

**Schools as the Unit of Change: Principal Roles in the Support  
of Parental Involvement in Mathematics Reform**

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Mathematics education reform has been under fire from different camps over the last decade. Since the *NCTM* published its updated version of the *Standards and Principals for Reform (2000)*, schools and communities have often continued to disagree about the goals and processes for improving mathematics education. Some districts have not informed or educated their staff and parental community about the need for reform or the content of new adoptions. Because of this lack of communication, some reform movements have failed, despite their good intentions to embrace the *Standards*. As this symposium suggests, there are some hopeful stories out there and ideas which have given researchers, teachers, principals and parents alike a reason to expect that the “Math wars” will not end with more student casualties. Clarke (1994) set the stage for our symposium focus on schools as a unit of change in mathematics education with her argument that professional development should include groups of teachers and should incorporate the support of administrators, students, parents, and community members. Research documenting these kinds of collaborative efforts to engage all stakeholders in efforts to reform mathematics education in schools is limited, although a number of authors have furthered our understanding of the relationship between mathematics education reform and professional development for teachers (Ball & Cohen, 1999; Campbell & White, 1997; Stein & Brown, 1997) and some have written about the importance of engaging parents actively in programs to improve mathematics education (e.g., Peressini, 2000).

A conundrum frames mathematics education reform efforts in many schools today. On the one hand, we have documents such as the *NCTM (2000) Standards and Principals for Teaching Mathematics* that articulate a rationale for new approaches to teaching mathematics which focus on developing mathematical understanding through problem solving and inquiry. On the other hand, there is a continuous push toward raising test scores, that educators and others translate into a need to de-emphasize “time consuming” efforts to develop understanding in mathematics and return to a focus on memorizing and learning procedures. Ultimately students and teachers are caught in the crossfire between the goals of maintaining or returning to traditional methods to raise test scores, or learning mathematics conceptually in order to improve performance. It is not surprising that controversy arises regarding mathematics education reform. Teaching

mathematics for understanding not only challenges student thinking but also challenges policymakers' and educators' views of teaching and learning.

In today's highly politicized and often polarized educational environment, principals, teachers, parents, and students can often feel isolated, frustrated, and confused about how to move forward toward an ambitious goal such as improving mathematics learning for all children (Alleksaht-Snider & Hart, 2001). Principals, in particular, have been identified as pivotal players in facilitating innovation, communication, and learning in relation to mathematics curriculum reform (Goldsmith, 2001; Loucks-Horsley, Hewson, Love, & Styles, 1998; Neuman & Mohr, 2001). In the following study, we examined the potentials and challenges identified by principals engaged in a collaborative project with parents and teachers that had a goal of improving mathematics learning for children in K-12 schools with high numbers of Latino students.

### **Introduction to MAPPS<sup>1</sup>: Math and Parent Partnership in the Southwest**

The MAPPS project is a 4-year, K–12, NSF-funded project developed by principal investigators Marta Civil and David Gay of the Dept. of Mathematics Education, University of Arizona. It is a family involvement program currently being implemented in Arizona, New Mexico, and California. MAPPS is based on three principles. The first principle comes from the National Council of Teachers of Mathematics (NCTM) standards that stress raising parents' awareness of the fundamental changes recently made in mathematics teaching and learning. Second is the theory of social constructivism in which the learner has an active role in creating knowledge and learns through hands-on group activities. The third and last principle that framed the development of the project comes from the concept of dialogic learning in which knowledge is co-constructed and built on the relationships of people who form a learning community in which everyone contributes equally (Flecha, 2000). These three principles underlie the curriculum development and implementation of the three major MAPPS components: Math for Parent Mini courses (MFP); Math Awareness Workshops (MAWS); and Leadership Training Sessions.

