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PROFESSIONALISM AND POLITICS IN HIGH SCHOOL
TEACHING REFORM

ABSTRACT. This paper takes the case of math education reform in California to analyze problems and prospects for reforming high school teaching. The experiences of three math departments reveal the profoundly political nature of high school mathematics reform. First, changing math instruction means rejecting established norms for professional practice in mathematics and in teaching more generally. I argue that radical teaching reform depends upon professionalism and sustained commitment of teacher communities, as well as on the knowledge of reformed practice they generate. Second, successful reform engages politics beyond the teaching profession, as the California "math wars" attest. After describing the course of organized opposition to a reformed high school math department, I examine the rhetoric and vested interests that figure prominently in parents' mobilization against mathematics reform. The analysis brings into focus the dual problems for high school teaching reform of changing professional practice and engaging political opposition to educational change. The stunning success of anti-reform politics in American mathematics education highlights the importance of activist professionalism in teaching.

INTRODUCTION

The press for high school teaching reform comes from mounting evidence that conventional instruction fails many students and fails to promote the higher-order learning outcomes sought by Western societies. Typical high school classrooms – in which a teacher lectures, students memorize text and lecture notes, and examinations assess student recall – yield weak and uneven educational outcomes. Students neither remember long the knowledge learned for tests nor do they learn the deeper content understanding and analytic skills required for higher education and the modern workforce. The kinds of learning environments needed to achieve these education goals, described in a recent National Academy of Sciences report (Bransford, Brown & Cockings, How People Learn, 1999), are a far cry from routines of high school teaching. The development of reform standards in the core academic subjects over the past decade addressed this disjunction between research-based knowledge of good education practice and instructional realities in American classrooms. For example, professional standards for mathematics education developed by the National Council of the Teachers of Mathematics (NCTM, 1989, 1991, 1995)
call for instruction that builds students’ understanding of mathematical concepts and strategies for applying them to real world problems.

Research on instructional reform includes a significant line of analysis on mathematics education. Analysts emphasize the fundamental changes in teachers’ conceptions of mathematics, student learning, and effective math teaching that are entailed in achieving math education reform. The kinds of learning opportunities that appear to make a difference for teachers and teaching are practice-based, extensive, and embedded in a community of practice that reflects and collaborates on instruction (Ball & Rundquist, 1993; Heaton & Lamport, 1993; Shifter & Fosnot, 1993; Stein, Silver & Smith, 1998). Recent research highlights on-site teacher “learning communities” as critical contexts for developing teachers’ understandings, skills, and identities as reform mathematics educators (Stein, Silver & Smith, 1998) and for designing teaching practices and programs effective with all students (McLaughlin & Talbert, 2001). Exemplars of strong reform mathematics communities demonstrate the power of collaborative professional practice to achieve the quality and equity goals sought by reform education standards.

Ironically, the effectiveness of some math teacher communities in reforming instruction has placed them at risk of political attack from a growing anti-reform movement. The political nature of math education reform, largely ignored in the research on teacher learning and change, has come into focus. Organized opposition to mathematics reform threatens not just the integrity of reform instruction but also teachers’ professionalism and commitment to teaching in the reform mathematics community under attack. This paper addresses the political meanings of practice in reforming math communities—the professional rules that these teacher communities break and the vested interests outside of K–12 education that they challenge. I first highlight the ways in which reforming math communities challenge traditions of professional practices and strengthen teacher professionalism. I then describe the course of anti-reform politics in middle-class communities and the rhetoric and threats that appear to mobilize parent opposition to reform math education.

This analysis draws upon research that colleagues and I conducted over the past decade with reform-oriented mathematics departments in three high schools—Esperanza, San Lucio, and West Valley (all pseudonyms). The schools are in different districts in California, sharing a state policy environment known for its leadership in math education reform and for spawning the national anti-reform movement. Our research in Esperanza’s and San Lucio’s math departments during the 1990s revealed the ways in which these teacher communities questioned and rejected sacred traditions in math education as they worked to make higher-order learning in mathematics a reality for all students in their school. Current research with West Valley’s math department, as well as my participant observation as a pro-reform parent during the Palo Alto, California math wars of the mid-1990s, reveal the conditional and precarious nature of these teacher communities’ reform practice, professional authority, and professionalism.

The course and consequence of anti-reform mobilization in California and elsewhere in the U.S. makes clear that parents and public have ultimate authority to set the terms of American education, over-riding that of the teaching profession and bureaucracies. I take up the issue of effective professional response to lessons from California math education reform, suggesting that activist professionalism (Sachs, 2000) may be an essential vehicle for education reform.

