

## **Teachers' Perceptions of Their Profession in Relation to Reform in Mathematics Education**

**Diana L. Treahy**

College of Charleston, South Carolina, USA

**Abstract:** In their comprehensive analysis of school mathematics education from the “new math” movement of the 1950s to reform efforts of the 1980s, Fey and Graeber (2003) contend that mathematics education reform efforts contain cyclical *crisis-reform-reaction* episodes. The current research examines a selected group of teachers' understanding of reform and the impact of the cycle of reform on their attitudes about their profession. The teachers in this study, participants in a professional development experience supporting progressive reform efforts in California during the 1990s, responded to a survey and follow-up interviews were conducted with a representative sample. The findings indicate that participants were supportive of the reform movement, but felt “left out” of the decision-making process—especially when the reform movement ended. If cycles of reform continue in mathematics education, teachers may become less willing to participate in future reform efforts. Furthermore, cycles of reform may lead to a decrease in teacher morale, which may in turn lead to teachers leaving the profession, thereby further exacerbating the impending teacher shortage within and beyond the U.S. context.

**Key words:** policy, reform, mathematics education, professional development, teacher change

In today's schools, it is common for teachers to be regulated and controlled by an elaborate work system that specifies what must be done and then seeks to ensure that it is done. When this is the case, the work of teachers becomes increasingly bureaucratic. However, bureaucratic and professional work are different . . . . Bureaucrats are subordinate to the system, while professionals are super-ordinate to their work system. (Sergiovanni & Starratt, 1993, p. 67)

### **Introduction**

Romberg (1970) describes a professional in mathematics education as a teacher who is “striving to improve the odds in his favor . . . [who] searches the literature, asks questions of authorities, attends professional meetings, and so on, in the hope of finding help” (p. 56). Over the years, researchers have found characteristics common to the group of people who make up the profession of teaching, noting that people who enter the profession are primarily motivated by intrinsic factors rather than extrinsic rewards (Cohn, 1985; Lortie, 1975) and have a primary career

objective to help people (Cohn, 1985). In a 1992 survey by Harris and Associates, 83 percent of teachers responded that they believe that they make a difference in the lives of their students. Although motivated to enter the profession by intrinsic factors, teachers also indicated that one of their biggest frustrations is responding to external forces that interfere with their practice (Cohn, 1985). The external forces Cohn notes are the school system, mandated policies, and students and parents. Strike and Ternasky (1993) note that teachers need to be treated as professionals if more effective teaching is to take place.

Public schools in the United States are susceptible to enormous external pressures from politicians, legislatures, school boards, parents, business people, interest groups, and state and local bureaucracies. As Dobay points out, "Because tax dollars pay for public education . . . many Americans feel that schools belong to them" (1988, p. 14). Hall (1968) argues that a high level of bureaucracy is negatively associated with high levels of professionalism within an organization, especially in the areas of autonomy and colleague control. Consequently, teachers hold little influence over their work (Darling-Hammond, 1988; Dobay, 1988). In addition, Engvall (1997) contends that externally developed policies and mandates set by state legislatures ensure the democratic control of schools, but they may also limit any discussion of "professionalizing" teaching (p. 61). As noted by Darling-Hammond (1985):

While . . . prescriptive policies may or may not achieve their intended effects, they always have other unintended, cumulative consequences. These additional effects must be weighed as one assesses the costs and benefits of a specific policy. In particular, attention must be paid to the collective impact of policies on the role of classroom teachers—policies that in the aggregate may make teaching less attractive, thus lowering the quality of the teaching force, which, in turn, causes policy makers to regulate in an effort to improve education. (p. 335)

The purpose of this research is to examine a cycle of reform in mathematics education and teachers' perceptions of their profession within the context of the American educational system. Specifically, this research assesses a selected group of California Mathematics Project teachers' understanding of reform and examines their attitudes about their profession in light of their experience with a cycle of reform (Fey & Graeber, 2003) in mathematics education. Throughout the discussion, the term *reform* refers to a set of recommendations outlined in both the *Mathematics Framework for California Public Schools* (1992) and the *Curriculum and Evaluation Standards for School Mathematics* (1989). It is the hope that the resulting information on the impact of the cycle of reform on teachers' attitudes

about the profession of teaching may inform future curricular reform efforts, professional development, and policy decisions as well as help broaden the general dialogue on educational reform within and beyond the US context.

### **Literature Review**

#### ***Reform***

The introduction of a new teaching philosophy, along with an expected change in behavior and practice, is a challenge to advocates of reform movements in education. Research suggests that teachers approach change cautiously and need reassurance that the benefits outweigh the costs (Cuban, 1993; Fullan, 1991; Wallace, 1991). If the costs exceed the benefits, change will not occur. As Hargreaves and Fullan (1992) note:

Many attempts to improve instruction take little account of the social contexts in which learning and teaching take place. The price of ignoring the context of teaching is failed idealism, guilt and frustration at not being able to meet the standards, criticism of teachers who fail to make the changes, and erratic leaping from one innovation bandwagon to another. (p. 56)

Moreover, the implementation of new and different goals requires a great deal of change—not only in instructional practice, but more generally in teachers' thinking about what it means to teach mathematics (Burns, 1999).

