

WORKING P A P E R

Teachers as Implementers of Mathematics and Science Systemic Reform Policies

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Abstract:

A persistent challenge facing education policies has been the difficulty of ensuring local implementation of instructional reforms by teachers. Despite numerous instructional reform initiatives, teacher practices have remained relatively constant over the past century. Some research studies attribute the lack of implementation of local reforms to teachers' interpretation of the policy messages underlying these reforms, which may be influenced by their views of their discipline and their students, and by the social context of the school, which influences not only their interpretation, but also the extent and quality of implementation. In this study, the authors examine teachers' response to policy messages related to mathematics and science reforms. Using information collected from semi-structured interviews, teacher surveys, and teacher daily logs, the authors identify the policy messages that influence teachers and discuss the factors that either facilitate or hinder teachers' implementation of these policies.

Systemic reforms have been a widely adopted approach used by states and local districts to foster improvements in student achievement. These reforms consist of policies designed to align multiple parts of the education system, such as professional development, curricula, standards, and assessments, toward common goals (Smith & O'Day, 1991). With National Science Foundation (NSF) funding alone, systemic reforms in mathematics and science education have been implemented in over 20 states since 1991 (Hamilton et al., 2003; Laguarda, Goldstein, Adelman, & Zucker, 1998). Many of the NSF-funded initiatives have incorporated curriculum materials, instructional practice, and professional development that are aligned with mathematics and science standards promulgated by national professional organizations such as the National Council of Teachers of Mathematics (1989; 2000), the American Association for the Advancement of Science (1993), and the National Research Council (1996). To date, however, evaluations of these NSF-sponsored large-scale systemic reforms have found only limited evidence that these reforms positively impact student achievement (Cohen & Hill, 2000; Hamilton et al., 2003; Laguarda et al., 1998).

Determining the extent of teachers' implementation of reform-based practices is critical to understanding the limited evidence of student achievement gains under systemic reform programs. Studies indicate that systemic reform programs have had remarkably uneven effects on teachers' practices within districts that have participated in reforms, and even within the same schools (Shields, Marsh, & Adelman, 1998). Although supportive of the concepts underlying these reforms, teachers were often uncomfortable with and only partially successful in applying those concepts in their classrooms (Shields et al., 1998). Teacher responses to these reforms have often resulted in piecemeal implementation, rather than complete adoption of systemic reform practices (Knapp, 1997). Some studies have focused on the types of supports provided to

teachers such as the quality and intensity of professional development or the availability of instructional materials, in an attempt to understand some of the uneven implementation of systemic reform practices (Corcoran, Shields, & Zucker, 1998). Other studies focus on the role of the district in supporting reform—particularly the leadership structure and organizational management (McLaughlin and Talbert, 2003). Still other studies view the uneven impacts of teacher practice within the context of policy implementation and suggest that a key area of systemic reforms that requires additional investigation is how policy messages move along different avenues of influence available to policymakers, particularly which messages reach and are implemented by teachers (Knapp, 1997). The literature on implementation has recognized that policy messages, or understandings of what policies are intended to accomplish, may differ between policymakers and policy implementers (Spillane, Reiser, & Reimer, 2002). Yet few studies have examined how teachers are responding to the policy messages from systemic reforms as well as from other on-going educational reforms (Drake, 2002; Knapp, 1997).

The primary goal of this study was to (1) determine the extent to which teachers are aware of policy messages from the NSF-sponsored Local Systemic Change (LSC) program and other educational reforms reach teachers; (2) examine how teachers are responding to the policy messages; and (3) identify areas for further research on the efforts to change teacher classroom practices.¹ The LSC program was designed to improve instruction in science, mathematics, and technology through teacher professional development and curriculum adoption within school districts (Hamilton et al., 2003; Klein et al., 2000). As with other NSF-supported systemic initiatives, the LSC program was expected to align policy and practice and encourage the adoption of recommendations published in national standards documents (National Council of

¹ This study is part of a larger longitudinal study of the relationship between teacher instructional practices and student achievement in mathematics and science, Mosaic II, National Science Foundation Grant No. ESI-9986612.