THE CALIFORNIA CONTEXT OF MATHEMATICS REFORM

California was a forerunner in the movement to establish research-based system standards for education in the disciplines. The state’s 1985 mathematics framework was based on reform principles grounded in research on learning and championed by national and state mathematics educators. This cutting-edge state framework anticipated the publication of national curriculum standards for K–12 mathematics (NCTM, 1989). The revised 1992 California math framework closely resembled the NCTM Standards and deepened the state’s commitment to mathematics education reform. The relatively long history of mathematics education reform in California clearly supported change in classroom instruction, albeit slowly and unevenly across districts, schools, and classrooms. Research on elementary math teaching in California during the late 1980s and early 1990s documented through longitudinal case studies the considerable challenge to teacher learning and change in practice posed by the standards (EEPA, 1990). A 1993 statewide survey of elementary grade teachers found that some kinds of professional development opportunities predicted change in teachers’ reported beliefs about math teaching and learning and their teaching practices. Professional development that was sustained and organized around reform mathematics principles and curricula appeared to make a difference in both teaching practice and student success on the state’s CLAS assessment aligned to reform math standards (Cohen & Hill, 2001). Other research documented the key role that teacher collaboration in a school or department played in bringing about the changes in beliefs about effective math instruction and teaching practices that the state’s
for mathematics has moved to national scale, as anti-reform leaders and organizations extend their networks to other states and districts with reform math standards and programs. The mobilization of anti-reform sentiment and efforts has been aided significantly by the websites of organizations established during the mid-1990s—most notably the HOLD (Honest and Open Logical Debate) group founded in Palo Alto, California in early 1995 and Mathematically Correct founded in San Diego, California later in the same year (for extensive discussion of the California math wars see Becker & Jacob, 2000; Rosen, 2000).

Arguably, the political and professional conditions of K–12 mathematics education in the nation today—in which some of the strongest reform-oriented math teacher communities are under assault—result from California educators’ success in reforming math education over the course of roughly fifteen years. The policy system legitimized reform standards for mathematics education and invested in teacher learning opportunities, encouraging educators to significantly change the way they thought about and conducted mathematics instruction. However, the California policy system was able neither to reliably implement its math framework nor to sustain the reform practices that it authorized and encouraged. Local schools and teacher communities more or less took up the hard work of reform. Their reform success depended on teachers’ commitment and courage to break norms of professional practice and, in some cases, to engage political struggle with their communities.

**REFORMING PRACTICE IN HIGH SCHOOL MATH DEPARTMENTS**

High school math reform is as much a problem of professional politics as it is a problem of teachers learning new teaching principles and practices. The reforming California math departments we studied clearly were not enacting codified bureaucratic or professional standards. Rather, they were pursuing a shared commitment to ensure that their students were successful in mathematics. In doing so they rejected values, assumptions, structures, and routines of math education that had been institutionalized in their school and are prized in American education. Recognizing the politics of high school reform within the profession is essential to understanding both the problem of change—and why math department communities are critical contexts of reform—and the problem of sustaining change in the face of public attack.
Why department community matters in high school math reform

The reform of mathematics programs, curricula, and instruction entails significant challenges to education traditions. A critical role that teacher community plays in reforming high school mathematics is to provide political support for radical professional practice. Collegial support for breaking norms of practice in order to improve learning outcomes for all students is pivotal to teachers’ progress on reform—especially in high schools and especially in mathematics.

Initiative and sustained effort

In all three reforming math departments, the initiative and sustained effort to change practice is grounded by teachers’ commitment to serving their students. In two of the departments, impetus came from dramatic evidence that traditional modes of instruction were not successful with the students in their school. In Esperanza High School, the math teachers witnessed a precipitous decline in their students’ success in the wake of their district’s court-ordered desegregation in the mid-1980s. Realizing that their traditional texts and teaching routines were not successful with the majority of the school’s bused-in students, math teachers began to examine their practices and to work together to create new instructional materials and approaches. Likewise, San Lucio’s reform math culture has its roots in a 1980s WASC review documenting that students felt they couldn’t learn in their math classes. The math department launched a reform effort that continues through the present.

Teachers’ community of practice was essential to the progress departments made on instructional reform. In Etienne Wenger’s (1998) terms, each developed mutual engagement around shared goals and standards for improving the quality and equity of student learning in mathematics, joint work and inquiry focused on improving their instructional practices, and a shared repertoire of teaching practices and resources. Teachers worked collaboratively to improve their department’s program, to develop better courses, to improve their instruction of particular mathematical concepts, and to achieve all students’ facility and conceptual understanding in mathematics. Discussion of how reform math department communities learn to construct practice is beyond the scope of this paper, but the literature includes powerful examples of both the process and outcomes of department reform (Boaler, 1997; Guittierez, 1996; Lieberman, 1997).