In reviewing teachers' views on educational reform, Mills and Stout (1985) found that teachers are primarily supportive of educational reform, although they feel "left out." In the 1984 Metropolitan Life survey of the American teacher, 75 percent of the respondents felt their voices had not been adequately heard and 40 percent of teachers surveyed felt that they did not have the support they needed from parents and administrators (Harris & Associates, 1984). If teachers feel a lack of support for their efforts, the result may lead to negative consequences, such as a lowering of teacher morale (Harris & Associates, 1984).

Yet most teachers reported feeling supported by and having respect for other teachers; in addition, 80 percent of the teachers said that their fellow teachers provided relatively satisfactory levels of support. The greater the opportunities for teachers to learn, practice, and be supported by other professionals in the field, the greater the chance that change will be long-lasting (Cohen & Hill, 2000). Thus, reform should involve teachers.

***Cycles of reform in mathematics education: California***

Researchers studying the challenges of change note repeating cycles or patterns that are common to reform movements. As Fey and Graeber (2003) argues:

The direction of curricula and teaching in elementary and secondary school mathematics has a predictable rhythm of *crisis-reform-reaction* episodes. A prominent social, political, or professional group calls attention to serious problems in student performance and recommends action, only to find that reform initiatives ultimately run up against resistance from opposing views and the deeply conservative nature of educational institutions. The burst of concern and energy sparked by crisis and reform rhetoric often settles down to a quieter pattern of business as usual, at best moderately perturbed by the energetic calls for change in standard practice. (p. 521)

Similarly, evidence points to the reoccurrence of reform efforts throughout history (Cuban, 1989; Goodlad, 1975; Lloyd, 1996). Cuban (1989) states that, although reform is “a planned solution to a perceived problem,” it fails to understand the complexities of policy making, administration, and practice within schools. As a result, it repeats itself and creates a “persistence in reform efforts” (p. 376).

Influenced by *A Nation at Risk* (1983) and the growing public dissatisfaction with American students' mathematics achievement, the California State Department of Education (CDE), led by State Superintendent Bill Honig, initiated a progressive, systemic mathematics reform movement with the development and publication of the *Mathematics Framework for California Public Schools-Kindergarten through Grade Twelve* in 1985. This document articulated a vision that initiated change in mathematics education in California and influenced the national level as well. In the mid 1980s, the National Council of Teachers of Mathematics (NCTM) appointed a committee of teachers, mathematics educators, and university mathematicians to develop a set of recommendations or standards for improving mathematics education. This committee developed four mathematical goals for students in the twenty-first century. The goals state that students should be able to communicate mathematics effectively, actively participate in all lessons, discuss mathematics, and describe their thinking and mathematical processes in written form (NCTM, 1989).

In 1992, the CDE released a new mathematics framework<sup>1</sup> reinforcing progressive reform in California. Influenced by California's 1985 framework and NCTM's

---

<sup>1</sup>Curriculum frameworks are revised or rewritten every seven years, as mandated by California state law.

*Curriculum and Evaluation Standards for School Mathematics* (1989), this document served as a guide for classroom teachers, teacher educators, curriculum leaders, and textbook companies. Included in this framework were criteria for instructional materials used by state textbook adoption committees and school districts in their efforts to reform practices in mathematics curriculum and instruction.

To aid in the reform process, the CDE and other agencies supported the development of “replacement units” and alternative curricula for teachers to use in place of conventional mathematics textbooks or portions of those textbooks. The CDE also approved funding for professional development and training. The California Mathematics Project (CMP)—one of nine California Subject Matter Projects (CSMPs)—provided staff development in content and pedagogy. Supported by the State of California and administered by the University of California Office of the President, the goal of the CMP is to improve the quality of California’s K-12 mathematics programs by increasing teachers’ mathematical and pedagogical content knowledge. The CDE also convened task forces that published reports such as *Caught in the Middle: Educational Reform for Young Adolescents in California Public Schools* (1987) and *It’s Elementary!* (1987).<sup>2</sup> These documents presented the task forces’ findings and recommendations, which validated and encouraged reform-based initiatives.

In 1991, a statewide performance-based assessment program called the California Learning Assessment System (CLAS) was initiated. The items on the mathematics portion of the test were “primarily designed to assess a student’s conceptual understanding, number sense, and ability to solve application problems, as opposed to his or her computational proficiency” (Bohlin, 2001, p 149). The test was not formally administered until 1993 due to a lengthy revision process.<sup>3</sup> Ultimately, scores were much lower than expected, and criticism surfaced. Critics alleged that some of the open-ended response items were intrusive and controversial; others complained that the technical quality of the test was flawed (Cronbach, Bradburn, & Horvitz, 1994). In addition, Cohen and Hill (2000) contended that “many teachers seem to have felt quite free to reject the test and its concomitant view of mathematics...without penalty and possibly with administrators’ and parents’ support” (p. 317). Consequently, in 1994—three years after its inception—the governor terminated funding for CLAS.

---

<sup>2</sup>For a complete listing of reports see [http://www.cde.ca.gov/cdepress/pubs/ed\\_reform.html](http://www.cde.ca.gov/cdepress/pubs/ed_reform.html)

<sup>3</sup>See Cohen, D. & Hill, H. (2000). *Instructional Policy and Classroom Performance: The Mathematics Reform in California* for further discussion of the CLAS test.

Soon thereafter, results of the National Assessment of Educational Progress (NAEP) report were released. Students in California ranked near the bottom in mathematics compared to their counterparts in other states. Blaming the results on California's progressive reform movement in math, a "math war" began in the state (Becker & Jacob, 2000). Parent groups and conservative, anti-reform advocates rallied together to lobby the governor and CDE to mandate a revision of the 1992 mathematics framework and change the approach in mathematics education to one that was more traditional and skills-based.