Teachers of Mathematics, 1989; National Research Council, 1996). These documents promote the use of classroom practices that engage students as active participants in their own learning and that enhance the development of complex cognitive skills and thinking processes. We refer to these practices as “reform-based” throughout this paper. Some evidence suggests small positive relationships between these reform-based classroom practices and improved student achievement (Hamilton et al., 2003; Klein et al., 2000). The following two sections discuss the research on teachers’ role in policy implementation and the multiple sources of policy messages directed toward teachers.

Recognizing Teachers as Policy Implementers

A common challenge facing education policies to date has been the persistent difficulty of ensuring local implementation of instructional reforms by teachers. As Tyack and Cuban (1995) bemoan in their review of public school reform, “Change where it counts the most—in the daily interactions of teachers and students—is the hardest to achieve and the most important” (p. 10). Their review found that the practices of classroom instruction have remained relatively constant over the past century. For example, an analysis of teacher instructional practices over the past century concluded that teacher-centered instruction continues to dominate classrooms, with few exceptions (Cuban, 1993). Early policy implementation research recognized the importance of “ground-level” actors who were tasked with enacting policies (Pressman & Wildavsky, 1973), and education researchers have gradually come to recognize the importance of teachers as the key to the successful implementation of instructional policies (Odden, 1991).

The research literature on education policy implementation has begun to illuminate the reasons for the inertia associated with attempts to change teacher practices. From an organizational theory perspective, teachers have maintained considerable control over the

implementation of policies from districts and other education agencies (Cuban, 1993; Tyack & Cuban, 1995). Though recent education policies such as curriculum content standards and student standardized tests have attempted to influence teacher practices in significant ways, teachers continue to have a relatively high degree of control over the content and delivery of instruction because schools cannot afford to monitor day-to-day classroom instruction. (Meyer & Rowan, 1978; Tyack & Cuban, 1995). The lack of incentives for enacting instructional reforms is another factor that may contribute to the unwillingness of some teachers to change the practices that they are already utilizing.

The cognitive science perspective has also yielded valuable research that suggests some reasons for why teachers may not implement instructional practices to the extent promoted by policymakers. Rather than attributing the lack of successful policy implementation to teachers' stubborn unwillingness to change, the cognitive perspective provides potential explanations for why teachers may have attempted but failed to adopt new instructional practices. In their comprehensive review of policy implementation and cognition, Spillane, Reiser, and Reimer (2002) propose that teachers may have difficulty fully adopting new policies due to a number of reasons such as different interpretations of the policies or understanding only superficial features of policies while missing deeper reform concepts. In addition, the beliefs of teachers—e.g., their views of their discipline and their students—may also influence their interpretation of new policies, perhaps even interfering with their ability to understand these policies (Spillane et al., 2002). Since teachers' beliefs may change over time, teachers' willingness and ability to change their practices may also vary with experience (Drake, 2002). The cognitive perspective also recognizes the influence of social pressures on policy implementation. Teachers interpret and implement policy messages within a social context that can include many actors, particularly

other school personnel, who may impart values and ideas about reform practices that can influence the extent and quality of teachers' implementation of instructional policies (Spillane, 1999; Spillane et al., 2002). Our next section examines these social contexts of policy messages in more depth.

Contexts that Influence Teachers

In the decentralized decision-making environment of the current public education system, context plays a critical role in shaping teachers' implementation of policy messages. McLaughlin and Talbert (1993) have developed a relevant and comprehensive framework that identifies influences on teacher practices due to classroom and school context, family and social context of the school, and curriculum and professional development requirements (Knapp, 1997; McLaughlin & Talbert, 1993). It is important to note that although systemic reforms are directed toward aligning policies within the education system, these reforms are likely to have control over, some of the categories described above. Because these various, often competing, contexts influence teachers implementation of policy messages, it is important to know which policy messages from systemic reforms actually reach teachers before one can determine whether those policy messages are implemented and how influences from other sources either facilitate or hinder teachers' implementation of policy messages.

As the recipients of policy messages from multiple contexts, teachers become the interpreters and brokers of these messages. As interpreters, teachers' understanding influences their subsequent practices which can either be aligned or in conflict with the intended messages from policymakers depending on the teacher's interpretation of the message. As brokers, teachers must balance the importance of multiple policy messages, determining which messages

may reinforce or in some cases compete against each other. Our results will provide some examples of how teachers are managing these multiple sources of policy messages.

