Designing Effective Professional Development Experiences:
What Do We Know?

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Associates

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Lucy Steiner

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1120 East Diehl Road, Suite 200
Naperville, Illinois 60563-1486
800-356-2735 • 630-649-6500
www.portercenter.org

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Background

In the last few years, challenging national standards have generated intense focus on student and teacher performance. Educators across the country have realized that improving teacher quality is a vital component of any strategy to create high-performing schools. Value-added studies in Tennessee by Sanders and Rivers (1996, as cited in Haycock, 1998) demonstrate that children assigned to three effective teachers in a row score up to 30 percentile points higher on math assessments than children assigned to three ineffective teachers in a row.

Unfortunately, research indicates that many teachers are not prepared to teach to high standards in this new environment (Cohen, 1990; Elmore, Peterson, & McCarthey, 1996). And furthermore, the professional development the majority of teachers engage in is not likely to improve their teaching practice. Most teachers still participate in "one-shot" workshops and report that these workshops have little impact on their teaching (Garet et al., 2001).

Clearly, designing strong professional development programs is essential to improving teacher quality. But, despite a wealth of information on professional development, schools are often not sure how to proceed. According to evaluation expert Thomas Guskey (2000), effective professional development planners use "backward planning." They first determine the student learning outcomes or goals that they want to achieve. This in itself is no small feat; it requires data collection and analysis and the input of a potentially wide range of stakeholders including teachers, students, parents, and administrators. But once this important step has been taken, the next question is often "How?" How do we improve teachers' ability to teach early literacy skills? How do we improve their content knowledge so they can expose students to more challenging mathematical concepts in middle school? How do we improve their willingness to introduce problem-solving and inquiry activities into their science courses? This is the "how" of professional development and it involves making a number of choices including, ultimately, what kind of experiences will motivate and enable teachers to acquire the knowledge and skills they need to implement the new practices.

Decisions about what experiences will be most effective should be largely driven by context. Planners need to consider variables such as available resources, other initiatives already underway, current practices and organizational culture as they determine what type of activity is best suited to a particular school and faculty. One set of teachers may be motivated and engaged by an action research project, for example, while another set of teachers might get more involved in collaboratively designing and implementing a new curriculum.

But what do we know about how well different professional development activities work? Available research does not provide definitive answers, although it does suggest some guidelines that can help teachers and administrators design effective professional development. Ultimately, research suggests that the underlying *characteristics* of an activity—particularly whether it is focused on the content that students will need to know and whether it is coordinated with an overall school improvement effort—are more

important than the *type* of activity that is chosen. For many professional developers who begin their planning by deciding on the type of activity they will use, this represents a radical shift in the typical design process.

Research

In the last two decades, researchers have focused a great deal of attention on professional development. Much of the writing has been case studies of individual schools or districts with promising programs (e.g., WestEd, 2000; Richardson, 2003) or authors' summaries of lessons learned from years of research and experience (e.g., Darling-Hammond & McLaughlin, 1996). But a growing body of research has focused on large-scale surveys of teachers about their professional development experiences (e.g., Parsad, Lewis, & Farris, 2001; Porter, Garet, Desimone, Yoon, & Birman, 2000; U.S. Department of Education, 1999; Supovitz, Mayer, and Kahle, 2000). Most of this research rates professional development as "effective" when it leads to desirable changes in teaching practices. But a small number of studies seek to hold professional development to a higher standard of effectiveness, linking its elements with improved student achievement (e.g., Wenglinsky, 2000; Wenglinsky, 2002; Cohen & Hill, 1998; Cohen & Hill, 2001; Kennedy, 1998; Carpenter et al., 2000).

Collectively, this research has identified certain characteristics of professional development activities that influence whether or not participants achieve their stated goals. The following synthesis of effective characteristics draws most heavily on the work of Garet, Porter, Desimone, Birman, and Yoon (2001).

Framework

After surveying a nationally representative probability sample of more than 1,000 teachers who participated in professional development sponsored by the federally funded Eisenhower professional development program, Garet et al. (2001) examined the relationship between characteristics of professional development and teacher outcomes while holding other variables constant. In their analysis, they examined both structural and "core" features to determine how the form and content of professional development activities influence teacher-reported outcomes:

Structural features:

- Form (Was the activity presented as a "reform" activity such as a study group or network, or as a traditional workshop or conference?)

- Duration (How many hours did participants spend and over what span of time did the activity take place?)

- Participation (Did groups from the same school, department, or grade level participate collectively? What opportunities did the teachers have for meaningful collaboration and reflection?)