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The project has been implemented at the pilot site in Sunnyside Unified School District in Tucson, Arizona, for four years. Each of the satellite sites in San Jose, California, Las Vegas, New Mexico, and Chandler, Arizona has had two years of project implementation. The student populations in each of these sites incorporate high numbers or a majority of Latino students, in addition to high numbers of bilingual families, most of whom speak Spanish and English. Over four years, a total of 245 parent leaders, 83 teacher leaders, and 13 administrators have participated in leadership teams that collaboratively planned and facilitated the presentation of approximately 200 MAWS at approximately 35 school sites. Parent leaders (and in some cases teacher leaders) as well as parents from the general public have attended a total of 30 MFP mini-courses, each of which included 8 two-hour sessions. Parent and teacher leaders and administrators have participated in about 100 different leadership training sessions over the four years.

### **Methods of the Study**

Five principals who had been identified at three of the four sites for the Math and Parent Partnership project as active participants in their leadership teams were each interviewed once in an effort to better understand the roles of principals in the project. Their perspectives on the work with teacher and parent leaders as well as the courses and workshops for parents and families were sought. Five, out of a total of 13 principals who participated on leadership teams over the four years of the project can only be seen as partially representative of the total group, but they do offer us some clues about areas of interest to pursue with further in-depth study. Principals were interviewed by evaluation and project staff while participating in the project. The interviews lasted from 45 minutes to an hour. All interviews were audiotaped and several were also videotaped. Content and constant comparative analysis was conducted in order to identify common and contrasting themes that emerged as the principals shared their perspectives. The research question we investigated was: What roles did principals see for themselves as participants in leadership teams with parents and teachers in the Math and Parent Partnership in the Southwest project?

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## Principals' Perspectives on their Roles in a Parent Partnership in Mathematics Education

When principal investigators, professional developers, district personnel, and evaluators began their work with the Math and Parent Partnership in the Southwest project in 1999, we hoped and expected that parents would find the workshops with their children and the mini-courses in mathematics to be valuable learning experiences and to support their desire to help their children in mathematics. We were unsure about how the project component that involved developing collaborative leadership for mathematics workshops among parents, teachers and principals would be viewed. Since there were no previous roadmaps, we learned during the process of doing the project about how to develop the leadership and mentoring components. When we started, although we had some hunches, we were also unsure as to what, specifically, the parents and others would find valuable about the mathematics workshops and courses and the leadership experiences. Marta Civil has written elsewhere ( ) and is presenting here at the NCTM Research Presession with other colleagues ( ), about some of the lessons we have learned regarding parents as adult learners of mathematics and parents as collaborators in mathematics education reform. Emily Bernier and Martha Allexaht-Snyder are presenting research at the American Educational Research Association meeting in Chicago that investigates teachers experiences in the leadership component of the Math and Parent Partnership in the Southwest project. As we investigate the perspectives of principals involved in the project, it is interesting to note that some of their experiences and perspectives parallel those of the diverse group of parents who have been involved in the project as parent leaders over the four years. There are also notable parallels and some contrasts between the perspectives shared by teachers and principals.

### *Expanding Roles as Learners and Teachers*

Carl Gonzalez, an elementary principal from Las Vegas, New Mexico, helped us to see that not only parents and teachers valued supportive opportunities to learn mathematics as adults, but so did principals. Carl stated clearly that he enjoyed taking on the role of a learner of mathematics.

What I've liked about [the MAPPS activities] is that I can kind of live down my role. Here [in the school] I'm supposed to be the educational leader, and over there, I'm not the leader, I'm just learning like everybody else. It may come a little bit easier to me than to some, but I don't have to be "Mr. Know-it-all" and it's kind of nice. . . . It's great to be a learner...it allows me to let down and to become the other side of the coin, if you will.

Herb Schneider, an elementary assistant principal from Tucson, Arizona, echoed Carl Gonzalez' view that he valued opportunities to be in the role of learner of mathematics. As he contrasted previous experiences in Family Math Nights with recent experiences with the Math and Parent Partnership program, he highlighted his experiences learning with parents.

One of the strongest differences I've seen ... is that we're learning too. Instead of us being professionals knowing all the answers and presenting the lesson, we're right there with the parents learning together.

