing landscape of learning required committee members to adjust their thinking in light of current research on how children learn. Districts leaders reported that creating time and space for committee members to evaluate their own thinking in the light of this new research was essential. Members were encouraged to discuss the significance of these ideas in relation to the needs of their local districts. The data suggests that because teachers and parents are key players in children’s education, investment in committee members’ understanding deserves high priority. Using a learning model, those responsible for successful school change tended to employ a process of inquiry; they attributed their success to the quest for common goals that, in the end, improved the committee’s capacity to solve problems together (Darling -Hammond, 1997, p. 215). District leaders who have been there remind others that change takes time.

CRITERIA AND RESPONSIBILITY

Finally, while conditions described above are critical to the success of the decision-making process, establishing guiding criteria and committee commitment serve as the final step in bringing the committee’s decision to school boards, teachers and parents. Insistence on research-based criteria to guide their decision, and ownership of the curriculum materials decision strengthened the case committees brought to their districts and communities.

- **IDENTIFY THE CRITERIA** In one way or another, district leaders in this study placed great significance on the committee members’ ability to articulate the criteria upon which their decision was based. As described above, one district defined their criteria before they explored the various standards-based curriculum materials. Their criteria reflected district data on student performance, outside evaluation of their mathematics program, state and national standards for mathematics education as well as congruence with parent expectations. Most other district committees first explored options for curriculum materials and settled on one that appeared to meet their needs before being explicit about their reasons for choosing that particular program. In these districts, administrators sent committee members back to the table saying it was insufficient to base their decision simply on the committee’s belief that their program choice would be “good for kids.” With the help of their assessment specialist,

In one district the curriculum advisory report identified these criteria:

- A common district philosophy for K-12 mathematics instruction should be developed.
- A set of outcomes for each grade level should be developed.
- K-12 mathematics instruction should place increasing emphasis on 1) problem solving and application activities; 2) use of technology and manipulatives at all levels; 3) more active student involvement in learning rather than drill activities, and 4) math taught in context rather than skills alone.
- All teaching material and methodology should be articulated and consistent throughout the K-12 program and should reflect national and state standards.
- After implementing the new mathematics curriculum, student grouping should be evaluated with the goal of raising the level of achievement for all students.
- The district should place high priority on staff development to aid them with the changes in instruction.
- The district should provide parents with ongoing information to help them learn about and understand the changes in instruction.
- All students will be introduced to algebra no later than eighth grade.

Choice of curriculum materials is important. TIMSS demonstrated that curriculum affects student achievement. Unlike countries whose students scored higher than U.S. students, textbooks in the United States exhibit a lack of focus. Because of the number of topics covered, and the amount of time devoted to review exercises, U.S. instruction may be less developed than in other countries, leaving U.S. students with only a minimal understanding of any particular topic. American textbooks evidence lower expectations for student mathematical mastery than their counterparts in other parts of the world.

NRC, 1999, GLOBAL PERSPECTIVES, p. 4.

one district used a survey of teachers to help them identify criteria. Their survey brought the added benefit of identifying potential “hot buttons” the committee would need to address when presenting their decision—such as how the choice would accommodate the needs of mathematically talented students. A third district narrowed their choice to one program but could not support their decision with research. In that case, selected committee members went through Project 2061’s Curriculum Materials Evaluation Process comparing their two preferred programs⁶. When they were finished, one curriculum stood out in its ability to build on student’s ideas about mathematics and develop their mathematical thinking. Regardless of which method the committees used, they all identified criteria to support their choice based on their own research as well as their understanding of what children in their respective districts needed. Typical criteria included:

- Improve student proficiency in mathematics
- Have tools built in to address student needs at both ends of the achievement spectrum
- Be consistent with national and state standards
- Provide K-12 alignment — have a consistent, coherent mathematics program
- Take a problem-solving approach
- Connect to real-life situations
- Provide active, hands-on student involvement
- Develop basic skills
- Pace so children will be doing algebra by 8th grade
- Help teachers grow in their own mathematical understanding
- Be teacher friendly, parent friendly