Based on documentation and feedback from site personnel, the essential practices that LSC sites utilized to convey their policy messages were professional development and curriculum adoption. Professional development in all of the sites included district-wide opportunities for teachers to learn about reform-aligned curricula and instructional practices. For instance, one site required all teachers to develop individual professional development plans and offered a menu of workshops that teachers could attend. Examples of curricula implemented in the sites included algebra programs (e.g., Engineering Math or Connected Math) that emphasized alternative teaching strategies such as the use of manipulatives or alternative assessment practices that were aligned with reform goals and district-developed science curricula that incorporated hands-on, inquiry-based instructional approaches.

Data Collection and Analysis

We gathered data from 30 teachers in three school districts that implemented the LSC program in order to determine whether teachers in these sites were aware of the policy messages from the LSC and other reforms and if so, how they were responding to them. . Each of the LSC sites received NSF funding for five year periods to fully implement their reforms, and our study occurred two to three years after the end of those grant funding periods under the assumption that the sites had ample opportunity to fully implement their reforms. In order to select the groups of teachers to be included in our study, three schools were randomly selected in each district, and at least two teachers, either mathematics or science were randomly selected within each school.² The groups of participating teachers represented five subject-grade level combinations (e.g., 5th grade mathematics) as indicated in Table 1. The decision to sample teachers within the same

school was intended to provide some information about the extent to which teachers' responses were similar within schools. As shown in Table 1, a total of 30 teachers out of approximately 290 were included in our study from across the three sites.

Table 1

Characteristics of Data Collected from Teachers

Site	Grade and Subject Area	No. Interviews	No. Surveys	No. Daily Logs
A	5 th grade mathematics	5	5	5
A	9 th grade mathematics	5	5	5
B	5 th grade science	4	4	4
B	8 th grade mathematics	8	8	8
C	8 th grade science	8	7	7
		30 total	29 total	29 total

The number of teachers per group varied from a minimum of four in one group to a maximum of eight teachers in two groups. Differences in teacher grade levels and subjects across the sites reduced the ability of our analysis to compare data across sites, but our selection method did allow us to compare how, if at all, LSC reforms were influencing teachers within sites. Our sample of respondents included 18 teachers who were asked about their mathematics teaching practices and 12 teachers who were asked about their science teaching practices. The teaching experience of respondents ranged from one year to 31 years, with an average of approximately 12 years. Likewise, teachers' experience at their grade levels were between one year and 30 years, but the average was approximately eight years. All of the teachers had bachelor's degrees and teaching certificates. Five teachers were working toward their master's degrees, 12 teachers

² Teachers were selected at the same grade levels as the 2003 data collection cycle for our longitudinal study.

had already earned their master's degrees, and one teacher had both a masters and a doctoral degree.

In order to explore teacher perspectives on reform activities as well as their instructional practices, our analysis included three data collection methods: semi-structured interviews, teacher surveys, and teacher daily logs. A semi-structured interview protocol was designed to gather information from teachers about the influence of local systemic reforms and other policies on their practices. Each interview lasted approximately 45 minutes and was conducted and recorded over the phone. The interview protocol consisted of questions designed to determine whether teachers were aware of the district reforms, and to what extent professional development and curricula were consistent with those fostered by the LSC systemic reform. In addition, the interview protocol explored additional influences on teacher practices such as state-mandated testing and accountability requirements that can significantly impact teacher practice (Corcoran et al., 1998; Hamilton, 2004; McLaughlin & Talbert, 1993; Stecher, 2002; Supovitz, Mayer, & Kahle, 2000).

Surveys and daily logs were also used to obtain information on the instructional practices of teachers.³ All but one of the teachers completed both the survey and daily log (see Table 1). The survey included questions about teachers' educational background and experience, their participation in professional development, the curriculum taught in classes, and their use of a variety of teaching practices. As a means of obtaining additional descriptions of classroom practices, the survey also included short, "vignette-based" items that asked teachers to rate the degree to which various teaching practices corresponded to what they would implement in their own classrooms. Whereas the surveys focused on overall patterns of behavior, the daily logs

focused on teachers' activities during a specific two-day period. Daily logs asked teachers to indicate the time spent on selected pedagogical practices, students' time spent on identified activities, and whether certain activities occurred at all during a lesson.

