Making Mathematics Happen

Teaching teams, staff development for teachers and administrators, and frequent communication are key elements of a Texas district's efforts to improve instruction without the usual loneliness of change.

If there's one thing my research has taught me, it is that change is painful. Consequently, it was with no little hesitancy that I embarked upon my most recent project. For three years I had been working with elementary teachers to promote the use of manipulative materials in their mathematics lessons. My foremost purpose was to transform the mathematical experience of the teachers with whom I was working, as my years in teacher education had convinced me of the central role of the teacher in sustaining lasting classroom change. Invariably such transformations did occur. Some, of course, were of greater consequence than others, but no matter how profound the change within individual teachers, the same complaint occurred year after year: the cry of loneliness from teachers attempting change.

Minimizing the Loneliness

Once they were doing something different from other teachers at their grade level, teacher after teacher would describe the loneliness of change. New ideas might be met with enthusiasm from a few colleagues, but most teachers encountered, at best, a polite listening and, at worst, criticism, even ridicule. I shared my frustration at this recurring phenomenon with my friend and colleague, Carol McGrevin, who has paid her dues as both an elementary school principal and assistant superintendent. She counseled: "If you continue as you are doing, you will change teachers, and those teachers will, in turn, change children, but you will not change schools. To change schools, you have to change principals, and to change principals, you need the support of key administrators in the central office."

By the time we had finished our second cup of coffee, Carol and I had a plan. We invited the curriculum coordinators responsible for elementary mathematics programs from a number of surrounding school districts to share our ideas about how to improve instruction without teachers' experiencing the feelings of estrangement that so often accompany their efforts to improve. Our plan encompassed three parts we considered essential.

First, the curriculum had to emphasize the meanings underlying mathematical concepts and operations and their relationships to one another. This emphasis on meaning would dis-

Photograph by Anne Pledger

These kindergarten students enjoy using manipulatives. They are using pattern blocks to extend patterns and make original designs.

courage the rote memorization and application of computational rules, while encouraging an understanding of what the rules mean and when and how to use them. This curricular component required strong instructional support. Therefore, to assist teachers in making mathematics more meaningful, we proposed, as our second component, staff development to help the teachers themselves become more mathematically knowledgeable. Since teachers tend to teach as they are taught, we had in mind instructional modes that relied heavily on concrete materials such as color tiles, multilinks, pattern blocks, and the like. Our plan also stressed the use of cooperative learning groups for problem-solving tasks.

The third part of our plan stressed the participation of administrators, particularly principals. We insisted upon a component for administrators, paralleling the sessions for teachers, that would focus on the support systems teachers need when they strive to learn new methods.

An Integrated Plan

We proposed to begin by concentrating the project within a single elementary school in each of the participating districts. To participate, the schools would have to commit total faculty involvement and full administrative support. By the end of the first year, after the faculty had achieved a level of competence and self-confidence sufficient to sustain their improved mathematics instruction, the school would then become a model for further dissemination of the project within the district.

Three of the curriculum coordinators in attendance that day liked our plan of action.[1] Each had in mind "the" principal who was right for the project. Our second meeting, with the principals present, was characterized by both high enthusiasm and anxious moments. We presented our proposal for creating teaching teams at each school, scheduling monthly staff development meetings, and monitoring progress between the meetings.

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Teaching teams. Each school was to establish a teaching team consisting of one key teacher from each grade and a lead teacher for the school. Each key teacher would coordinate activities at his or her grade level, while the lead teacher would coordinate activities between grade levels. We suggested that the key teachers be selected by their peers but that the lead teacher be appointed by the principal. Because the lead teacher would serve as a liaison between the principal and the other teachers, he or she would need good rapport with both. We stressed that interpersonal skill, not mathematical background, was the major consideration for both key and lead teachers.

The purpose of the teaching teams would be to ensure curricular coherence as well as peer group support and cooperative learning during implementation. The team structure would enable us to identify problems early and to intervene where possible. Most important, the structure would, we hoped, promote camaraderie among the teachers and thereby avert the sense of isolation so often felt when teachers attempt serious instructional changes.

Monthly staff development. During the year the key teachers and the lead teacher would receive 54 hours of direct instruction, while substitutes covered their classes. Also participating in these all-day sessions once a month would be the school principal and the curriculum coordinator. They would spend half of their time with the teachers, learning about the project's underlying philosophy and becoming familiar with the strategies and activities the teachers would be using in their classrooms. The other half of the day, spent with other administrators, would be devoted to developing support systems for teachers, such as appropriate modes of staffing and scheduling.