In 1995, with political pressure mounting, California's State Superintendent of Public Instruction, Delaine Easton, announced that two task forces would be formed to examine both the state policy and the curriculum frameworks in mathematics and reading. After careful review and deliberation, the mathematics task force recommended keeping the original 1992 mathematics framework. Nonetheless, in September of that same year, the State Superintendent asked the State Board of Education (SBE) to work on a supplement to the 1992 mathematics framework that included more basic skills materials. On October 11, 1995, Governor Pete Wilson signed Assembly Bill 170 (AB 170), also referred to as the "ABC Bill," which was designed to put pressure on mathematics and language arts teachers to emphasize basic skills. Many interpreted this as a call for direct instruction. Specifically, the bill stated:

The State Board of Education shall ensure that the basic instructional materials it adopts for mathematics and reading in grades 1 through 8 inclusive, are based on the fundamental skills required by these subjects, including, but not limited to systematic explicit phonics, spelling and basic computational skills. (AB 170, 1995)

Jacob (2000) contends that the adoption of AB 170 was the "first substantial evidence that policies would reverse in the state" (p. 3). Following this statute, the SBE approved the creation of a Mathematics Program Advisory Panel, which produced a document entitled the *Mathematics Program Advisory* (1996) calling for more "balance" in the curriculum. As Jacob (2000) notes, this directive "led many to believe that the SBE was adopting a more centrist position" (p. 3). However, this would prove not to be the case.

In the fall of 1996, the SBE appointed a Curriculum Framework and Criteria Committee to develop a new mathematics framework for California. The

appointments made to this committee, as well as the process of drafting the document, were highly controversial<sup>4</sup>. As Becker and Jacob (2000) note,

The most substantial policy changes were introduced during the final writing stages and included no serious input from K-12 teachers or mathematics education professionals. (p. 530)

Around this same time, a Standards Commission was appointed to draft California's first language arts and mathematics standards, working on this task from 1996 to 1997. Unlike the framework committee, appointments to the Standards Commission were made by the governor, the State Superintendent of Public Instruction, and the legislature, without any input from the SBE.

However, the SBE was responsible for granting final approval of the standards document. Similarly to the development of the framework document, the process of drafting and approving state mathematics standards proved to be quite controversial. Initially, the draft of the mathematics standards met resistance from basic skills advocates, noting what they saw as mathematical "defects" and "omissions" (Wu, 1998). Consequently, the SBE rejected the standards written by the Standards Commission and appointed two of its own members to work with a small group of Stanford mathematicians to revise the deficiencies. On December 11, 1997, the SBE approved *The California Mathematics Academic Content Standards for Grades K-12*, which emphasized the sequential teaching of basic skills.

The revised standards were denounced by those who supported the reform movement and by California's own State Superintendent of Public Instruction. On December 10, 1998, a new mathematics framework was published that emphasized traditional, skills-based standards by which textbooks and assessment were to be aligned. "Policy decisions regarding the *Mathematics Framework* (1999), *Mathematics Content Standards*, textbooks, and assessment were taken out of the hands of teacher leaders and mathematics educators and placed primarily in the hands of selected mathematicians and members of the State Board of Education" (Bohlin, 2001, pp. 170-171).

In the spring of 1998, the Standardized Testing and Reporting (STAR) system was approved, requiring yearly testing of all students in grades 2 through 11. Considered high-stakes testing, STAR—developed to measure student progress towards the standards at each grade level—put pressure on teachers and districts to produce high

---

<sup>4</sup>See *Who Makes California's Mathematics Education Policy Decisions?* (California Mathematics Council's Public Affairs Committee, 2000).

scores and further align with the mathematics content standards. Not only were test scores published in the newspaper, monetary compensation was given to districts for high performance based on each school's overall ranking.

### ***Consequences of policy changes and reform***

Jacob (2001) contends that a period of counter-reformation in California resulted in an "attack on teacher professionalism, [representing] a view that teachers are not capable of instruction and must be told how to teach" (p. 268). Furthermore, the authors of *A Report Card on Reform: The Teachers Speak* (Carnegie Foundation for the Advancement of Teaching, 1988) assert, "If good teachers are to remain in the classroom, they must be regarded as professionals" (p. 8). Darling-Hammond (1987) notes that demands made by state curriculum mandates contribute to negative feelings by teachers about their profession. In this environment, teachers view their roles as factory foremen rather than professionals (Pitman, 1987), perceiving themselves as those who are "strictly supervised at every point of the working day and robbed of every opportunity of exercising their own judgment" (Shanker, 1989, p. 106). Reflecting on the need for further study of reform as seen through the perspective of teachers, Cuban (1989) argued:

Substantially altering what teachers do in their classrooms, then pressing for more reforms without examining why such repeated efforts have yielded so little is as promising as trying to convince an eight-year old that studying Plato is more fun than eating an ice cream cone. (p. 372)

Based on the need for additional study of reform from the teachers' perspective, the current research examines reform in California from the point of view of a selected group of teachers who are members of the San Joaquin Valley Mathematics Project, a site of the California Mathematics Project. This research aims to examine teachers' attitudes toward their profession in light of their experiences with a cycle of reform in mathematics education to determine possible consequences of policy changes and swings from the perspective of teachers who have changed their practice—hereafter called reformers.