The analysis of data from interviews, surveys, and daily logs relied primarily upon qualitative data analysis techniques followed by exploratory quantitative analyses to identify themes and patterns across the data. The interviews were analyzed using grounded theory methods of coding and microanalysis of the data (Strauss & Corbin, 1998). Interviewer notes were the data source from the interviews and were analyzed using the qualitative data management software, ATLAS.ti (Scientific Software Development, 2003). Recordings of the interviews were archived as a reference to draw direct quotations for the analysis. A literature review informed a preliminary list of codes, which was refined using input from interviewers and new themes found in the interviews. Two reviewers conducted and reviewed the coding in order to ensure the consistent application of codes to the data. The analysis of the quantitative survey and daily log data was conducted in conjunction with the iterative process of analyzing the teacher interview data. Analysis of the quantitative data primarily consisted of identifying patterns across teacher responses based on themes from the analysis of the interview data. The following sections discuss the results of our analyses by examining teacher responses to policy messages from systemic reforms and other sources and by presenting several illustrative cases of teachers who reported changing their practices in response to LSC policies.

³ These surveys and logs were developed for the broader study of the relationship between the LSC reforms and student achievement. Please see Le et al. (2003) for additional description of the development of the surveys and daily logs, as well as a discussion of the creation of scales from these data sources.

Results

Teacher Awareness and Understanding of LSC Policies

An initial step in our study was to determine whether teachers were familiar with the intended policy messages of the LSC programs to implement reform-oriented instructional practices. Based on our interview data, twenty-seven of the thirty teachers interviewed were able to describe the main objectives of their local school district in their subject area by either citing the specific curriculum program adopted by the district or by using terms associated with reform-oriented instruction such as active student participation, inquiry-based instruction, and hands-on practices. As an 8th grade mathematics teacher explained:

[The district's] objectives were focused on constructivist and discovery methods.

These objectives focused on having students determine patterns and see

relationships whether numeric or not. For example, students are presented with

stories and situations and allowed to find systems and determine patterns.

The three teachers who were not familiar with the LSC policies did not participate in many professional development activities and had been with the district for less than five years. These results suggest that the district LSC programs were, for the most part, successful in conveying the message of their intended policies to their teachers.

Teacher Responses about Their Classroom Practices

The significant components of the LSC program, curriculum policies and teacher professional development, were designed to influence teachers to implement reform-based instructional practices in their classrooms. To explore teacher instructional practices, we asked teachers which type of teaching style best mirrored their own: A) a style that focused on developing conceptual understanding and critical thinking skills as well as a depth of knowledge

in fewer content areas or B) a style that focused on a broad coverage of topics and more teacher-directed instruction, teaching facts and skills first rather than a more inquiry-based approach. We designed the description of Style A to incorporate more reform-oriented practices, while the description of Style B incorporated fewer reform-oriented practices.

Thirteen teachers, or about 43% of the sample, believed their instruction was more aligned with the reform-oriented style, often describing their use of hands-on instruction and inquiry-based strategies. As one 5th grade science teacher explained, “My teaching is very activity-based. I take any information that I’m teaching and try to present it in very hands-on ways, which may lead to some research projects. I try to have students learn things on their own initially.” Overall, teachers who viewed themselves as more aligned with a reform-oriented style reported participating in more professional development over the past year. The daily logs confirmed that teachers who aligned themselves more with a reform style reported implementing more reform practices in their classrooms. These teachers tended to report spending more time discussing and explaining ideas, asking more open-ended questions for understanding, and allowing students to work more often in mixed ability groups.

Only four teachers, approximately 13% of the sample, felt their practices matched the teaching style that was less reform-oriented. These teachers responded that they generally covered a broad range of topics and concentrated on transmitting knowledge to students by teaching facts and skills. These four teachers all cited state and district requirements, particularly content standards, as being too numerous, and several teachers stated that if it was not for those requirements they would instruct using more reform-oriented practices. We will discuss the influence of state content standards and other policy messages to teachers in the following sections.