• **MAKE SURE EVERYONE IS ON BOARD** Not all study participants were explicit on this point but those who were considered it essential. One administrator said, “We had a rule that if people had concerns or objections, they were to be placed on the table.” She did not want people agreeing on issues while in the meetings and then outside ripping the process apart. When it came time to decide on their choice, one committee member recalled the curriculum leader asking, “Are we all agreed on this decision? It was very solemn,” he said. She repeated the question at least three more times, “Are you sure? Do you know what this means?” District leaders reminded committee members that not only was it their decision, they were expected to bring the decision to the school board, teachers and parents. Membership on the committee carried enormous responsibility.

• **USE THE PILOT TO TEST THE RECOMMENDATION** No district deviated from the common practice of piloting their curriculum, though some spent two years and others only one testing their choice. One district spent an added year piloting because during

their secondary adoption parents felt the district moved too fast, without adequately testing the program. In some districts about one-third of the teachers piloted, in others it was one teacher piloting at each level in each building. Study participants recognized the power of the piloting phase. "It's very powerful when teachers speak from their personal knowledge," said one administrator. "They could say, 'Yes, I've seen it work.'" As a principal explained, the advantage of piloting lies in its ability to confirm the committee's choice: "It helps teachers to really believe in their choice. They have to experience it so when they go to their colleagues, they could honestly say, 'We decided based on our experience,'" he said. That added credibility translated to trust on the part of their colleagues.

In a smaller school district it was possible to bring the committee recommendation to all teachers at once and engage their concerns. While the discussion of the pros and cons were extensive, "by the end of the afternoon we came to a consensus. We had no blocking," the committee leader reported. In a third district, the administrator was being pressured by time. In retrospect he said, "Apparently four of the secondary committee members were not fully on board." He explained that, even though the committee was charged with choosing curriculum materials that would give the district an articulated K-12 mathematics program, in the past "teachers in this district could choose their own book and did not have to pay attention to what went before or came after." He surmised that though there were elementary teachers on the committee and that fidelity to state and national standards was expected, some of the secondary teachers apparently did not fully realize that they would no longer be able to choose their own book. "It came as a shock to them." In the end, these same teachers sabotaged the committee's decision and forced the school board to go back on their initial endorsement of the curriculum materials selected for 9-12 students.

• **SHARE THE RESPONSIBILITY OF REPORTING THE DECISION** As mentioned earlier, district leaders not only placed the responsibility for the curriculum decision squarely on the shoulders of committee members, but they had them bring that decision to the school board, to peers in the building and to parents during the piloting process. The symbolic significance cannot be missed. Since district leaders saw themselves as facilitators of the process and left the decision up to the committee, it made sense to have these parent and teacher representatives deliver the decision. Said one teacher, "parents on the committee decided right along with us. It was our responsibility to bring our decision to the school board and parents helped us do that."

Observations:
STUDENTS LEARN MORE:

" I think the kids are learning easier, and getting more out of class. I don't have to focus so much on right or wrong, but pay attention to the way they are thinking or solving the problem."

3RD GRADE TEACHER

"It has been neat to watch the difference between what the students are doing in class this year with integrated math compared to how they worked last year. This year I see students who are actively engaged. They are talking mathematics! They are asking in-depth questions, problem solving and continually challenging each other."

HIGH SCHOOL TEACHER

"The strategies the students are learning are incredible. I wish I could have been doing this all along."

5TH GRADE TEACHER

"We have taken many students out of their 'comfort zone' and drawn them to high levels of mathematical thinking."

HIGH SCHOOL TEACHER

The criteria that committee members identified reflected not only the expectations of parents and teachers, they were also consistent with research on how students learn mathematics. Armed with criteria, the committees' final deliberations affirmed them in their choice of curriculum materials and they could bring their decision to colleagues, parents and school boards with confidence.