Core features:

- Content focus (To what degree did the activity focus on improving and deepening teachers' content knowledge and their understanding of how students learn content?)

- Opportunity for active learning (What opportunities did teachers have to become actively engaged in a meaningful analysis of teaching and learning?)

- Coherence (Was the activity closely coordinated with school and district improvement efforts? Was the content in alignment with state standards and assessments?)

Form

Numerous researchers have documented the ineffectiveness of traditional professional development activities. Teachers have typically experienced these activities in two ways: Either they attend inservice days sponsored by their districts in which they are offered a menu of training options designed to transmit a specific set of ideas, techniques, or materials (Little, 1993), or they attend courses taught by university-based teachers with an academic rather than an applied focus (Stein, Smith, & Silver, 1999). Research has shown that neither of these approaches leads to substantive and sustained changes in teacher practice (Cohen and Hill, 2001; Parsad et al., 2001; Porter et al., 2000).

In contrast, "reform" activities such as study groups, teacher networks, mentoring, coaching, and other collaborative endeavors are believed to have more success changing teaching practice (Darling-Hammond, 1996; Little, 1993; Richardson, 1994). In their study documenting the effects of different characteristics, Garet et al. (2001) found a modest direct effect of activity type on enhanced knowledge and skill, indicating that reform activities have slightly more positive outcomes when all the other quality characteristics are included. However, they believe that these activities are more effective primarily because they are longer and, therefore, have some of the other core features such as content focus and active learning. When traditional formats such as workshops and institutes are longer, they too have better core features and are just as effective.

Duration

There is some evidence that when teachers experience professional development over a longer period of time, it has more effect on their teaching. A U.S. Department of Education (1999) survey of the Eisenhower professional development program found that when teachers report that their activities extended over a longer period of time, they cite more improvement in teaching practice. Cross-site examinations of the effects of a large-scale professional development program in math and science, the National Science Foundation Local Systemic Change (SLC) initiatives, also found that the duration of professional development is related to the depth of teacher change (Weiss et. al, 2004). One explanation for this may lie in how duration interacts with the core features of an activity. Garet et al. (2001) found that activities of a longer duration have more subject-

area content focus, more opportunities for active learning, and more coherence with teachers' other experiences.

Kennedy's (1998) review of existing research confirms that duration alone is not enough to ensure success. She found that variations in content have a stronger effect than whether the program takes place over time. Wenglinsky (2002) also found that when teachers spend time on professional development that is not focused on content, there is little impact on student outcomes. Differences in effect sizes also suggest that duration, in and of itself, is less important than the content of what is actually taught. For example, in a recent study examining how teacher knowledge of content and pedagogy improved as a result of participation in a summer institute, Hill and Ball (in press) found that longer institutes tended to have higher gains. However, there were several counter examples where shorter institutes produced higher gains, so this suggests that the focus and content of teacher's learning opportunities has a more important effect.

Participation

In the 1970s, researchers interested in school effectiveness consistently noted the importance of having a climate that promotes and supports collaborative planning and collegial relationships (Berman & McLaughlin, 1977; Venezky & Winfield, 1979). In the past two decades, researchers have looked more deeply into the question of school culture. A growing consensus has emerged in the field of professional development that planners need to move teachers away from traditional patterns of isolation and privacy and toward a new conception of teaching in which collaboration and shared inquiry are the norm.

The growing body of research into the effects of collective approaches to professional development has shown some promise. McLaughlin and Talbert (1993) found in a five-year case study of nearly 900 educators that teachers who belonged to strong professional communities were better able to adapt to the challenges of teaching today's students. Her findings are echoed in the work of several other researchers who attribute increased student performance to certain characteristics of highly collaborative schools. These characteristics include a focus on student learning, opportunities for shared practice and time for reflective dialogue with colleagues (Louis and Marks, 1998; Hord, 1998). Also, in a study of 24 schools in the midst of "restructuring," Newmann (1996) and associates found that in the more successful schools professional development was targeted toward groups within the school rather than individual teachers.

Content Focus

A few researchers have expressed surprise at the dearth of information about the content of professional development programs. Kennedy (1998) notes that there is a large body of literature on professional development, but most of it focuses on structure rather than content. Nevertheless, a strong body of research has recently emerged focusing on the effectiveness of professional development activities that focus on both subject-matter knowledge and an understanding of how students learn particular subject matter.