The remaining 44% of teachers reported that their teaching styles incorporated aspects of both styles offered in our interview. About equal numbers of mathematics and science teachers reported using both styles. One 9th grade math teacher described how she combined reform and traditional teaching styles:

There are a set number of topics that we must get through based on state standards. In order to do that, math teachers must—absolutely must—make sure that the kids understand them. Unfortunately, that does not create true understanding, so what I try and do is those types of problems first, and then open it up to exploration-type questions, problem-solving questions.

For teachers who incorporated both teaching styles, professional development was cited as a primary source of influence on their teaching practices, usually supporting their efforts to incorporate more reform-oriented practices. On the other hand, the content and accountability associated with state standardized assessments also influenced the practices of these teachers and the content of their classes. For mathematics in particular, standardized assessments pushed teachers to utilize less reform-oriented practices. As one 9th grade mathematics teacher explained about the pressures of these assessments, “It makes me crunch reviews in, immediately prior to tests. It has tied up time I would have preferred to delve in for deeper understanding for my students.” These data suggest that the instructional practices promoted by the LSC sites were, to some extent, being implemented by most teachers we interviewed. However, it is important to note that the results discussed to this point do not imply any causal explanation for whether the LSC policies caused any of these teachers to change their instructional practices. Policy messages from other sources to be discussed later such as state standards and testing policies may have also shaped teacher practices. In addition, many of these teachers may have adopted

reform-oriented practices prior to their exposure to LSC policies. To explore some causal explanations for changes in teacher instructional practices, our final set of results explores several cases of teachers who reported changing their instructional practices in response to policy messages that they received.

Professional Development

Professional development influenced the instructional practices of most teachers we interviewed. Teachers reported that professional development activities focused on instructional practices and curricula were consistent with the policy messages of LSC sites. Twenty-five of the 30 teachers reported having changed their practices at least to some extent as a result of participating in professional development. For instance, one 9th grade mathematics teacher responded, “I got away from the lecture and notes approach to teaching and I moved more towards [using] manipulatives and allowing kids to discover how things work in math instead of just telling them.” These professional development activities varied in length from hour-long workshops to weeklong seminars. The extent of teachers’ changes varied, with several teachers perceiving that the reform-oriented practices that were promoted in professional development were similar to their existing practices. An 8th grade science teacher explained, “It [professional development] didn't influence me a whole lot because that's the style I taught anyway. It's just that I didn't teach it that formally, so it wasn't that hard to change over.”

Our survey asked teachers to respond about their participation in either mathematics or science professional development related to content, teaching methods, curriculum, student thinking, standards, assessments, or technology use. For both mathematics and science, teachers received the most professional development in the use of particular curricula or curriculum materials, averaging 4-8 hours of professional development over the past 12 months. Teachers

surveyed about mathematics responded that they participated in more hours of professional development than teachers surveyed about science. Teachers in mathematics professional development also reported receiving an average of over 4-8 hours of professional development related to teaching methods and standards over the past 12 months. These results suggest that professional development activities were an important venue for conveying policy messages related to the use of district-sponsored curricula and methods and that districts were more focused on mathematics professional development. As discussed later, this focus on mathematics is not surprising based on the policy message that states are sending using state standardized testing requirements.

Curriculum Adoption and Use

Teacher responses across all groups also indicated that reform-oriented curricula were being widely implemented in classrooms; however, in some cases these curricula were modified to meet classroom needs. For instance, some teachers described changing the order in which concepts are taught while others supplemented the curricula with other resources available to them. As an 8th grade mathematics teacher described, “The curriculum is pretty set as to the order of things, but teachers can be flexible in combining investigations, and it’s easy to guide students or give them more slack, and to switch things around.” One factor that teachers explained as important to their adoption of these curricula was the support of their school administrators and other teachers. This support took the form of teachers sharing instructional materials and ideas about practices as well as administrators providing meeting times for teachers to discuss curriculum and allowing teachers to attend additional professional development. Thus, in the case of, curriculum adoption and use, the curricular policy message was mediated by the school context.

Instruction Aligned to State Standards

Teachers identified policy messages in addition to those from the LSC programs that also influenced their instructional practices. As mentioned earlier, the focus of state policies on standards-based instruction was an important influence on teachers. About 77% of our sample teachers responded that content standards had influenced their instruction. Teachers often explained that the number of standards was too great, limiting the amount of time available to delve into specific standards in more depth. For example, one 9th grade math teacher aligned himself with a non-reform teaching style because:

I'm trying to address the standards and they [district personnel] ask teachers to look at a variety of concepts. Because of the breadth of the curriculum, I don't go into as much depth as I might like to on some topics, though sometimes I do.