Observations:

MEETS DIFFERENT
ACHIEVEMENT LEVELS:

"I see the standards-based curriculum as challenging for high achievers. It requires higher-order thinking rather than successful procedural knowledge for students to excel. Much of what I see my current Advanced Placement (AP) Calculus students doing involves contextual questions that are deeply conceptual which they find difficult but will prepare future AP Calculus students well."

HIGH SCHOOL TEACHER

"During free time students are choosing to do math. We are coming to respect students' ability to explain their thinking."

ELEMENTARY TEACHER

"One of the reasons I like the integrated program is that students enjoy the variety of meaningful activities. There's a deeper level of understanding as students relate math to concrete, everyday situations."

MIDDLE SCHOOL TEACHER

"I work with students who need extra support in math. This year, with our standards-based program, it is the MOST ENGAGED that I have ever seen these students as they work through solving problems using mathematics. They are thinking, discussing, sharing and learning."

HIGH SCHOOL TEACHER

CLARITY AND COMMITMENT

While parents described a common sense understanding about the type of mathematics education that would help their children succeed beyond high school, when school districts began to adopt mathematics programs to meet those needs, a tenacious attachment to traditional mathematics persisted. As elsewhere, people lamented the poor showing students make on international comparisons of mathematical proficiency, yet they responded like their peers—"the only time that Americans pay any attention to mathematics teaching is when educators try to improve it" (Battista, p. 426). In planning their adoptions, district leaders described investing time and energy in the process itself.

The combined wisdom of study participants suggest that during the adoption stage, attention to process meant two things: First, district leaders embarked on an *authentic process*. The charge they undertook was to *distill the diverse and rich research on children's mathematical learning and create opportunities for participants on the curriculum committee to examine their thinking alongside the changing needs of students*. They gave their committees the task of producing a research-based recommendation they could take with confidence to their parents, teachers and communities. Second, district leaders examined attitudes within their respective communities from a variety of viewpoints and over time. *Including diverse perspectives* in an examination of all aspects of the problem provided the best insurance that the committee would be able to identify the fundamental issues, and was essential to their ultimate success.⁷ In reconciling diverse perspectives, *members clarified their ideas, while district leaders had an early warning of challenges that may lay ahead*. As district criteria indicated, committee members were able to "clarify what matters most" and did so in terms of improving student achievement in mathematics.

When districts failed for whatever reason to be faithful to their process, problems occurred that were magnified later on. Including parent voices from the start is critical. One district leader said that during their secondary adoption, they assumed that parents would continue the strong support for teacher decisions they had always given. However, when the district began to pilot their standards-based curriculum materials,

parents were unprepared for the changes. In the midst of misinformation and organized resistance, the school board reversed its earlier approval and added a traditional track to the high schools' mathematics program. The resulting rift in trust with parents, but also with the mathematics committee, took a painful toll, while the complications of running two programs threatened to weaken the coherence of the district's mathematics program as a whole. In another district, the curriculum director knew that not all of his secondary teachers on the committee were convinced about the decision to adopt standards-based mathematics district-wide. Admitting he was under a time crunch—he needed a decision before summer in order to register his staff for training in the curriculum—he and the superintendent chose the high school curriculum. "I underestimated the resistance of some teachers to the changes proposed by the math committee," he said. In that district, with pressure from unhappy teachers, the school board stepped in and allowed the teachers to select a more traditional curriculum. The reversal went counter to the criteria the committee established, angered parent members on that committee, and made fulfilling Minnesota Graduation Standards more difficult for both teachers and students in that district.

To be successful in tomorrow's world, today's students require a mathematics education that is not the same as the mathematics their parents and grandparents learned. And while research can guide curricular decisions, in the end, the choices about mathematics programs and methods depend on what the community wants their graduates to know and be able to do. The first step toward informing the public is to include diverse voices in the decision-making process, and then to hold them accountable for their decision in light of the rapidly changing world. Even as today's school leaders "return the work to the people," they do not abandon them, but rather, they equip them with new knowledge to inform their thinking (Heifetz, 1994).