In developing strong reform communities of practice, these mathematics departments challenged an array of conventions in K–12 education and in math education particularly. They rejected prescriptions for education practice that constrained their success with all students and that inhibited innovation; instead, their progress on reform depended upon taking a deviant stance on math instruction. While the policy community and those who study how teachers learn reform practices often overlook this fact, the experience of reforming math departments makes visible the professional politics of education reform.

Breaking rules of professional practice

Reforming math departments challenge traditional standards for mathematics education and for teaching as a profession. Table I highlights broad patterns of practice that distinguish reforming math departments from traditional math departments that we and other researchers have studied (McLaughlin & Talbert, 2001). The “deviance” of these professional communities implicates their instructional practices, career cultures, and professional identities and relationships.

Rejecting canons of mathematics instruction

In order to engage all of their students in challenging mathematical content, reforming high school departments question and supplant traditional routines of math content and program organization. An Esperanza math teacher commented, for example:

We used to have a Basic Math Lab, and what we found out is the same thing that people are finding out everywhere: kids have done fractions for five years, they couldn’t care less about doing fractions—so why don’t we do something with them?

These departments redesign courses to develop their students’ conceptual understanding, problem solving skills, mathematical reasoning, and ability to apply math concepts to real-world situations. Their curricula “spiral” key concepts, or revisit them over time, to enable students to develop deeper understandings of mathematical principles. Teachers facilitate student inquiry and probe understandings of key concepts. Assessments are ongoing in the reform classrooms, so that teachers and students get feedback on the success of instruction in order to redirect their work.

These standards challenge traditions of U.S. mathematics instruction that organize curricula as a sequence of topics, rely on texts and lectures for teaching, and assess students for mastery of skills and procedures. In the traditional California math departments we followed in the 1990s, teachers elaborated and enforced standards of “passage” from course to course and failed students at ever-higher rates. While such faculties held students back until they could demonstrate readiness to move to the next level, the reforming departments organized themselves to advance all students through mathematics, including calculus. They rejected traditional departments’ practice of erecting hurdles for students’ advance. The reforming
TABLE I
How reform mathematics communities challenge traditions in the teaching profession

<table>
<thead>
<tr>
<th></th>
<th>Traditional practice</th>
<th>Reform practice</th>
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<tbody>
<tr>
<td>Mathematics instruction</td>
<td>Focus on mathematical facts, rules, and procedures</td>
<td>Focus on mathematical principles and flexible adaptation</td>
</tr>
<tr>
<td></td>
<td>Sequential coverage of topics</td>
<td>Spiraled introduction of concepts</td>
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<tr>
<td></td>
<td>Text-based instruction</td>
<td>Applied projects, inquiry-based instruction</td>
</tr>
<tr>
<td></td>
<td>Assessments of recall, speed, and accuracy</td>
<td>Performance assessments</td>
</tr>
<tr>
<td>Curriculum differentiation and student tracking; emphasis on selecting students into high-track classes</td>
<td>Core curriculum and heterogeneous student grouping; emphasis on increasing students' access to higher-order content</td>
<td></td>
</tr>
</tbody>
</table>

Teacher assignment to courses and student

Teacher tracking: Teacher rotation among courses:

Logic of matching student and teacher expertise in curriculum tracks

Logic of developing teacher expertise and equity in student learning opportunities

Norms and boundaries of professional community

Norm of privacy

Norm of collaboration

Insular department community; routine business

Open department community; boundary spanning for professional learning and problem solving

They work long hours to invent ways of accommodating their students’ widely diverse math backgrounds and languages. They progress on this steady course of work to improve their practice as mathematics departments serving diverse students. Teachers take pride in their collective success. An Esperanza math teacher commented, "We have an unbelievable math enrollment in this school. I don’t think you’ll find any school with [almost] 1,300 kids [and] with 1,100 taking math."

Challenging status prerogatives of teaching assignments
These math departments also reform teachers’ professional identities and careers. In traditional departments we studied, the least prepared math teachers were marginalized, along with their students, into low-track classes. In Esperanza, San Lúcio, and West Valley teachers rotated classes to share responsibility for all students and to ensure that novice math teachers would learn from their colleagues. These departments intentionally built their instructional capacity by rotating teachers through courses. This practice challenges the prerogatives of seniority and expertise that determine a pecking order for teacher assignments in traditional departments. The Esperanza chair commented that “everyone is willing to take their turn with the lower [classes]. We’ve tried to foster that attitude throughout the years and so far it’s held.” This chair’s comment that “so far it’s held” acknowledges the counter-cultural, political nature of the policy and its dependence upon ongoing teacher legitimation.