These findings suggest that state standards may unintentionally force teachers to choose between implementing the state content standards and adopting the reform practices that were supported by the LSC program. One trend in our interviews was that more experienced teachers did not seem to vocalize their need to make this choice between state standards and reform-oriented practices.

State Standardized Testing

State standardized testing seemed to encourage some aspects of the LSC reforms such as integration across subjects, though teachers also perceived some conflicts between testing and their instructional content and practices. Twenty teachers in our study reported that state standardized tests constrained them to narrow and realign their curriculum to focus on content covered on those tests. A 9th grade mathematics teacher explained how the emphasis on tests affected his instruction:

The emphasis on testing and standardized test scores narrows the curriculum. It's influenced my teaching because I'm not allowed to explore things in depth. For example, I'd like to take my classes to the computer lab to do online research but it's too time consuming.

Another 9th grade mathematics teacher echoed these sentiments by saying that she spends more time reviewing concepts at the expense of time spent engaging students in deeper understanding. Science teachers were also influenced by standardized tests as well, although less directly than math teachers and in some ways, more positively. The states in which our study's LSC sites were located did not administer standardized assessments in science. However, five of the 12 science teachers in our sample explained that they had modified their science instruction to include more language arts or mathematics—both subjects with state tests. An 8th grade science teacher explained:

Some of the math accountability requirements have influenced my teaching.

Because math is so closely related, our goal is to identify the areas of math we can help the math people prepare the kids on. We try to use the same terminology the math people use and from their curriculum, we try to identify the kinds of things that are important.

The alignment of science instruction with the assessments in mathematics and language arts is consistent with reform-oriented instruction that promotes curricular linkages across subjects.

State Accountability Policies

The public reporting of student and school performance is an important component of state accountability policies, and our study found that teachers responded to these policy messages by changing their instructional content and practices. About 47% of teachers

mentioned the added pressure from the district and the general public to place greater emphasis on student test-taking skills and the standards due to the public reporting of school performance and student test results.⁴ A 5th grade mathematics teacher described this pressure by stating, “Parent choice makes a difference in test scores. The school has lost students to different schools because the school's test scores are low.” In addition to pressures from the general public, the public reporting of a school’s test results reveals the performance of a school’s teachers to teachers in other schools. As one 8th grade science teacher described

Part of the influence was due to the nature of the human animal and not to end up at the bottom. The competition between schools of a similar student body is important. There is also a monetary reward for schools based on improvement or a high score. There is also the avoidance issue about not wanting to be at the bottom and having colleagues at other schools looking down on us. We’ve become very test-driven rather than being learning driven.

These data suggest that the public reporting provisions included in state accountability systems are pressuring teachers to align curricula within and across schools to improve student learning. Public reporting policies also seem to reinforce the importance of state tests, which as discussed earlier could hinder the implementation of LSC reform-oriented instructional practices if teachers devote more time to test-taking skills and reviewing concepts for tests.

Case Studies: Examples of LSC Reforms Influencing Teachers

This section describes two illustrative cases of teachers who stated that they changed their instructional practices dramatically in response to their exposure to LSC reforms,

⁴ In the context of this paper, state accountability policies are broadly defined as the public reporting of school performance and student standardized test results. An important aspect of these policies that results from public reporting is the expectation that parents may choose to send their students to other schools (Hamilton, et. al, 2002).

particularly professional development and new curricula. The change processes described in these cases demonstrate how LSC reforms can have dramatic influences on teachers and how specific components of these reforms were important influences on these teachers.

At the time of our interview, John Benjamin⁵ taught 8th grade science and was the head of the science department at his middle school. With 30 years of teaching experience, he had taught at both the middle and high school grade levels and was certified to teach biology and chemistry. John had extensive exposure to reform-oriented professional development since the implementation of the LSC program, participating in “summer institutes, half day workshops, and full day workshops” that included “how to produce change, content training, assessment training, differentiation, gifted and talented students, and implementing inquiry approaches in science.” Over the past year, John participated in more professional development than any other science teacher in our sample. When asked about his teaching style, he responded that he incorporated both reform and non-reform practices, but that he tended to utilize a more reform-oriented style. This was evident from his daily logs and survey responses, with above average time spent on hands-on activities, group work, and other reform-aligned instructional practices when compared to the rest of the sample teachers. When asked how reform-sponsored professional development had influenced his teaching, John was unambiguous:

The professional development has definitely influenced my teaching. It’s made me a lot more reflective about what I select to teach, why I elect to teach it, and how I assess it.