Ruth Smith, an elementary principal from Tucson, saw value not only in learning with the parents and children, but also commented on the opportunities to learn from interacting with the children during Math Awareness Workshops. She valued the chance to see what students were understanding about the mathematics she hoped they were learning in school.

When I go to the presentations, I try to sit down with the parents or the teachers and try to get them to do the math. Because a lot of times, the principals will stand in the back or just kind of absorb, so I really try to do the activities. It has been a really nice time to get to know the kids and talk about if it relates to [what they do] in the classroom, if they've done it before, if it's transferring over into the classroom. Some of the skills I expect that they would have received already, and we find that they haven't. It gives me a better awareness of what's going on in the classroom.

Ms. Smith also found that her active participation as a member of a MAPPS leadership team allowed her to see parallels between the mathematics curriculum of the workshops for parents and children and the mathematics curriculum they were using in her school.

I think [the MAPPS program] is pretty parallel, it's pretty similar. I've seen a lot of activities they've done. I know they've done it in *Target Teach* (it's part of the Marilyn Burns) and it's a way that a lot of teachers have had a lot of training on. The good thing is that it does transfer and the kids do seem pretty successful with the MAPPS project because there are things that they have some background knowledge to.

In addition to taking on roles as learners of mathematics, principals talked about taking on roles as teachers. Sam Pope, an elementary principal from Tucson, spoke eloquently of the importance he attached to the opportunity to teach as part of a leadership team that facilitated Math Awareness Workshops (MAWS).

Participating and teaching at the MAWS is a lot more fun than other things I have to do during my day, so I really look forward to it . . . It's a collegial effort, something [the teachers] do every day, but it also gives them a chance to see me in a role that they're not used to seeing me in every day.

Mr. Pope spoke of feeling like he could be a "different kind of principal" as he co-taught with teachers in the MAPPS project, because he still sees himself as a teacher and he still loves teaching math.

Each of the four principals quoted above imply with their comments that an important aspect of the collaborative partnership program in mathematics education has been the opportunity to take on roles as learners and teachers. They see these roles as allowing them to expand beyond what they seem to view as the traditional limitations of the school administrator's role.

*Supporting and collaborating with teachers and parents*

Herb Schneider, one of the elementary administrators, suggested that principals should not separate themselves from the instructional part of the MAPPS program. He argued that if administrators “have their hands in it and are teaching,” it helps to develop rapport with the staff, who know then that “you’re in there with them, working as a team.” Sam Price agreed, saying that, “The MAPPS [approach to leadership] matches my leadership philosophy, which is a shared leadership philosophy. This gives me an opportunity to walk the talk.” He and others spoke of preferring a style of working as a team and sharing responsibility for the work of the school. In addition to these general comments about principals’ roles in promoting shared leadership and teamwork with teachers and parents, Carl Gonzalez spoke specifically about reaching out in providing support to parents whom he hoped would become involved in the Math and Parent Partnership activities.

Basically, I [encourage involvement], I explain to parents who don’t know anything about MAPPS, I use it as a resource. If I feel that the child is having problems in math, I bring the parents into my office and I say, “You know, we’ve got this great program. It’s going on at a different school, but it’s for the whole district, it isn’t just strictly for that school.” And I explain what the program does and how it will allow the parent to help the child. Because a lot of my parents will come in and say, “I don’t know what to do with Johnny- he’s having trouble in math and I can’t help him.” And I say, “Yes, you can, because we can help you, and in turn you will be able to help some other parent in the future.” So, I use it as a resource and any time we have IEPs or SAT teams, Student Assistant Teams, and it comes up that the child is having problems in math, Bingo, there’s the connection right there. So, yes, it is a resource and we do refer—we have quite a few of our parents in the MAPPS, yes.

In another statement of the how he sees his role of supporting parent and teacher leaders in the MAPPS project, Carl Gonzalez reiterates the idea of an alternative role for principals to that of an authority figure. He suggests that principals need to take on a role of being a member of a team, or as he puts it “one of you guys.”