Sharing ideas and monitoring progress. Back at their schools after each meeting, key teachers would share what they had learned with the other teachers at their grade levels, encouraging them to try a variety of activities and to relate their successes and difficulties. Once a week, the key teachers would meet with the lead teacher to share what was happening at their grade levels. The lead teachers, in turn, would meet weekly with the building principals and, on occasion, with Carol and me, to discuss classroom use of the mathematical concepts and activities learned during staff development days.

After we presented our plan, the principals expressed some reservations. To alleviate their concern about leaving their schools for a full day each month, we agreed that assistant principals could on occasion fill in for them. The principals were also hesitant about having so many teachers out at the same time. We stressed the importance of treating teachers as professionals and affording them the same kind of on-the-job training other professions offer. Within a week we received word from all three principals that their schools were committed to the project.

Getting Started

With funding received under the Educational Economic Security Act (EESA), Title II, we purchased manipulatives for every grade level in each of the three schools and a small library of reference books. We were ready.

We held the monthly staff development meetings at Texas Christian University. The teachers and administra-

Photograph by Carol McGrevin

Principals play an integral role in assisting change in a school. Shown here with a student is Sue Boothe, principal of Keller Elementary, who plays a visible leadership role in instructional development at her school.

tors valued the time spent together traveling to and from the university and sharing an extended lunch. During the normal course of a school day, opportunities to chat informally rarely occur. As the project progressed, we came to relish these gatherings more and more. Since the teachers represented all grade levels in a school, their shared reflections helped them develop their understanding of the school's entire mathematics curriculum. They rose above the old tendency to want to hear only what applied to a specific grade level.

We met for a total of nine full-day sessions during the 1988–89 school year. The first few months were confidence-building time. I spent many hours in classrooms showing teachers how to use manipulatives (and sometimes how not to use them). Nothing was left on shelves for very long. Every manipulative got some exposure to kids, and the teachers were exploring right along with their students. Carol was in and out of the offices of the principals and the central office coordinators, offering support and suggestions.

As the key and lead teachers grew more comfortable with manipulative-based mathematics instruction, we encouraged them to share more with other teachers in their schools. Eventually we suggested that they become the demonstration teachers, and the administrators even took over classes on occasion so that key teachers could work in other classrooms. Each meeting brought stories of new breakthroughs (and a few breakdowns). There were cheers and tears. It wasn't always easy, but we were learning from each other.

Team Building

Perhaps the most difficult lesson for most of the teachers was learning how to lead their peers. Not every teacher exhibited enthusiasm for the project. Some had seen one project too many and were simply waiting for the perceived bandwagon to move on without them. Others were apprehensive about "doing everything right," where "right" translated to a preoccupation with what would happen to their test scores. Still others, who had misgivings about their own math backgrounds, were fearful that someone might discover their carefully guarded secret. Everyone—key teachers, lead teachers, and administrators—spent more than one sleepless night as they struggled with how to make the project work. Carol and I faced the dilemma of how to get the key teachers to share what they were learning without being overly self-conscious about their instructional role. As it turned out, the teachers themselves produced their own solution when they asked us how to talk with parents who wanted to know more about the project. We suggested that they let the children do the explaining within the context of a "math night" for parents.

Soon math night evolved into a full day, with grade levels competing to design the most interesting activities and displays. At every turn, the key teachers were asked to make suggestions, provide clarification, demonstrate, elaborate, coordinate. The grade level teachers began to gel into teams, with the key teachers leading the way. The parents were impressed—and so were we.

The success of math day led to greater openness in exchanging ideas. Manipulative materials moved more easily from classroom to classroom, as did the teachers themselves. The principals soon got into the act, deciding that their school boards needed to know more about the project. The presentations they designed were met with an enthusiasm reflecting their own. Camaraderie had indeed been established—teachers and administrators were a team.

The Winds of Change

Of course, not every event was as satisfying as math day nor as successful as the board presentations. The project proved to be a season of both wins and losses, victories and defeats. Sometimes the winds of change blew one way, sometimes another. A symmetry, however, began to emerge. Kim Blair, a lead teacher, expressed it this way: "People on this campus 'talk math' all the time . . . it has become a common (and exciting) bond. There is sharing among teachers that has never before occurred to this extent."

There are still a few teachers in the three schools who experience loneliness and isolation, but now they are those who have *not* changed. The loneliness of change has become the loneliness of the status quo.□

[1]Three school districts in the Dallas-Fort Worth metroplex area participated in the project: West Birdville Elementary in Birdville ISD, Cannon Elementary in Grapevine/Colleyville ISD, and Keller Elementary in Keller ISD.

Kathleen Martin is an Associate Professor, Department of Curriculum and Instruction, Texas Christian University, P.O. Box 32925, Fort Worth, TX 76129. **Carol McGrevin** is an Associate Professor, Department of Educational Leadership and Policy Studies, University of Northern Colorado, Greeley, CO 80631.