Kennedy's (1998) review of the effect of math teacher inservice programs on student achievement found that programs that focus on subject matter content and how students learn it had the largest positive effect on student learning. Garet et al. (2001) also note that content-focused activities had a substantial positive effect on enhanced knowledge and skills, as reported by the teachers in their sample.

Further evidence for professional development that is content based was recently presented by the assistant secretary for research and improvement at the U.S. Department of Education. Whitehurst (2002) stated that out of seven teacher characteristics that could increase achievement, participation in professional development that is focused on academic content and curriculum was second only to a teacher's cognitive ability. He included in his review Cohen and Hill's (1998) study of mathematics teaching in California, which found that, controlling for the characteristics of students enrolled, average mathematics achievement was higher in schools where teachers had participated in professional development focusing on teaching specific mathematics content, compared to the achievement in schools where teachers had not. "The things that made a difference to changes in their practice were those things that were integral to instruction: curricular materials for teachers and students to learn in class, assessments that enabled students to demonstrate their mathematical performance—and teachers to consider it— and instruction for teachers that was grounded in these curriculum materials and assessments" (Cohen & Hill, as cited by Schmidt, Houang, & Cogan, 2002, p. 14).

Further evidence that content-focused professional development is more effective is found in the work of Carpenter et al, 2000. In their experimental study analyzing the effects of Cognitively Guided Instruction, an intervention in elementary school mathematics focused on examining student work, Carpenter et al, found that professional development that focuses on specific mathematical content and how students learn such content is especially effective, particularly for instruction designed to improve students' conceptual understanding.

Active Learning

In their study of the effects of different characteristics of professional development and how they influence teacher practice, Garet et al. (2001) found that opportunities for active learning had a small positive effect on teachers' knowledge and skills. Further research is needed, but several observers have documented that when teachers have the opportunity to become actively engaged in their own learning through observations, close study of student work in collaboration with colleagues, and joint curriculum planning, for example, they are more likely to improve their practice (Lieberman, 1996; Loucks-Horsley, Hewson, Love, & Stiles, 1998).

Coherence

One of the criticisms often leveled at traditional professional development programs is that the activities are not part of an overall improvement strategy. If teachers experience professional development as disconnected from the state and local standards that students must meet, then they are unlikely to feel committed to making changes in their practice.

There are a few studies that support aligning professional development with broader change efforts. One national survey of teachers found that when teachers report a connection between professional development and other school improvement efforts, they are more likely to say that professional development has improved their teaching practice (Parsad et al., 2001). This is borne out by a study of exemplary organizations in both the educational and private sector that found that professional development was most effective when "coordinated with organizational goals" (Laine, 2000). Garet et al. (2001) also found that the coherence of professional development activities has an important positive influence on change in teaching practice. In their work analyzing the design and implementation of the school probation policy in Chicago's elementary schools, Finnigan and O'Day (2003) found that external partners who provided services that were not coordinated with existing school goals had limited or no impact in the schools. Another study released by the Council of Great City Schools looked at four urban school systems that are raising academic performance and reducing the achievement gap. Among the similarities the study found, districtwide professional development for teachers and staff on implementing a coherent curriculum was listed as one of nine key characteristics (Snipes, Doolittle, & Herlihy, 2002).

Impact of Characteristics

Although the research base is by no means robust, there is growing evidence that certain structural and core features of professional development activities do have a positive influence on teachers' enhanced knowledge and skills, practice, and even, in a few cases, on student achievement. The most consistent finding is the importance of subject-matter focus and the need to link professional development activities coherently with other reform efforts. The duration of an activity is also important, although the benefit there seems to derive from the fact that longer activities are more likely to promote coherence, to encourage active learning, and to emphasize content knowledge.

In addition, the type of activity (reform versus traditional) also has a modest effect, although again it may be because reform activities are likely to be longer and have the other features. There is also some research support for designing an activity for teams of colleagues if it promotes the kind of collaboration that seems to exist at effective schools. Designing an activity with an active learning component has shown a modest effect in one study as well.

So, several different types of activities have *potential* value—if they are designed and implemented to have the characteristics of high-quality professional development. With that in mind, a discussion of the research that exists on specific types of activities follows.