Paired assignments of new and least-prepared teachers with experienced, reform-oriented colleagues is another policy that both challenges conventions of teacher assignment and significantly improves the departments’ instructional capacity. These teachers’ opportunity for “legitimate peripheral participation” (Lave & Wenger, 1991) in the thinking and practices of reform mathematics leaders in the department establishes a powerful learning environment and foundation for professional growth and identity formation as a math educator. This practice was particularly important in Esperanza, where only half of the department’s teachers had a college degree in mathematics, and in San Lúcio, which experienced turnover of several teachers each year.

Challenging professional privacy and autonomy norms
The collaborative practice of reforming high school math departments flies in the face of strong traditions in teaching. As politically challenging as changing math teaching practice is, the construction of joint enterprise and shared repertoires of instruction is perhaps more daunting. A long tradition of research documents the persistence of privacy in American teachers’
Reforming high school teacher communities break rules of privacy. They depend on mutual trust as a condition of reform. Open and honest professional exchanges, in which teachers share failures and successes in lessons, is key to reform at the level of community. These professional practices are counter-normative in a national teaching culture that values privacy and in local union cultures that draw tight boundaries around practice. Daily routines of practice in reforming communities challenge assumptions of individuals’ professional autonomy, in teaching.

These reforming math teacher communities also challenge norms of department autonomy. They actively pursue support from their local professional environment and broader math reform networks. They open their boundaries and extend their work lives to include exchanges with math colleagues in other schools and in local colleges. For example, San Lucía’s math department regularly includes outside math educators in weekly meetings, and together they reflect on math instruction and design improvements. When they were detracking their math program in the late 1980s, this department formed a professional alliance with a university program designed to promote effective teaching and learning in heterogeneous classrooms.

PUBLIC ASSAULT ON REFORMING MATH COMMUNITIES

Although these math departments open the boundaries of their professional community to include math colleagues outside the department, they have had minimal exchange with their school’s parent community. In this respect, they resemble traditional math departments. None has tried to engage parents in learning about reform principles and practices of mathematics education. Nor, except in the important case of West Valley High School and similar middle class communities, has the community raised questions about the department’s program or its teachers’ practices. The California math wars – or the organized efforts to mobilize parent opposition to reform mathematics – thus far appear not to have penetrated poor or working class communities like those served by Esperanza and San Lucio high schools. Nevertheless, because their practices are deviant and parents remain in the dark about the reasons and benefits of math teaching reform, these strong reform communities are vulnerable to organized political backlash. Without an appreciation for the exceptional professionalism and achievements of reforming math departments, parents can become fearful and distrusting of their unconventional program and teaching practices.

California’s anti-reform politics focus squarely on those teacher communities that have labored long and successfully to reform their instructional programs and to achieve high standards of professionalism. The experience of West Valley High School’s math department tells the story of parent fears of unorthodox math instruction, political mobilization and anti-reform rhetoric, and professional demoralization in the wake of retrenchment policy responses.3

The dismantling of a reform math department

West Valley High School’s math department started to phase out its traditional curriculum in the fall of 1994, when all eight teachers began teaching the Integrated Mathematics Program (IMP) to incoming freshman. Gradually, the faculty used IMP throughout the program. They were involved in training sessions for the program, met on Saturdays to discuss their work, and most found a renewed enthusiasm and excitement for their teaching. This reform work strengthened the teacher community, and through collaboration the math teachers learned to extend and enhance students’ access to mathematical understanding. By 1998 the number of West Valley students choosing to take a fourth year of mathematics had doubled, and the teachers believed that they were making good progress.

Like San Lucio’s and Esperanza’s math departments, the mathematics faculty of West Valley High School is well integrated into the professional environment and networks of mathematics reform educators in California and beyond. Its faculty includes a teacher recognized nationally for her outstanding teaching, and she is a committed and highly effective reform leader within the department. Until recently, this strong mathematics department was completely supported in their work developing reform-oriented teaching – by the principal, the district curriculum officer, the superintendent, and the parents with whom they were in contact.

A movement to end reform-oriented mathematics teaching at West Valley began with a small group of middle-class parents whose children were due to start at the school in the fall of 1999. These parents had actively campaigned against school reforms in their children’s elementary and middle schools and became cognizant of the high school’s reform orientation in mathematics. The four parents most actively involved were concerned that their children would not be taught basic skills through the IMP curriculum and that their chances of getting into college would be jeopardized. Instead of discussing the program with the teachers or the school administration, these mothers got in touch with a prominent mathematician who was a well-known, vocal opponent of mathematics education reform. After meeting with this person, they followed directions
to parents on the "mathematically correct" web site for how to rid their school of reform mathematics.