### **Methodology**

The design for this study was primarily qualitative, specifically employing a case study method. Obtaining the names and addresses of teachers who participated in reform efforts in California in the early 1990s proved to be one of the biggest challenges in this study. In order to find a sample of teachers who had instituted reform-based practices into their classrooms, efforts were focused on participants of the California Mathematics Project (CMP), one of largest statewide professional



development projects in California. The CMP has provided professional development for mathematics teachers in California beginning in the early 1980s; this training has focused on reform ideas consistent with the 1989 NCTM standards and reform-based practices.

To initiate the data collection, email messages were sent to CMP directors and county office personnel who had access to participants' names and addresses. Surprisingly, the directors contacted declined to participate in this study or provide any information about their teachers. One director stated that he felt the nature of this study was 'too political.' Another noted that it might "stir up negative feelings" toward the current, more traditional movement in California. Finally, through a contact at a local university, the name of a past CMP director and professor from the Central California area was acquired. This person provided the names and addresses of over 300 teachers in her area who had participated in the San Joaquin Valley Mathematics Project (SJVMP), one site of the CMP.

The San Joaquin Valley Mathematics Project is based at California State University, Fresno (CSUF), and serves teachers from five counties throughout California's Central Valley—a vast 22,405 square mile agricultural area consisting of 162 school districts, over 700 schools, and over 350,000 students who collectively speak over 100 different languages. Initial funding for the SJVMP was received in 1988. The staff consists of (a) a Project Director/Principal Investigator and two Co-Principal Investigators who are CSUF faculty members, (b) a Coordinator of Professional Development, (c) three Regional Coordinators, and (d) twelve Grade Level Leaders. All of the non-university staff are classroom teachers or curriculum specialists who have assumed leadership positions in the Project after being involved with the Project for at least a year (Bohlin, 2001, p. 153).

Surveys were mailed to participants from 1989 to 1995—289 in total—in the first week of October 2000, asking about their current view of the profession. Approximately six weeks after the first mailing, 76 surveys had been returned, with 35 of these teachers agreeing to be contacted for follow-up interviews. As displayed by their placement on the Map of Teachers in Figure 1, a group of six teachers were selected for interviews based on their "fit statistic" in accordance with Hall's (1968) attitudinal subscales. Wright and Linacre's (1991) BIGSTEPS computer program was used to generate fit measures for each subscale. Wright and Linacre (1991) define "fit" as the likelihood of agreeing or disagreeing with the overall survey items. (Note in Figure 1, double, boldfaced **OO** indicates selected interviewee. X indicates survey respondent not selected for interview).

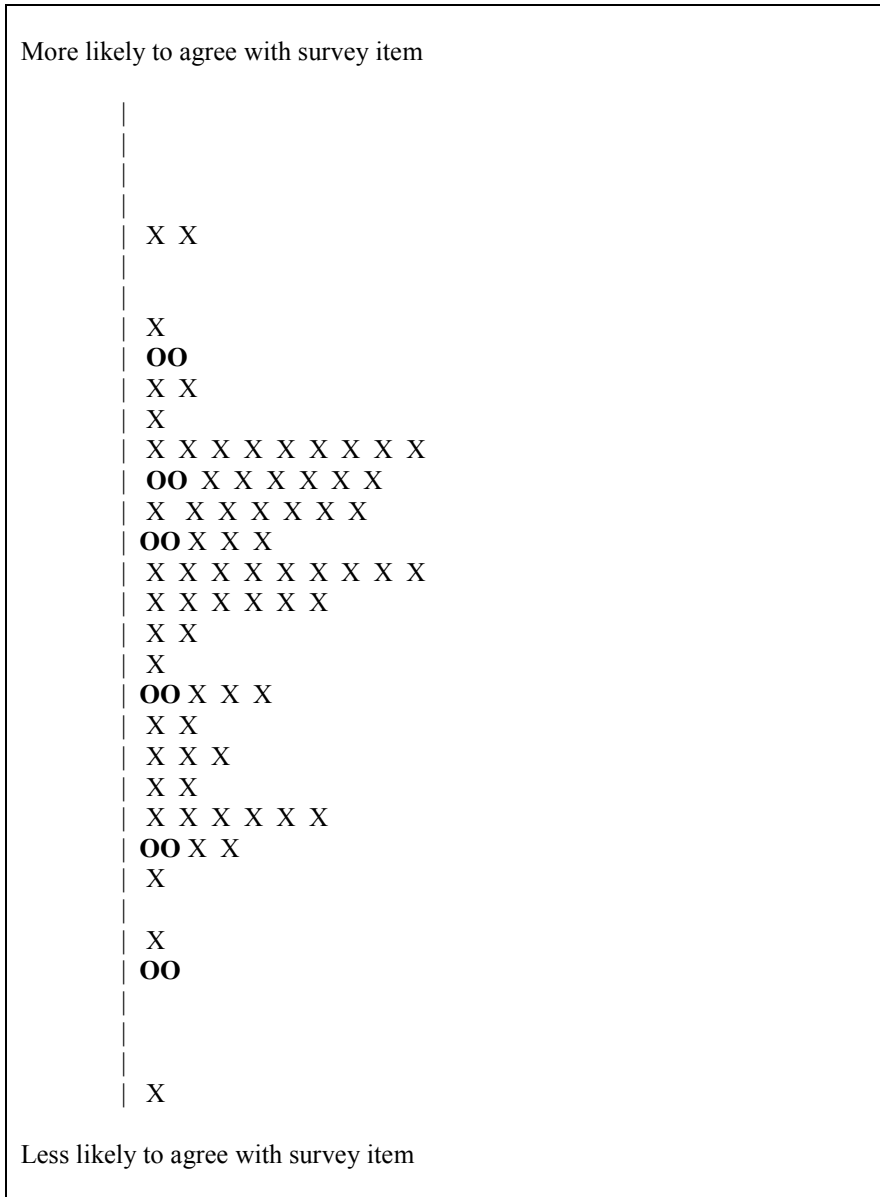


Figure 1. Map of teachers chosen for interview.