I think the role of the principal in the MAPPS project, and this is my opinion, is that it should be kind of to fade back, get into it, but not into the authority type of, “I’m here to make sure you guys do a good job.” No [instead], “I’m here to be one of you guys, to know that I don’t know all of the answers either, but I feel that this is important enough that I come into it to show you that, hey, I don’t have all the answers. I’m willing to learn just like you as parents and teachers are.” I think that we should be able to fade back from being authority figures.

The above set of comments from elementary administrators shows them extending the idea of the value of their roles as learners and teachers. The principals report using the alternative roles to convey messages about their support for parents and teachers and to enact their views of the importance of shared, or collaborative, leadership in schools.

*Valuing parents as intellectual resources and recognizing their leadership potential*

One of the unique features of the MAPPS project is its assumption that parents of diverse educational and linguistic backgrounds will be able to learn mathematics to support their children’s learning and will be able to collaborate with teachers and administrators in teaching other parents. Several principals spoke of the ways in which they saw the goals of the project complementing their own views of the instrumental role parents can play in promoting their children’s education. David Minot, principal of a San Jose, California, high school serving mainly children of recent immigrants, stated this point of view as follows:

I’m delighted with the program because it promotes what I call an “untapped resource” in reaching our students. The challenge we have with many of our families and students is convincing them about beyond high school, the post-secondary options. We’ve tried various schemes over the years of how to promote post-secondary options with students. We felt, after lots of observations, that one area that we haven’t been reaching into very well, or tapping, was our parents. We felt that by directly involving the parents in more educational experiences with the school, that it would be easier for us to make inroads with our college services. So that’s how the interest has grown.

Carl Gonzalez reflected this same view of all parents as having potential as intellectual resources in their children's education.

I think everybody has something to contribute and parents need to know that. Parents need to know that teachers are not the sole source. We stress that a lot in our IEPs and our SATs: "You guys are the first teachers, you've got them for five or six years before we even get them. The kids learn so much more from you. And so what you're doing with keeping up with their learning is just being a good parent basically."

Parents being prepared to tutor their children in mathematics is a goal Herb Schneider, assistant principal in Tucson, sees for his school's involvement in the MAPPS project.

MAPPS courses have a lot more hands-on specifically built into it. They're also more designed to be able to work with the parent and the child on the hands-on activities. Here in the school, it is more the teacher dealing almost exclusively with the student. The nice thing with the Math Awareness Workshops is that the parents can use the skills they've learned and in a way become a tutor for the child. So it's more like teaching a teacher, is what it feels like. It's getting the concept across, but also providing activities that they can continue that activity with someone else, and not just for themselves.

Mr. Gonzalez, a principal from a different state than Herb Schneider, extended this theme of seeing parents as resources for their own children's learning. He considered the possibility of a tutorial program in mathematics that could be taught by parents and would offer learning opportunities for other parents as well as children.

What I'd like to see in the future—I've been kind of toying with this idea—is making a parents' room. Let's say this room, we would call it the PTO room, where the parents could come in and maybe tutor to the point where, not just students but other parents [could be tutored]. If you have some housewives that have time, maybe 10-12, and they're not as honed up on their math skills as they think they should be, hey, this would be a great place to do it. And I think once we can get those parent-teachers coming in, the other people [will see] that school

isn't such a threatening place after all. "She's just a parent and she's teaching, why can't I?" And we're hoping that it will flower out into all kinds of different types of tutoring programs, if you will. The degree is great and everything, but then you've got people that can have a degree and can't teach worth a hoot, and then you've got people with no degree but they've got the knack for teaching. And I think a lot of those [parents] in the MAPPS program, they're going to see that they turn out to be really good teachers of [parents who can be] teachers [too].