Basically everything has been influenced. In the last five to ten years, I have totally taught differently than fifteen to twenty years ago.

John attributed the changes in his instructional practices to the interactive teacher learning, the availability of lessons applicable to his classes, and the opportunities to experiment during the

reform-sponsored professional development. Figure 1 presents some quotations that illustrate how reform-sponsored professional development influenced John’s personal views and instructional approach.

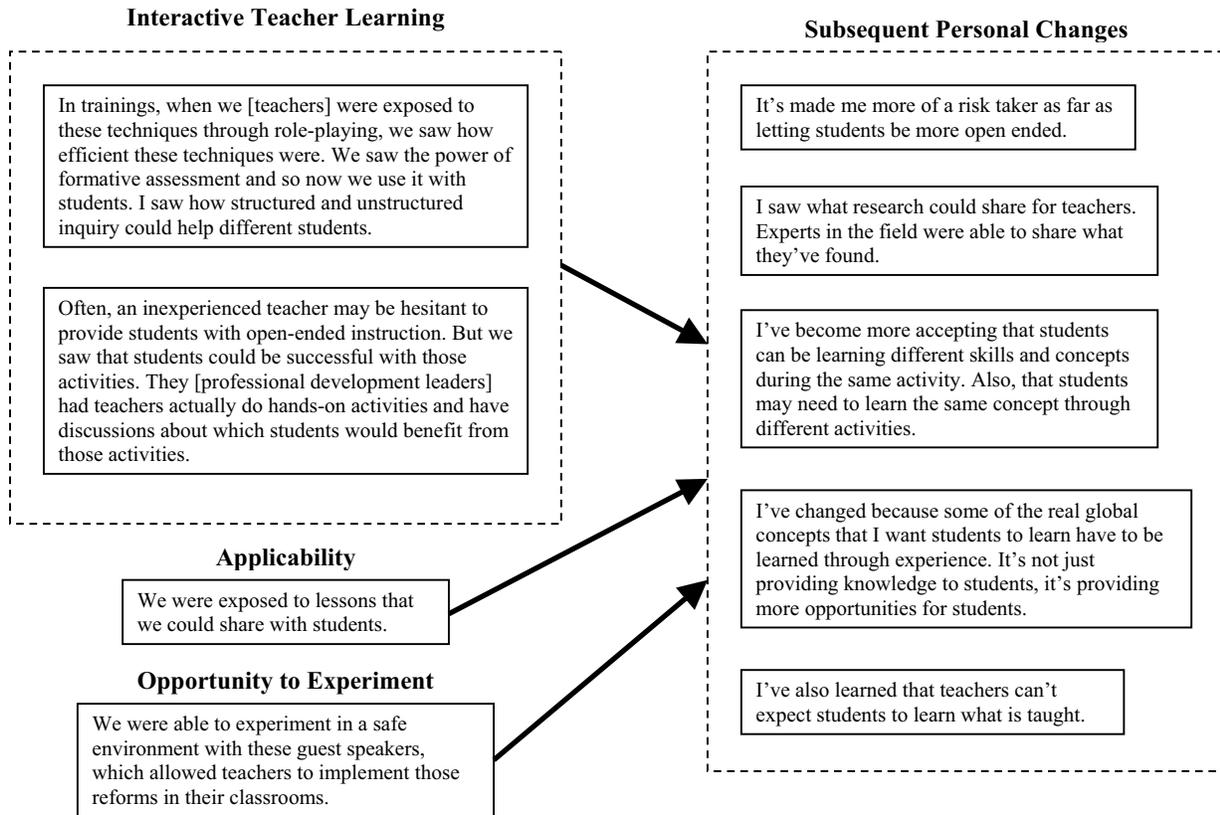


Figure 1. Diagram of John Benjamin’s quotations explaining his changes in instructional practices due to reform-oriented professional development

In the case of Jane Perry,⁶ a 7th and 8th grade math teacher with 20 years of experience, both the reform-sponsored professional development and curriculum provided the impetus for the changes in her instructional practices. At the time of her interview, she viewed her teaching style as very reform-oriented, and her daily logs showed above average time spent on discussing and explaining ideas and asking open-ended questions for understanding when compared to other

⁵ A pseudonym was used to protect the confidentiality of the study participant.