The course of anti-reform progress in this community followed the formula set by the web site. Parents are instructed to campaign for choice in their school's teaching program, and to support their argument with data (which the web-site provides) on the ineffectiveness of reform oriented mathematics teaching. The four parents spent many months organizing their campaign to bring about choice in West Valley's math program. Part of their work included circulating petitions to parents and students on school grounds, at local shops, and at ball games. The parents also held meetings to which the teachers were not invited. A report that the mathematician told parents at one of the meetings that top universities did not accept students who had taken the IMP curriculum spread rapidly through the community of parents, instilling fear that the program was damaging their students' futures. After many months of campaigns and meetings behind the scenes, anti-reform parent leaders and others who had been mobilized through the campaign confronted the West Valley math teachers.

In March of 1999 two of the department's teachers were scheduled to give a standard report to the district school board on the mathematics program. Ninety parents came to the meeting, armed with petitions and literature from the Mathematically Correct web site that portrayed the IMP program as educationally unsound. The parents had compiled material into a large binder that they presented to the school board, along with the demand that West Valley offer a traditional curriculum as an alternative option to IMP.

Over the next few months the controversies heightened and concern spread throughout the parent community as the local newspapers contributed misinformation to parents' anxieties. The district superintendent advised the math teachers to ignore the false information and give no response. Teachers later regretted following that advice. The school tried various approaches to resolving the conflict with the parents, including inviting parents to sit in on IMP classes, to no avail. The principal supported the mathematics department throughout the months of parental attack, believing in the effectiveness of the teachers and their educational program. As she stated in an interview:

They're amazing. And that's why last year had to be such a personal tragedy for them, because that has to be probably the most professional department we've had on campus, and by far the strongest math department I've ever worked with. And they spent a ton of hours being prepared and working together, and it was just, it was so far ahead of our other departments as far as linking the standards and, and, really strong methods ... It's just a travesty that they would have to go through such a gut wrenching experience.

After several meetings, debates, and demoralizing attacks upon the teachers, the math department ultimately agreed to offer a traditional program in addition to the IMP curriculum. Especially devastating to these student-oriented, committed teachers were expressions of fear by some students that the program had "ruined" their futures. The successful fear tactics of the anti-reform campaign had made it impossible for the math department to provide evidence of their success sufficient to counter the demand for a traditional program. Having conceded to the demands, the math department was given the task of reviewing texts for the new traditional algebra program; but before long, the superintendent decided that the parents should be involved in the choice of textbook as well. The parents outlined several criteria for the algebra text -- including the absence of graphing calculators. The department chair recalled that at this point the math department "didn't really care," and didn't want to try to negotiate further with the parents. "It was like, it is an Algebra class, give us a book and we can do it."

In the fall of the following year the school offered both IMP classes and traditional algebra classes. The vast majority of parents opted for the traditional curriculum, tipping the program heavily away from the practices and commitments of this reformed math department. Most of the reform math teachers were forced to teach traditional courses and, literally, rearranged the desks in their classrooms between traditional and IMP classes. The West Valley math teachers were demoralized and felt that their professionalism was compromised.

Despite its strong faculty, supportive administration, and record of student success, this reforming math community was decimated by the anti-reform movement. Teachers with identities as reform math educators struggle to sustain their professional commitments, others are considering a different career, and the reform mathematics program has been virtually eliminated. This dramatic case of public assault on a strong math reform program highlights the tenuous and negotiated nature of teachers' professional authority, the threat that education reform can signal to parents, and the power of organized parent groups to countermand reform.

Patterns of anti-reform sentiment and rhetoric

The assault on West Valley’s strong reforming math department was not paralleled in Esperanza and San Lucio High Schools. Parents in these working-class communities have been generally supportive of their school’s math program. Local anti-reform politics thus appears to be conditioned heavily by the social class of parent communities. West Valley’s middle-class, educated parent community is similar to the Palo
Alto and San Diego communities where similarly heated attacks on reforming math departments were made. In these communities, parents organized to challenge both the reformed math programs and teachers’ professional authority and judgment.

Themes of anti-reform rhetoric that organized middle class parents’ attack on reforming math departments are highlighted in Table II. Such accusations of poor mathematics education, disparaging teachers’ efforts to ensure their students’ success in mathematics, were shouted at public meetings in West Valley and Palo Alto and appear on the websites of Mathematically Correct and HOLD. The rhetoric traveled recently to the celebrated New York District 2 and continues to mobilize parent opposition to nontraditional math programs.4

Each line of attack on reform mathematics implicates a fear that parents can feel when confronting for the first time a well-implemented program designed to engage all students in higher-order mathematical thinking. Middle class parents were easily rallied around issues that arose regarding their school’s deviant math programs. While some parents’ concerns might be rooted in their experience with the ill-fated New Math of the 1960s, most would have experienced traditional high school math classes and taken from them notions of good mathematics education. Most likely they hold the popular belief that only the most academically talented students can be good at math and honor what sociologists have long referred to as the “gate keeping function” of mathematics. The most generous account of parent attacks on their school’s math faculties is that they were puzzled by unorthodox instruction and concerned that their children would be out of sync with college programs: the least generous account is that they were threatened by the equity agenda of math reform and mobilized to defend their own children’s advantage in a traditional math program (see Kohn (1998), for elaboration of the argument). Most likely both dynamics came into play in the math wars that raged around strong reform programs.