The principals quoted above appear to be inspired by their collaborative work with teachers and parents in a partnership for mathematics education. They are considering new roles for parents that others often dismiss as either not caring or not able to help their own children learn, much less help other parents. Herb Schneider spoke of the teachers and parents at his school beginning to see the leadership potential of parents. He commented: "It's nice to see the parents take the role of instructor with other parents." Mr. Schneider suggests that the staff at his school have enjoyed having more interactions with parents, sitting side-by-side with them in workshops and training sessions. He has seen that "parents are feeling like they are more on common ground with the teachers" and they don't feel in such hierarchical relationships as they have felt in the past. Mr. Schneider have seen parents and teachers developing a sense of commonality, saying, "We're in this together and how can we use this to help students?"

*Building relationships with families and providing support for students' learning of mathematics*

In addition to viewing parents as important intellectual resources for their children's learning and potential leaders in mathematics education in collaboration with teachers and other parents, principals in our study saw another important role for themselves in the context of the mathematics partnership program. They saw part of their work in the program as being to build relationships with families so that families could support students learning of mathematics. Sam Pope states succinctly, "I saw the program as a vehicle to expand parental involvement, while at the same time helping students." He

adds that his vision for the project is that he wants to see a broad base of parental involvement that has an effect on student achievement. His hope is that parents will become more able to help their children with mathematics and feel more confident themselves about mathematics. Herb Schneider adds that the principal's role in building relationships with families so is to make them feel welcome at project activities by greeting them by name, and making sure they are comfortable and have all the information they need. Mr. Schneider sees that children are motivated to participate because they feel good about working with their parents on math activities- he sees the key partnership being that of parents and children. Another key to building relationships with families that he sees as important is the long-term nature of the project. Administrators can let parents know that the workshops are not one-time only, but will be part of a series.

David Minot, the high school principal from San Jose, California, spoke of the importance of offering workshops and training in parents' native languages.

Well, for all our parent groups to be able to provide it in the appropriate target language has worked out the best. Whether it is for the Cambodian speakers, the Vietnamese speakers or the Spanish speakers, it definitely does work well—obviously it's the language of comfort.

Minot also speaks of the challenge they have in developing mathematics curriculum and pedagogy for parents of high school students that provides access and support to parents from a wide range of educational backgrounds. He argues that the goal is not to teach parents the high school mathematics curriculum, but instead to increase their knowledge of what to expect from their children and increase parents' confidence in talking to their children about their schoolwork.

[The content of the mathematics curriculum for high school parents is] probably the hardest challenge because our families come with a multiple level of skills. Some of our families come with the most basic, their educational opportunities haven't been as...compared to the students we are having now, they can't even compare. So that has been a challenge. . . . But we do know that we have

involvement. The parents can go home and at least get a sense or notion of what schooling is about at the high school level and be able to ask the children, “I know you must have homework because I was in this class here. And I was learning these concepts, and I was told I would have homework, so I would expect you would also.”

Carl Gonzalez, who comes from the relatively small town of Las Vegas, New Mexico, describes his role in building relationships with families as starting with creating a non-intimidating atmosphere at school and then extending beyond the school doors.

The staff that they’ve got working for them, they get down to the parents’ level, down to my level which, I’m no math whiz. They have been very helpful, very, very helpful. They make it enjoyable, kind of a homey thing, like getting together with neighbors and stuff like this, rather than the teacher/student thing. And I think that with a lot of our parents, anyway, when they went to school, school was an intimidating place, and I think to a lot of our parents it still is. Maybe they didn’t have a great experience at school, and school was supposed to be “the word” coming down from school, rather than being a place where you can come in and enjoy yourself, if you will. That happens on a Thursday—I see some of my parents and you can tell that they’re very relaxed. They come in and they’re even more relaxed than when they come in and talk with me. If I see them coming in I’ll talk to them, because we want to see our parents not only when the kid does badly, but also when he does well.

Beyond the school doors, Gonzalez sees his role as responding enthusiastically, and with his own participation, to parents’ motivation for participating in the mathematics partnership work.