The group of teachers interviewed included both female and male, veteran elementary, middle, and high school teachers in urban, suburban, and rural settings in Northern California.

The data from the surveys reveal a select group of mathematics teachers' attitudes about their profession, taken together with the interviews this study provides an examination of the teachers' attitudes about their profession and their views of the reform movement they experienced. Recognizing that I do not have survey data on these teachers before the cycle of reform and that the sample size of the interview data is six, this study is admittedly limited. Nevertheless, because I was a teacher who experienced the same reform period in my practice, I have strong beliefs about the claims I am making.

### **Results: The Reformers Speak**

In reviewing teachers' views on educational reform, Mills and Stout (1985) found that teachers are primarily supportive of educational reform, but feel left out. Moreover, teachers' perceived lack of support for their efforts may lead to negative consequences, such as decreased teacher morale (Harris & Associates, 1984). In the 1984 Metropolitan Life survey of the American Teacher, three-fourths of the respondents felt their voices had not been adequately heard on issues related to reform (Harris & Associates, 1984).

In this study, similar themes emerged. Most teachers were supportive of reform and movements led by professional organizations in mathematics education. However, they felt left out of the decision-making process of the reform movement. Consequently, they believe that the cycle of the reform results in a decrease in teachers' overall morale. The following discussion analyzes these findings.

#### ***Support for reform movement***

All of the teachers interviewed referred to the beginning of the reform movement as a positive time in their careers. Teachers viewed this period as a time of opportunity and support; others characterized it as the "best of times" and a period of "awakening."

*Importance of support networks.* All six of the teachers interviewed credited the SJVMP with providing them support for their beliefs. At the summer institute, teachers read and discussed documents that helped move their thinking forward. In addition, the teachers developed support networks through which they could discuss, debate, and analyze reform-based documents and materials. Teachers in

this study credited the reinforcement of their new beliefs and attitudes about teaching mathematics to the incredible support received from other participants in the project. Participants in the study noted feelings of isolation before the joining the math project. One teacher indicated:

You know, I was in my room, I worked hard, but it was pretty isolating. I don't want to let go [of the feelings of community]. I deeply feel that as a community of math teachers, certainly locally, but definitely statewide. I did not have a community of anything before (Participant 6, personal communication, January 21, 2001).

Another teacher said:

The SJVMP made me feel so good that I was not alone. It introduced me to so many other people with whom I could network. The connections—even nationally—were awesome. Before then, I felt very isolated (Participant 5, personal communication, January 21, 2001).

*Development of intellectual foundation.* Still other teachers in the study credited the reform era and professional development with the development of an intellectual foundation in mathematics. During the summer SJVMP institute and follow-up meetings, participants read and discussed research documents related to mathematics education, which began reshaping the foundation of their beliefs by questioning preexisting notions.

One teacher shared the following:

I got involved with quality mathematical documents . . . The more you learn, the more you realize you need to know more. I find that the deeper I go into the research, the more I read, the more I realize what I do not know (Participant 2, personal communication, January 20, 2001).

Similar experiences were found from other teachers.

It was a great time because we were talking professionally and talking with each other. I was questioning myself, "Am I [a] reformer or not?" I was not sure (Participant 6, personal communication, January 21, 2001).

During this time, I was wondering. As I grew more, I had opportunities to see student work, visit classrooms, and realize that these teachers were producing the kind of work and understanding in their students that I was

not getting. I thought, they must have better students. Well, I would go visit and see that they looked like my kids. They were like my kids. Maybe I could do something differently (Participant 6, personal communication, January 21, 2001).

The teachers reported that the creation of support networks and the acquisition of an intellectual foundation were the two most important features of the SJVMP. These aspects of the experience were critical in helping teachers advance their reform efforts. These findings support Cohen and Hill's (2000) contention that the greater the opportunities for teachers to learn, practice, and be supported by other professionals in the field, the greater the chance that change will be long-lasting.

Moreover, professional development opportunities in mathematics education need to be more than just an opportunity to learn how to teach math. During the professional development experience, teachers were exposed to the NCTM *Curriculum and Evaluation Standards for School Mathematics*, California's mathematics framework, and other reform documents. As reported in the interviews, one of the five teachers was not even aware of the new California mathematics framework until she attended the summer institute. Teachers also reported feeling isolated from other teachers before attending the SJVMP summer institute. The data clearly point to the conclusion that long-lasting professional development is a catalyst for change in the teachers' practices and beliefs about what it means to teach mathematics.

### ***Impact of public policy changes***

Engvall (1997) contends that, "societal norms have granted teaching low status and a lack of respect" (p. 51). Lortie (1975) describes this low social status as a "shadowed social standing" (p. 10) that allows others to dominate public policy and leave teachers silenced (Goodwin, 1987). The results of the current study concur with these findings.