To be sure, the university mathematicians who have publicly opposed K–12 math education reform have weighed heavily in the public discourse and in setting the rhetoric of anti-reform politics. They have been made leaders of the organized attacks on strong reforming math communities. However, to understand the success of anti-reform efforts, it is essential to consider the nature and sources of parents’ concerns and fears that the rhetoric captured and to recognize the inherently political nature of education.

**Table II**

<table>
<thead>
<tr>
<th>Conditions of reform practice</th>
<th>Anti-reform rhetoric and underlying threats to parents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Changed curriculum content</strong></td>
<td>“Fuzzy Math”; poor content coverage, weak preparation for college admissions tests, doesn’t meet elite university standards</td>
</tr>
<tr>
<td>Spiraled learning of concepts (versus sequential coverage of topics)</td>
<td>(Breaks from traditional sequence of K–16 math curriculum in U.S.; mathematicians and parents fear students will be under-prepared for college)</td>
</tr>
<tr>
<td>Fewer topics addressed in more depth (versus emphasis on topical coverage)</td>
<td></td>
</tr>
<tr>
<td><strong>Changed pedagogy</strong></td>
<td>“Fun math”; lack of rigor</td>
</tr>
<tr>
<td>Applied projects, inquiry-based instruction (versus reliance on text)</td>
<td>(Departs from common sense view of math as abstract and a “hard” subject)</td>
</tr>
<tr>
<td></td>
<td>Parents can’t help with homework</td>
</tr>
<tr>
<td></td>
<td>(Threatens parents’ influence over student performance and access to high track)</td>
</tr>
<tr>
<td><strong>Changed assessments</strong></td>
<td>“Unstandardized” assessments</td>
</tr>
<tr>
<td>Performance-based assessments, group projects (versus standardized tests)</td>
<td>(Threatens sorting functions of education and values favoring competition and meritocracy)</td>
</tr>
<tr>
<td><strong>Changed curriculum structure</strong></td>
<td>“Watered down” curriculum; failure to prepare top students for top universities</td>
</tr>
<tr>
<td>Detracked curriculum structure (versus hierarchy of courses and student tracking)</td>
<td>(Undermines the competitive advantage of middle class students; challenges the traditional gate-keeping role of high school mathematics)</td>
</tr>
<tr>
<td><strong>Changed professional community</strong></td>
<td>Attacks on teachers’ professional judgments, the legitimacy of education research, and “educrats”</td>
</tr>
<tr>
<td>Teacher community professionalism focused on educational improvement and equity (versus control of K–12 teaching through higher education, bureaucracy, or parent preferences)</td>
<td>(Challenges parents’ sense of control, mathematicians’ turf and teaching traditions, conservative reform agendas)</td>
</tr>
</tbody>
</table>
the math wars. Not only is de-tracking a central theme in the discourse and rhetoric surrounding K–12 mathematics education reform, but it triggered the Palo Alto uprising and thus launched math warfare in California. Palo Alto parents organized in opposition to a rumor that the middle schools were planning to completely de-track their programs. Considerations and denigration of the programs’ content and pedagogy followed the attack on de-tracking.

Teachers’ professional authority

Central to the anti-reform dynamics is parents’ challenge to teachers’ professional authority. Faced with a full-blown reform math program and faculty committed to new principles of teaching, parents could either respect or question professional judgments. In middle class communities, the strong reform communities of teachers were attacked and their professional judgments were discounted. Perhaps the strength of community and sense of professionalism that define reforming math departments was threatening to parents used to dealing one-on-one with teachers to ensure special treatment. In any case, strong consensus and collaboration among teachers is deviant in American education, and may have threatened some parents’ sense of exercising power as “client” of public schools.

Regardless of parents’ experience of their school’s math teacher community, there can be no doubt that university mathematicians enlisted as leaders in the local and state-level math wars pit their credentials against those of teacher leaders of math reform. These mathematicians’ negative judgments of programs and practices of reforming math departments were pivotal in swaying parent sentiments against teachers’ professional authority. The professional judgments of reform math teachers, department leaders, district administrators, and the entire education research community were challenged by anti-reform leaders; teachers and their defenders were ridiculed as “educrats” by the conservative press.