I got stopped at the filling station the other day by Mrs. Lucero. And she attends [MAPPS] and she says, “We missed you Thursday night.” Then she says, “But this is what we’re going to be doing on Thursday. Then we’re meeting on Saturday also.” And you could see that she was very excited about it. And so, I

figure, “Hey, little David, who I have, is going to see the results of that, the fruits of that.”

Finally, Gonzalez points out that relationships can be built with all family members who can support children’s learning, including grandparents.

We had a grandmother that was very positive. In fact, we lost her—she moved off to North Carolina, but she came and she was very vocal about it because she had a kindergartner and a second grader. She was having problems teaching the second grader math. She got into that and she kept telling me, “Hey, this is great. Now I know what the teacher is talking about.” And I said, “Hey, that’s great.” Very energetic for being a grandmother. And we’ve got a lot of cases where grandparents are bringing up kids and they’ve been out of school so long the “new math,” can be very threatening. She had a great time and she was very vocal about it. She thought the world of the program. It’s too bad we lost her.

Both high school and elementary principals outlined roles for themselves in supporting the design of their mathematics partnership programs so as to build relationships with families and help families to see themselves as having important roles in helping their children be successful in learning mathematics. From structuring activities to involve parents and children together, to offering workshops in parents’ native languages, to reaching out to grandparents and making parents who may have been unsuccessful in school feel comfortable, principals articulated a number of strategies they recognized as making a difference in reaching out to families.

*Developing a shared vision for mathematics education and partnership with parents  
across schools in the district*

A final aspect of the partnership in mathematics education work that the principals discussed is quite interesting in view of our symposium focus on schools as the unit of change in mathematics education. Principals spoke of seeing a sense of shared vision for mathematics education and partnership with parents developing at their schools. They also spoke, however, of appreciating the sense of community across the district as a

whole that they, their staff, and their parents were developing through participating in the MAPPS project with teams of parents, teachers, and administrators from other schools. Principals valued the opportunity to have teams from other schools present at their school, and to visit other schools themselves. Sam Pope stated that the opportunity to work with teachers from different schools around the district had been “fulfilling.” Herb Schneider articulated the sense of a shared vision developing among parents and teachers across school levels in the district as follows:

It’s been very positive because we’ve actually been working more together than we normally would. We’re seeing [teachers and parents from other schools teach], they’re interacting with our parents, which wouldn’t normally happen. We’re visiting the Math Awareness Workshop sessions at their schools, we’re interacting with their parents and staff. So it’s actually working at a district level, getting us familiar with each other, which is really a nice plus from it. . . . [It’s been good] to see how it’s going and see what it’s going to look like for us in a few years. It’s kind of like an older brother or sister you get to see what happens in a junior high or high school. So it’s been really nice that way.

Mr. Schneider adds that an important part of the MAPPS project as a whole for him has been the whole-project district-wide leadership training meetings when all parent, teacher and administrator members of leadership teams come together.

“I’ve been very impressed with the number of times we get together to learn and to celebrate the successes. I think it’s important. Too many programs don’t take the time out to say, “Look what we’ve done!”, acknowledge the successes, and [then say] “Look where we’re going.”

## **Conclusions**

Nuemann’s and Mohr’s “Principles for Principals Improving Mathematics Education” and MAPPS Principals’ Perspectives: Intersections and Breaking New Ground

*Neumann’s and Mohr’s Roles for Principals*

Articulator of Core Values

Advocate (with parents and community members)\*

Promoter

Designer of Collaborative Learning

Catalyst

Lead Learner\*

Navigator

*Neumann's and Mohr's Roles for Principals*

Understand the local and national picture

Listen to all voices

Determine what is really important

Examine any new curriculum materials and teaching strategies

Learn through providing and participating in professional development

*MAPPS Principals' Perspectives\**

Teacher

Supporter and Collaborator with Parents and Teachers

Advocate for Parents as Intellectual Resources and Leaders

Builder of Relationships with Families

Developer of Shared Vision for Mathematics Education and Partnership with Parents

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