*Teachers voices never heard: Disenfranchised from their own system.* Some teachers in the current study noted feeling "disenfranchised" from district mathematics meetings because they supported the reform movement. One sensed that her voice was not heard at many curricular meetings:

All of the things that we did were so misunderstood and when the new standards were written in California, they never listened to the teachers' voices. The teachers' voices were not heard at many committee meetings and other meetings around the state. You would have 16 people speaking

one way and 2 to the old way, and they would listen to the 2 (Participant 3, personal communication, January 21, 2001).

Still others noted the politics of the time and the profession shaped by groups who held "far too much influence." One teacher noted that he found himself increasingly troubled by the probable impact of this climate on student learning after the end of the reform era. Other teachers noted their frustration as well. As one teacher said:

This time is a time of darkness around the math teaching profession for me. I saw during this time that people with little information and big voices can set policy and that politics (Participant 1, personal communication, January 20, 2001).

Another teacher described:

You get excited about something, you really work hard, and then you are blindsided by curriculum coordinators and the state . . . I was not given support to do what was best for my students (Participant 2, personal communication, January 20, 2002).

Some interviewees noted feelings of betrayal and sadness in reference to the ending of the reform movement. As one teacher indicted:

I was getting very burned out because I was working very hard. I was also teaching all of the other subjects and there was a lot pressure from parents. I felt like I had been betrayed (Participant 2, personal communication, January 21, 2001).

Similar feeling was shared by another teacher.

Well, I just think that when I am in my classroom, I just focus on what I am doing. I just think that this was the beginning of a great sadness (Participant 3, personal communication, January 21, 2001).

With the current emphasis on high-stakes testing in California and the practice of transforming standards into checklists prescribing how curriculum should be aligned, teachers in this study felt that their judgments as a professional were often questioned. One teacher noted:

They want us to check off and be done with the kids and we are being watched as we do this thing. This makes me feel that my judgments as a

professional are being scrutinized and superseded by a checklist of benchmarks (Participant 3, personal communication, January 21, 2001).

As evidenced in the survey and interviews and as noted above, the results of this study support Goodwin's (1987) contentions that teachers feel silenced by dominant public policy and left out of the decision-making process.

*Decrease in morale: Teachers leaving the classroom.* The teachers in this study described intense feelings of sadness, disenfranchisement, disempowerment, and discouragement—all related to the end of the reform period, when they felt pressure to teach according to standards handed down to them from above. The teachers agreed that too much control existed over their work; they wanted more freedom to make decisions about what they teach. These feelings might be attributed to what some interviewees called a “surprise attack” when they were told they could not teach reform-based mathematics lessons. Other teachers mentioned rigid checklists and benchmarks handed down from the state that inhibited their freedom to select the materials and content that they teach. Parents were also mentioned as overseeing their teaching in a “militant” fashion. One teacher noted that she was threatened with having dissatisfied parents “knocking on her door again” if she did not change to more traditional methods of instruction.

The teachers also described the low morale they witnessed among other mathematics teachers in their profession. Teachers in the study described the bad feelings they observed between those who supported the reform movement and those who opposed it. Teachers felt a decrease in their passion for the profession and an eroded confidence in the system. One teacher noted:

I felt that I had no power. I moved to place where I could influence more people and have more power. I grow people.(Participant 1, personal communication, January 20, 2001).

Many teachers described their experiences with the politics of the era and how they were not treated professionally. They spoke of the pressure and frustration some reform-based teachers currently feel teaching mathematics in California. One teacher described the current post-reform era as a “time of pressure.” She attributed this feeling to concerns over high-stakes testing.

We have moved into accountability, assessment pressure time. I think teachers are so far from the feelings of the early decade. I think teachers are throwing up their hands saying there is too much testing, too much material (Participant 6, personal communication, January 21, 2001).

This pressure the teachers felt resulted in a decrease in morale and a desire to leave the classroom.

I think the morale is low. I think it has gone from extremely high overall in the reform era to very low now. I must admit, I was associating with people who believed in that [new] direction. Now, there is pressure and frustration (Participant 6, personal communication, January 21, 2001).

Thus, the results herein concur with Harris and Associates' (1984) findings that the teachers who participated in the reform effort felt left out of the decision-making process and, consequently, experienced decreased morale.

### **Unintended Consequences of Cycles of Reform**

The data in this study reflect teachers' attitudes toward their profession after the cycle of reform ended in California. Consequently, it is difficult to show any quantifiable impact using pre- and post-reform data. However, teachers did report their beliefs about what they see as the impacts of the cycle of reform on their attitudes and the attitudes of their colleagues. Based on the interview data and specific statements made by the teachers interviewed, cycles of reform may indeed lead to increased teacher shortages and a lack of trust or involvement in future reform efforts.

#### ***Increased teacher shortage***

In 1997, the California Commission on Teacher Credentialing (CCTC) released a report on teacher induction and certification for the 21<sup>st</sup> century describing the current teacher shortage in California. It claims:

California needs more new teachers to enter the profession than at any prior time in the State's history ... teacher shortages are caused in part by problems of teacher attrition.... California schools cannot achieve equilibrium between teacher supply and demand while attrition rates remain high due to lack of continued preparation and support. (CCTC, SB 1422, p. 1)

The findings of this study suggest that cycles of reform may cause attrition. Four of the six teachers interviewed left their classrooms and are no longer teaching. As one said:

People are looking for early retirement. It is not that we got enthusiastic about something and now it is not there.... My big concern is how are we



going to get more people into this profession with all of this going on?  
(Participant 4, personal communication, January 21, 2001).