Clearly, the participation of mathematicians in mobilizing and endorsing opposition to K–12 reform mathematics education has undermined the authority and credibility of teachers and their school districts to defend reform programs and practices. Although the individuals involved in Palo Alto’s and West Valley’s math wars do not represent mathematicians nationally, their concerns do represent vested interests in traditional K–12 math programs. In the context of traditional college-level mathematics programs, reform standards undermine articulation between secondary and higher education in terms of the sequential, hierarchical organization of knowledge and skills and in terms of the system for screening students for selective mathematics degree programs.
college math programs have relied on the selection function of high school mathematics, a function that is squarely challenged and effectively undermined by reformed mathematics programs. Mathematicians may also feel professionally threatened by not setting the terms of math education in the nation, and their involvement in the K–12 math wars may represent a turf battle (see Martin, 2001). Regardless of what vested interests might motivate their actions, and in spite of their limited expertise in mathematics teaching and learning, university mathematicians fueled parents’ fears and legitimized their organized opposition to their school’s math reform programs.

The fates of strong reform communities like West Valley’s math department bring into focus the competing ideological, social-class, and political values and interests that play out in American public education. This math community conquered challenges to reform within the profession only to encounter them afresh from outside the profession. Ironically, its strength of reform practice and professionalism—developed through teachers’ arduous collaborative work on behalf of their students’ learning—made the department vulnerable to challenge from the broader community.

THE PROBLEM OF SUSTAINING REFORMED MATH COMMUNITIES

Reforming math departments demonstrate the power of teacher communities to reconstruct their practice to develop all students’ conceptual understandings of mathematics. Not only do these teachers’ classrooms embody principles of effective learning environments, but their work norms and relations embody standards of professionalism—a strong service ethic, shared technical knowledge, mutual responsibility, and commitment to teaching.

The problem of changing education and the profession hinges on the leadership and commitment of teacher communities and on the learning resources available in their system and professional contexts. The experiences of successfully reformed high school math departments offer several principles for reforming teacher communities, beginning at the level of practice and moving to policy:

- **Engaging in professional politics** is fundamental to progress on teaching reform, particularly in high schools and in mathematics. Teacher communities need leadership and courage to reject standards and routines that fail students but may boost teachers’ prestige, to challenge status prerogatives for teaching assignments within K–12 education, and to break norms of privacy in order to share professional practice and responsibilities.

- **Exploiting learning opportunities** is essential to reforming instruction. Since principles of effective learning environments apply to adults, as well as to students, this means that reforming teacher communities seek professional development opportunities that are sustained, focused on subject matter instruction, and build communities of teachers committed to sharing knowledge of successful reform practice. Teacher communities strategically draw upon resources beyond school boundaries—opening their boundaries to colleagues and participating in professional networks outside the school.

- **Establishing capacity for reform** is a key role that school policy systems—at school, district, state, and federal levels—play to support reforming teacher communities. Reform-oriented standards and frameworks, instructional materials, professional development venues, and resources for adult learning about effective teaching practice all represent capacity for teacher communities to effectively reform their practice. Capacity also comes from administrators’ understanding of reform education principles and ability to exercise leadership in support of reforming teacher communities.

These principles for changing educational practice are inadequate, however, for sustaining progress on educational reform or the professionalism of reforming teacher communities. Organized opposition to reform mathematics education in California followed on the heels of reforming teacher communities’ successes. And neither strong teacher communities nor policy systems legislating reform standards have been able to withstand public challenges to the legitimacy and efficacy of reformed mathematics instruction. The professional commitments, knowledge resources, and system legitimacy that promoted and enabled reform in math teacher communities do not constitute sustaining capacity.

Anti-reform movements in California and elsewhere reveal the contingent authority of both bureaucracies and the profession to reform education standards and practice. Ultimate authority in American education lies in public values and preferences; especially in school systems serving middle-class communities, the long-term success of education reform depends upon the approval and support of local parent communities and constituencies of public education. This principle for sustaining reform, operating at all levels of the system, has become visible in the context of local and national math wars. To be sure, math reform standards developed a decade ago by professional associations were responsive to
the business community’s demand for high school graduates equipped with skills in flexible problem-solving and mathematical reasoning needed for today’s jobs (SCANS, 1992). The recent challenges to reform standards come significantly from higher education, another key constituent of K–12 education, and seem to reflect threats to the mathematics establishment. By fueling middle class parents’ fear of risks posed by reform math programs to their children’s access to elite universities, organized groups of university mathematicians and parents have successfully squelched reform efforts promoted by the business community.

While teachers’ professional standing has always been conditional (Hargreaves & Goodson, 1996), we might expect that the demonstrable success of the reformed math programs described in this paper would constitute sufficient grounds for public legitimation and support. The fact that this was not the case, and that the educators in West Valley were forced to change their practice against principles of effective learning environments and standards of professionalism, frames a new question: under what conditions can teachers achieve legitimacy for their reformed practice? This issue is fundamental to the future of educational change.