Research Base for Specific Types of Activities

In *Designing Professional Development for Teachers of Science and Mathematics*, Loucks-Horsley et al. (2003) provide a list of types of activities and offer a substantial amount of information about how to implement them effectively. The National Staff Development Council has produced a similar review of types of professional

development activities applicable to all content areas: *Powerful Designs for Professional Learning*, edited by Lois Brown Easton. In both books, the authors refer to the research base that exists to support each of the various types of activities. In some cases, there is a strong and growing body of research to support a particular approach. In other cases, the research base is not as strong. Some types of activities, for example, are supported only by examples of individual programs that have experienced success. In these accounts, the authors rarely attempt to isolate the effects of different variables (activity type, content, quality of implementation, and others) on outcomes related to teacher behavior or, in some cases, student achievement. Nevertheless, because many of these activities do incorporate some of the features listed above, they are promising and could be very successful in a particular context.

In the latest edition of their book *Student Achievement through Staff Development*, Joyce and Showers (2002) offer a useful framework for examining the "context" of a professional development initiative. They propose that, as a first step, designers determine how much change they expect teachers to make as a result of their participation. Joyce and Showers (2002) describe various potential outcomes or levels of impact as follows: (1) teachers gain knowledge or awareness of educational theories and practices; (2) teachers change their attitudes, whether it be about their own ability, their students' potential or a particular subject; (3) teachers develop discrete skills such as more effective questioning techniques; and (4) teachers experience "transfer of training," in other words, they can implement and use a new instructional method in the classroom and measure its effect on student learning. According to Joyce and Showers' (2002) model, all outcomes are potentially useful in different circumstances, but it is only the last outcome that can influence and improve student achievement, because it is only the last one that changes the conditions in a classroom so that increased learning can occur. Determining the outcome a particular professional development strategy needs to meet is the first step in enabling the designer to then select activities with the most potential for meeting that objective.

The next section outlines the research base that exists for individual types of activities. The activities listed are those that could potentially incorporate the characteristics listed above and could enable teachers to change the learning environment in such a way that increased learning occurs, as described by Joyce and Showers.

Involvement With Curriculum

Selecting or implementing a new set of curriculum materials can be a powerful form of professional development, partly because it has one of the key characteristics listed above: it is focused on the content that students need to know. The overall importance of curriculum work is supported in the literature on effective schools. After analyzing the research on the effects of schooling on student learning over the past thirty years, Marzano (2000) argues that a guaranteed and viable curriculum is the chief determinant of student achievement. When curriculum work is well designed—meaning that teachers are given the time to research, practice, try out, and then reflect on the effectiveness of high-quality materials and approaches—teachers are often astonished at improvements in student learning.

This evidence of impact on student learning is a powerful motivator for teachers to change their own teaching practice to incorporate the new instructional strategies inherent in the well-designed materials. A study by Ferrini-Mundy (1997) examining how new mathematics standards influenced several districts found many examples of teachers whose attitudes toward new teaching behaviors were more positive once they observed their students learning.

Several evaluations of a large-scale curriculum implementation project sponsored by the National Science Foundation (NSF) have found similar positive effects. Since 1995, the NSF has supported science curriculum implementation projects in nearly one hundred districts. Annual cross-site evaluations of this project found that teachers who participated in at least 20 hours of professional development were significantly more likely to receive high ratings on their lessons than non-participants (Weiss et al., 2004). A similar evaluation report also funded by the NSF analyzed teacher's efforts to develop science curriculum materials that serve diverse populations in an urban setting. While the authors note that this was not a controlled experiment, they nevertheless found that the pre- and post-test of student learning yielded significant positive effect sizes for four different curriculum units (Singer et. al, 2000)

Another study by Cohen and Hill (2001) looks specifically at the effects of a curriculum replacement strategy in California. Having failed to convince textbook publishers to offer teachers more guidance in implementing state mathematics standards, state reformers developed "replacement units" on specific topics like fractions. They introduced these units in 2½-day-long sessions in which teachers could do the mathematics themselves, talk with each other, and examine student work. The authors found that these opportunities increased teaching practices associated with the new frameworks and decreased use of conventional methods, thereby changing their core teaching approach. More research is needed to determine if these approaches are equally as effective in other disciplines..

Workshops/Institutes/Seminars

According to Garet et al. (2001), 79 percent of the teachers they surveyed in California who participated in professional development activities participated in what they refer to as "traditional" forms of professional development: workshops, seminars, and institutes. This confirms the findings of other researchers who maintain that most teachers experience professional development in this form. Unfortunately, many of these training experiences take the form of "one-stop" workshops with little follow-up, are fragmented rather than coherent, and are not connected to the content students are expected to master (Parsad et al., 2001; Cohen & Ball, 1999; Porter et al., 2000). Consequently, they have little impact on teaching and learning (Parsad et al., 2001). But when workshops are built into a long-term professional development plan with follow-up time regularly scheduled for discussion and reflection, or when they are designed as part of a larger professional development plan that includes other types of activities such as curriculum modification or case discussions (Loucks-Horsley et al., 1998), they can have an impact on both teacher practice and student achievement.