### ***Lack of trust and interest in future reform efforts***

As evidenced in the results of this study, the teachers experienced a political cycle of reform in their practice. The cyclical nature of reform is well-documented. If policy again changes for these teachers in California, it will be important to consider their possible responses. When speaking about the end of the reform movement in California, participants voiced distrust and discouragement. They discussed their attitudes toward future reform movements and how they may be hesitant to participate in future reform efforts. One teacher noted:

I will hesitate to put so much heart and soul into it. Not from fear of being burned again, but from a different sense of reality. My own attitude is that some amount of opposition is going to occur and not all of it will be misguided. Some of it will be merely reactionary and have little thought behind it. Opposing views need to be heard through and either carefully refuted or incorporated. Many teachers who went through this round of reform/counter-reform won't be around for the next round. Many will merely shrug it off as just another thing "they" are asking us to do  
(Participant 1, personal communication, May 22, 2001).

## **Conclusion**

The results of this study suggest that the group of mathematics teachers participating in this study no longer view their profession highly after the reform era in which they were involved ended. Specifically, teachers no longer feel free to make decisions without being subject to outside review. The findings also indicate that these teachers were supportive of the mathematics reform movement in California. The most notable features that shaped and solidified their beliefs about reform were the creation of support networks and development of an intellectual foundation, which they received through their participation in a collaborative, intensive mathematics professional development experience. This experience was so profound for some that, although the reform era ended in California, their beliefs about teaching children mathematics continues. As one teacher described:

So many teachers have told me that you can't take away from them what they have deeply learned, practiced in the classrooms, and witnessed the results of with students. Once teachers change their ideas and practice, just taking away the books and changing state testing programs won't take away the ideas of reform. They often say "you can't go back," and I

totally agree. I feel deeply inside that I am a different teacher and leader of staff development than I was before the reform efforts of the late 80s and 90s. Many of us so deeply involved in these issues have felt like the "math war" analogy was accurate. I think it has been an extremely emotional time, but I didn't get killed in the "war," and those teachers who deeply understand reform are still alive and well (Participant 6, personal communication, June 4, 2001).

However, although they experienced a change in their beliefs and practice during this reform era, the current research found that the participants still felt left out of the decision-making process. These findings support Goodwin's (1987) contention that, in education, politicians and administrators dominate while the "voices of teachers are silent" (p. 32). It appears that cycles of reform may impact the profession significantly. If cycles of reform continue, teachers may become less willing to be involved with future reform efforts. Furthermore, such cycles of reform may lead to a decrease in teachers' morale, which may in turn lead to teachers leaving the profession, thereby creating an increased teacher shortage. Cohen and Hill (2000) contend that teachers are a "key connection between policy and practice" (p. 296). If teachers are so vital to this process, then why were they not asked their opinion about the policies they were mandated to implement in their classrooms?

I suggest further study be conducted on reform and its impact on teachers attitudes and beliefs about their profession within and beyond the U.S. context including those who have more divergent beliefs about reform. Such a study would allow researchers to compare the professional attitudes and beliefs among teachers who differ philosophically while providing an international perspective. It would also be useful to examine teachers at the pre-service level in order to see how attitudes about reform begin to evolve in new teachers as well.

The findings of this study indicate that cycles of reform may have an impact on teachers' morale and the profession in general. Because of the projected teacher shortage in mathematics education, most notably in the United States, I feel that it was essential to explore teachers' views about their profession in light of their experiences with reform. It is my hope that this discussion gave voice to the teachers who implemented reform-based practices into their classrooms and that these voices will encourage future dialogue concerning reform efforts, professional development, and policy within and beyond the American educational system.

### References

- Becker, J. P., & Jacob, B. (2000). The politics of California school mathematics: The anti-reform of 1997-99. *Phi Delta Kappan*, 81(7), 529-537.
- Bohlin, C. (2001). Teacher leadership development as a critical component of systemic reform: The San Joaquin Valley Mathematics Project. In C. Nesbit, J. Wallace, D. Pugalee, A. Miller, & W. DiBiase (Eds.), *Developing teacher leaders: Professional development in science and mathematics* (pp. 147-174). Columbus, Ohio: ERIC Center for Mathematics, Science and Environmental Education.
- Burns, M. (1999). *What's reform all about*. Sausalito, CA: Math Solutions Publications.
- California Department of Education. (1985). *Mathematics framework for California public schools—Kindergarten through Grade Twelve*. Sacramento, CA: Author.
- California Department of Education. (1987). *Caught in the middle: Educational reform for young adolescents in California public schools*. Sacramento, CA: Author.
- California Department of Education. (1992). *Mathematics framework for California public schools—Kindergarten through Grade Twelve*. Sacramento, CA: Author.
- California Department of Education. (1999). *Mathematics framework for California public schools—Kindergarten through Grade Twelve*. Sacramento, CA: Author.
- California Commission on Teacher Credentialing. (1997). *Recruitment and preparation of teachers for mathematics instruction: Issues of quantity and quality in California*. Sacramento, CA: Author.
- Carnegie Foundation for the Advancement of Teaching. (1988). *Report card on reform: The teachers speak*. Princeton, NJ: The Carnegie Foundation.
- Cohen, D., & Hill, H. (2000). Instructional policy and classroom performance: The mathematics reform in California. *Teachers College Record*, 102(2), 294-343.
- Cohn, M. (1985). *Talks with teachers: A preliminary analysis*. Washington, DC: National Institute of Education.
- Cronbach, L. J., Bradburn, N. M., & Horvitz, D. G. (1994). *Sampling and statistical procedures used in the California Learning Assessment System*. Palo Alto, CA: CLAS Select Committee.