Several plausible responses to this issue point to directions for research, and design experiments, in mathematics education reform and other change initiatives in education. This research is needed in order to ground principles for sustaining reforming communities such as those described in this paper.

Maintain stratifying structures

One answer is that teacher communities can sustain instructional reform if they maintain stratifying structures; reformed programs and practices that threaten vested social class interests in reproducing privilege through curricular tracking will meet insurmountable opposition. Support for this view comes from the fact that both math education reform and de-tracking reforms, each pursuing an equity agenda, have encountered heated and well-organized opposition. (Oakes & Wells, 1996; Wells & Serna, 1996).

Systematic analysis of the kinds of instructional reforms that mobilize opposition from parent groups, and conditions under which they survive, could further evaluate this argument.

Disseminate the knowledge base for reform

Another answer to the question focuses on knowledge dissemination – teachers’ limited ability to point to a body of evidence in support of reform practice underlies their weak professional legitimacy. In this view, teaching reforms can be sustained if there is more widespread dissemination of the knowledge base for reform, through widely publicized, high-prestige documents that provide scientific grounding and legitimacy to reform principles and practices. Associations of professional educators, such as the NCTM, may not be sufficiently high-status or independent of the education establishment to be effective vehicles for changing beliefs about teaching and learning. Two recent publications of the National Academy of Sciences allow for a test of this argument – one synthesizes research on learning and describes effective learning environments that depart radically from education traditions (Bransford, Brown & Cockings, 1999); the other focuses specifically on mathematics education (Kirkpatrick, Swafford & Findell, 2001). While the latter document calls for balance in reform and traditional content and pedagogy, it clearly offers legitimacy for the kinds of reform practices that West Valley parents came to distrust. In theory, these documents will serve as antidote to rhetoric prompting educated parents to oppose math education reform and as a basis for developing demand for reformed teaching.

Engage parents and publics in reform communities

A third answer emphasizes local control over American education and the negotiated legitimacy of educational practice – suggesting that teacher communities can sustain reform if they engage parents and publics in reform communities. While the reforming teacher communities we studied are highly interactive with their professional environments, they generally have little exchange with parent and civic communities. Given principles of effective learning environments, parents may need access to reformed instruction to grasp its principles and practical values for student learning. Including parents in the purposes and work of reforming teacher communities, while logistically challenging, could address fears about their children’s learning opportunities that have been the crux of anti-reformers’ success in mobilizing opposition to reform teaching. By working with math educators around the goal of developing students’ mathematical understandings, parents might come to understand the challenges and opportunities of reforming math education and to reject the fear tactics of anti-reform organizers. Further, poor and working class parents who have been on the margins of the math wars might be mobilized to support the equity agendas of math reform and prospects for their children’s enhanced learning outcomes.

The growth and demise of math education reform communities in California high schools suggests that the future of education reform in
the U.S., if not in Western nations more generally, depends upon "activist professionalism" (Sachs, 2000) – the building of active trust between teacher communities and the public. In democratic society, the public has ultimate authority over education; and the math wars highlight the limits of teacher professionalism bounded by K–12 educator communities and school systems. Judith Sachs (2000) describes a form of teacher professionalism that engages education stakeholders in a "more reflexive social order" (Giddens, 1994) of collaboration and discourse around social justice concerns. The vision of activist professionalism challenges teacher communities to construct new relationships with parents and publics – to further break norms and boundaries of traditional teaching practice – as political ground for sustaining their standards of professionalism and reform work.

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NOTES

1 Collaborators on research in Esperanza during 1988–1992 included Milbrey McLaughlin, Susan Stodolsky, and Pamela Grossman; Joanne Lieberman was primary researcher in San Lucio's math department during 1994–1996; and Jo Boaler was primary researcher in West Valley's math department from 1999–present.

2 Esperanza's math department is in one of five high schools in one of the most heavily immigration-impacted counties in California, serving a majority of low-income Latino and Southeast Asian students. San Lucio High School is one of two high schools in a district serving a predominately working-class community; the majority of its students are Latino or African American; its mathematics department is known locally and around the state for its strong reform program. West Valley High School is one of two high schools in a district serving predominately white, English-speaking, middle-class families.

3 This account describes the course of events surrounding the dismantling of West Valley’s reform math program, leaving out teachers’ expressions of demoralization in being assaulted by parents and being forced to teach traditional math classes (teachers’ reflections on these events are documented in Boaler, Greeno, and Talbert, 2000).

5 An assault on York District 2’s progressive math program was organized in Spring 2001 by a coalition including some of the same mathematicians and politicians that helped mobilize West Valley parents against their reformed math program.

REFERENCES


**Author’s Bio**

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