In a survey of professional development programs that appear to have a positive effect on the achievement of middle school students, Killion (1999) and her colleagues at the National Staff Development Council found that most of the 26 programs that met their criteria for inclusion rely heavily on the training model, often conducted in the form of summer institutes. One such program is Project CRISS (CReating Independence through Student-owned Strategies). Based on principles of cognitive psychology and reading, the program is designed to improve students' reading and writing skills across all disciplines. Teachers participate in an initial training session in which they have an opportunity to learn the underlying theory, to see models of the teaching strategies in action, and to incorporate the strategies into their own curriculum materials. There is a follow-up session after a few months, and a district facilitator is available to support teachers and to serve as a liaison between the program staff and the local school or district. In evaluation studies, students whose teachers participated in Project CRISS training demonstrated significantly greater gains in the retention of subject-specific information than comparable students who did not participate in the program. Teachers were randomly assigned to the treatment or control group.

A study of approximately 1,500 Ohio math and science teachers who participated in a six-week summer institute focused on using inquiry-based instructional methods showed similarly positive results (Supovitz, Mayer, & Kahle, 2000). Using growth-curve modeling, a statistical method that is designed to accurately measure growth over time, the authors examined teacher surveys to determine whether teachers' attitudes and use of inquiry-based methods increased over a four-year time span. The professional development program began with the six-week summer institute but was also designed to provide ongoing follow-up. Participating teachers had six days of follow-up activities throughout the school year, and a network of fellow participants to use as resources at any time. They also had the ongoing services of regional leadership teams who conducted on-site visits and were available for on-demand support. According to the authors, the attitudes, preparation, and practice of participants showed substantial and statistically significant gains in the first year that were sustained over the next three years.

A recent study examining the effects of California's Mathematics Professional Development Institutes (MPDIs), a large-scale program designed to provide subject matter professional development in various subjects, found that teachers who attended a summer workshop of one to three weeks' duration and participated in up to 80 hours of follow-up during the school year did improve their content knowledge for mathematics teaching as measured by a highly sophisticated assessment (Hill,& Ball, in press).

Action Research

Based on the assumption that teachers will grow professionally if they can generate and investigate questions about their own practice, action research is a strategy with a long and varied history (Loucks-Horsley et al., 1998). First introduced formally in the 1940s, action research has had surges of popularity as teachers have sought to be active participants in their own professional growth. Much has been written outlining how teachers should implement a thoughtful action research plan, but most guides follow a

similar plan: (1) select a problem to investigate that is relevant to your own and/or your colleagues' instructional practice; (2) collect and interpret information related to the problem; (3) study the relevant professional literature; (4) determine what action you need to take; and (5) take that action and document the results (Calhoun, 1994).

Individual case studies document positive changes in teacher behavior and attitudes when teachers participate in action-research projects. Sparks and Simmons (1989) report that teachers who have participated in action research are more reflective and more attentive and responsive to student learning. This finding is reflected in a similar study of a district-wide action research project implemented in Madison, Wisconsin (Zeichner, Marion & Caro-Bruce, 1998). Participant interviews, examination of student work and teacher assignments and detailed observations of action research meetings found that involvement in action research project had multiple effects. Teachers reported that they developed more confidence, were more likely to talk with colleagues about teaching and were more analytical about their practice. The study also found that there were positive effects on student learning, although they could not isolate the effects of participation. For example, teachers reported positive changes in student attitudes, involvement, behavior and/or learning as a result of the specific actions taken as part of their research.

In their study of high schools that are members of the Coalition of Essential Schools, Wasley, Hampel, and Clark (1997) found that the ability of individual faculty members to engage in critical self-examination was a determining factor in schools that had widespread improvement. In less successful schools, faculty members focused on logistical issues rather than on issues related to student learning.

There has been some criticism by basic and applied researchers who question the level of scholarship of many action research projects. In response Baumann and Duffy (2001) reviewed over 30 published teacher research studies and found that these studies did demonstrate strong professional knowledge including references to existing research and theory. More research is needed to see if action research can have a long-term impact on teachers' instructional practice.