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"The only time that Americans pay any attention to mathematics teaching is when educators try to improve it"

BATTISTA, M., 1999, *THE MATHEMATICAL MISEDUCATION OF AMERICA'S YOUTH*, PHI DELTA KAPPAN, p. 426

DISCUSSION QUESTIONS

1. What strategies/processes might you or your district leadership use to "take stock of attitudes"?
2. How might you or your district leadership ensure that all "voices" are heard in the decision making process? Who are all the "voices" in your community?
3. What is meant by "use a learning model?" How might you use a learning model in your district/community?
4. What research-based criteria will guide your decision-making process? What strategies will you use to reach consensus in your community regarding the most important criteria to use?

END NOTES: OPENING UP THE PROCESS

1. Parents' hopes for their children's mathematical learning are similar to the goals of standard based mathematics as described in these sources: In the report *Adding It Up* (2001), the editors' description of mathematical proficiency includes, among other things, the capacity for logical thought, ability to formulate mathematical problems and to explain and justify thinking, as well as a "habitual inclination to see mathematics as sensible, useful, and worthwhile" (p. 5). In *Principles and Standards for School Mathematics* (2000), NTCM 's Equity Principle requires high expectations for all students while the Learning Principle insists that students build new knowledge through well chosen tasks (p.3-5).
2. Parents' common sense about what children need reflects the practical expectations industry has for graduates. Futurist David Zack (2000) writes that what employers seek is not measured in grades. They need employees who have curiosity and imagination. Arguing that "it is the height of arrogance to impose today on tomorrow" he suggests children need to believe they have a share in the future, and they need the freedom to make mistakes (p. 10-11). In this context, mathematics programs that encourage students to become confident in their ability to tackle difficult problems and to seek multiple solutions to those problems are best preparation for a future that is yet to be written.
3. Michael Battista (1999) documents the failure of traditional mathematics. "The results of testing by the National Assessment of Educational Progress indicates that only about 13% to 16% of twelfth graders are proficient in mathematics. And according to the National Research Council, 75% of Americans stop studying mathematics before they complete career or job prerequisites" (p.426).

In a letter to California's Board of Education, Luther S. Williams, the assistant director of the National Science Foundation describes the failure of traditional mathematics education: "The wistful or nostalgic 'back-to-basics' approach that characterizes [California's] standards overlooks the fact that the approach has chronically and dismally failed. It has excluded youngsters from engaging in genuine mathematical thinking and therefore true mathematical learning, and has produced a disproportionate mathematically illiterate citizenry" (in Burns, M. 1998).
4. *The Art of Focused Conversation* (2000), edited by R. Brian Stanfield, is a very readable and useful guide to preparing conversations to focus thinking through dialogue rather than debate. Based on the principles of inquiry, the book provides a practical overview for structuring conversations, pitfalls to avoid, and 100 "model" conversation outlines for numerous situations leaders encounter.
5. See chapter 1 in the SciMath^{MN}'s *Minnesota K-12 Mathematics Framework* for a succinct presentation of the "Case for Change" and the meaning of mathematics.
6. Project 2061 of the American Association for the Advancement of Science (AAAS) has developed procedures for evaluating mathematics textbooks based on coverage of mathematics content and including, among other things, the ability of the curriculum materials to identify a sense of purpose by connecting mathematics, provide first-hand experiences with mathematical concepts, promote mathematical thinking, and be aligned with assessments. They also have published their evaluation of middle school learning materials and high school algebra programs. To learn more about Project 2061 check their web site at www.project2061.org.
7. In terms of leadership, the adoption of standards-based mathematics curriculum materials represents a quintessential adaptive problem because it requires leaders to help stakeholders align values with circumstances, where the values must change (Heifetz, p. 35). Adaptive work requires people to decide "what matters most and in what balance and with what trade offs." Inclusion of competing value perspectives may be the most essential element to the leader's success (p. 23).