⁶ A pseudonym was used to protect the confidentiality of the study participant.

sample teachers. She had been “extensively influenced” by reform-sponsored professional development, having even presented at some of the workshops during the summers. She described the changes in her practices by saying:

When I graduated from college, my supervisor told me I needed to focus more on concepts than on algorithms, but I didn’t know what that meant. Now my teaching is 180 degrees different. I’m very sensitive about teaching concepts, developing algorithms, having students explain their work and justify their answers, working in groups, finding many ways to do things and then focusing in on what’s the most effective and efficient way to do it.

Prior to the LSC reform at her site, Jane’s attendance at National Council of Teachers of Mathematics meetings and district staff development helped her recognize the trend toward instructional practices that emphasized problem-solving skills and conceptual understanding. For her, the reform-sponsored curriculum was critical, as she explained, “A huge piece, for me, was to have a curriculum written that supported the type of teaching I wanted to do, and then to have the opportunity to use it.” The convergence of Jane’s interest in adopting reform practices and the reform-sponsored curriculum provided her with the necessary support to change her previous instructional practices.

The cases of John and Jane demonstrate some important LSC reform characteristics that can result in changes to teachers’ instructional practices. Components of the LSC reforms that induced changes in John and Jane included interactive teacher learning, applicability of content and curriculum to the classroom, opportunities to practice content, and opportunities to collaborate with other teachers. These LSC reform components are similar to the reform-oriented practices being promoted by national standards documents for students.

Conclusions

By using the perspective of teachers as policy implementers, this study has explored how systemic reform programs have influenced teachers' classroom practices and how other policy messages have influenced teachers' adoption of those goals. The results of our study certainly support other studies that have concluded that substantive rather than superficial change in classrooms is very difficult (Knapp, 1997; Shields et al., 1998; Spillane et al., 2002). Efforts of the LSC programs that we examined were successful to some extent, with most teachers responding that they were using reform-oriented classroom practices. Policy messages from the LSC programs seemed to be effectively reinforced through professional development and reform-aligned curricular policies.

However, our results suggest that while LSC programs were systemic at the local level, policy messages from sources such as state standards and tests were at times an impediment to teachers' implementation of reform-oriented practices. Teachers who perceived a conflict between local and state policy messages leaned toward instruction aligned with state policy messages, especially due to the reinforcing pressures of public reporting of student and school test performance. These results strongly suggest the necessity for future local systemic reforms to ensure the alignment of their policy messages with the messages from state policies or to provide guidance to teachers to help them respond effectively to the multiple messages they are receiving. Teachers' voluntary participation in professional development may have also contributed to the uneven implementation of reform-oriented classroom practices. Based on our data about teachers' instructional styles, teachers who participated in more professional development tended to implement more reform-oriented practices. However, many teachers with reform-oriented teaching styles responded that they were already employing reform-style

instructional practices, and that LSC-sponsored professional development simply supported their existing practices. Professional development activities were primarily voluntary, so lesser amounts of participation of some teachers, and the more conventional teaching approaches used by those teachers, should be a concern to policymakers who attempt to deliver their policy messages through such activities. More efficient methods of conveying policy messages may require more targeted approaches to identifying teachers who could benefit most from professional development activities.

As policymakers continue to intensify their efforts to influence classroom practices, additional research is necessary to learn how teachers are balancing the multiple policy messages that they are receiving from the policy environment. Our study has attempted to shed some light on the types of decisions teachers are making, such as the perceived choice made by some teachers—particularly less experienced teachers—between the breadth of standards-based instruction and the depth of reform-oriented practices. A critical question that arises is why some teachers perceive certain policy messages as conflicting while other teachers do not. Increasing our understanding of teachers as policy implementers may provide greater insight on the process of effectively influencing classroom instructional practices.

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