- Cuban, L. (1989). The persistence of reform in American schools. In D. Warren (Ed.), *American teachers: Histories of a profession at work* (pp. 370 - 392). New York: Macmillan.
- Cuban, L. (1993). *How teachers taught: Constancy and change in American classrooms, 1890-1990*. New York: Teachers College Press.
- Darling-Hammond, L. (1985). Beyond standardization: State standards and school improvement. *Elementary School Journal*, 85(3), 315-336.
- Darling-Hammond, L. (1987). The over-regulated curriculum and the press for teacher professionalism. *NASSP Bulletin*, April, 22-29.
- Darling-Hammond, L. (1988). Policy and professionalism. In A. Lieberman (Ed.), *Building a professional culture in schools* (pp. 55-77). New York: Teachers College Press.
- Dobay, C. V. (1988). *Seeds of mediocrity*. Lanham, MD: University Press of America.
- Engvall, R. (1997). *The professionalization of teaching: Is it truly much ado about nothing?* Lanham, MD: University Press of America.
- Fey, J. & Graeber, A. (2003). From the New Math to the Agenda for Action. In G. M. A. Stanic & J. Kilpatrick (Eds.), *A recent history of mathematics education in the United States and Canada*. Reston, VA: National Council of Teachers of Mathematics.
- Fullan, M. (1991). *The new meaning of educational change*. New York: Teachers College Press.
- Goodlad, J. (1975). *The dynamics of educational change*. New York: McGraw-Hill.
- Goodwin, A. L. (1987). Vocational choice and the realities of teaching. In F. S. Bolin & J. M. Flak (Eds.), *Teacher renewal* (pp. 30-36). New York: Teachers College Press.
- Hall, R. H. (1968). Professionalism and bureaucratization. *American Sociological Review*, 33(1), 92-104.
- Hargreaves, A., & Fullan, M. (Eds.). (1992). *Teacher development and educational change*. London: Falmer.
- Harris, L., & Associates. (1984). *The Metropolitan life survey of the American teacher*. New York: Metropolitan Life.
- Jacob, B. (2000, August). *The impact of the back to basics policies: One year after state board action*. Paper presented at the 9th International Congress on Mathematical Education, Tokyo.
- Jacob, B. (2001). Implementing standards: The California mathematics textbook debacle. *Phi Delta Kappan*, 83(3), 264-272.
- Lortie, D. (1975). *Schoolteacher: A sociological study*. Chicago: University of Chicago Press.

- Lloyd, D. (1996). *Understanding American education: Its past, practices, and promise*. Burke, VA: Chatelaine Press.
- Mills, R. P., & Stout, D. L. (1985). *Listening to teachers. Teaching in America: The possible renaissance*. Denver, CO: Education Commission of the States.
- National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform*. Washington, DC: U.S. Government Printing Office.
- National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author.
- Pitman, A. J. (1987). Teacher professionalism. In T. A. Romberg & D. M. Stewart (Eds.), *The monitoring of school mathematics: Background papers* (Volume 3: *Teaching and future directions*). Madison, WI: Wisconsin Center for Education Research.
- Rasch, G. (1960). *Probabilistic models for some intelligence attainment tests*. Danmarks Paedagogiske Institut. (Reprinted by University of Chicago Press, Chicago, 1980).
- Romberg, T. A., Webb, N., Pittelman, S., & Pitman, A. (1987). *1986 annual report to the Ford Foundation: The Urban Mathematics Collaborative Project* (Program Report 87-4). Madison, WI: Wisconsin Center for Education Research.
- Romberg, T. A., Pittelman, A., Pittelman, S., Webb, N., Fadell, E., & Middleton, J. (1988). *Mathematics teachers' views about teaching as a profession: A report from the Urban Mathematics Collaborative Documentation Project*. Madison, WI: Wisconsin Center for Education Research.
- Sergiovanni, T. J., & Starratt, R. J. (1993). *Supervision: A redefinition*. New York: McGraw-Hill.
- Shanker, A. (1989). Reform and the teaching profession. In L. Weis, P. G. Altbach, G. P. Kelly, H. G. Petrie, & S. Slaughter (Eds.), *Crisis in teaching: Perspectives on current reforms* (pp. 99-110). Albany, NY: State University of New York Press.
- Strike, K. A. & Ternasky, P. L. (1993). Ethics in Educational Settings. In K. A. Strike & P. L. Ternasky (Eds.), *Ethics for professionals in education* (pp. 1-9). New York: Teachers College Press.
- Wallace, M. (1991). Flexible planning: A key to the management of multiple innovations. *Educational Management and Administration*, 19(3), 180-192.
- Wright, B. D. & Linacre, J. M. (1991). *BIGSTEPS computer program for Rasch measurement*. Chicago: MESA Press.
- Wu, H. (1998). The mathematics education reform: Why is it and why should you care? Retrieved November 30, 2007, from <http://math.berkeley.edu/~wu>

**Author:**

**Diana L. Treahy**, School of Education, Health and Human Performance, College of Charleston, 66 George Street, Charleston, SC 29424, USA; treahyd@cofc.edu