Case Discussions

Case discussions offer teachers an opportunity to reflect on the teaching and learning process by examining a story or videotape that captures a particular classroom experience (Loucks-Horsley et al., 1998). There are many different types of cases. Some focus on student learning, others on how teachers respond to a challenging situation. Although they can be read or viewed alone, most researchers agree that a key to their impact is the discussion among colleagues that takes place following the presentation or reading. When they are well written and facilitated, case discussions encourage participants to look deeply into how instructional practice influences and interacts with student thinking. Cases also have the potential to stimulate new ways of thinking by providing teachers with contradictory information that challenges their current practices.

Researchers conducted multiple interrelated studies to measure the impact of a case-based professional development project called Science Cases for Teacher Learning

(Heller & Kaskowitz, 2002). After identifying the teacher and student outcomes that they hoped to achieve, researchers set about measuring these outcomes through various data collection methods including written surveys, interviews and pre- and post- tests of related science content. They found significant gains in relation to each of their target outcomes, including students' scores on the post-test and teacher understanding of students' conceptual difficulties.

Additional empirical evidence supporting the use of case studies comes from research studies evaluating the effects of the Mathematics Case Methods Project (MCMP). MCMP, one of the best known case discussion initiatives, is housed at WestEd, a federally supported education laboratory in San Francisco. MCMP is structured so that groups of six to twelve elementary and middle school teachers from the same school meet monthly for a few hours to discuss a case. Evaluations document how participation has influenced teaching practice. According to Barnett and Friedman (1997), the case discussions have been an impetus for changes in teachers' beliefs about how children learn and how mathematics should be taught, have increased teachers' content knowledge, and have led to changes in teachers' instructional practices.

Similar outcomes were found in a two year study of teachers who were participants in the Developing Mathematical Ideas seminar (DMI), a mathematics teacher development seminar for elementary school teachers based on using teaching cases (Cohen, 2004).. More research is needed to determine if case discussions have a long-term effect on teaching practice, and if they influence student achievement as well.

Study Groups

Study groups vary in size, but they typically involve groups of teachers from the same discipline, school, or district meeting regularly over a significant period of time to explore some topic of mutual interest related to teaching and learning. According to Susan Loucks-Horsley, the key elements of this strategy are that the topic is important to the participating teachers, that teachers have ongoing time to meet, and that teachers have a process for how to address the topic raised (Loucks-Horsley et al., 1998). Makibbin and Sprague (1991, as cited in Loucks-Horsley et al., 2002) further suggest that there are four models for structuring study groups. The *implementation model* is designed to help teachers implement strategies they have learned in a workshop or other short-term training session. The *institutionalization model* is used when teachers want to further refine and reflect on practices they have just started using. *Research-sharing groups* focus on recent research findings and how they might be implemented in the classroom. *Investigation study groups* allow teachers to investigate new strategies, try them out in the classroom and discuss implementation with their colleagues.

Although there are several useful guides that describe how to form and implement study groups, there is not a strong research base documenting their effectiveness. One exception is the work of Carlene Murphy who has developed a particular variation of the study group model, Whole-Faculty Study Groups (WGSG). In studies evaluating the effectiveness of this model, she has found that when WFSGs are properly implemented, the process helps with overall school improvement and student achievement (Murphy and

Lick, 1998). Several studies exist that document positive results at individual schools (Loucks-Horsley et al., 1998). More research is needed to determine whether well-designed study groups have a consistent, positive effect on teacher practice and student achievement.

Lesson Study

Originating in Japan, lesson study is a structured process in which teachers plan, investigate, observe, and revise research lessons. The purpose is not only to develop a thorough understanding of the issues related to one particular lesson, but to gain a much deeper understanding of student learning and related instructional strategies and to work in an intensely collaborative way with their colleagues. In the last several years, researchers have been looking for ways to adopt lesson study as a strategy for professional development in US schools (Loucks-Horsley, 2002).

In lesson study, teachers meet in small groups to set goals and plan a particular lesson. They collect information from multiple sources including outside experts as they initially design a lesson. Once the lesson has been developed, one teacher from the group teaches the lesson while the others observe and take detailed notes on implementation. Then the teachers jointly evaluate the lesson, thinking deeply about evidence of student learning. Given what they have now learned, teachers in the group revise the lesson and either have another teacher lead it prior to another revision, or write it up in a form that can be shared with other teachers.

Lesson study has great potential as a professional development activity because is focuses on the most important part of the learning process: what actually happens in classrooms between teachers and students. But because it is so intensive and so gradual (developing one lesson may take a year), certain contextual conditions might be necessary for success. Having a school culture that values and supports collaboration and that is comfortable with a long-term change strategy might be necessary pre-conditions for success (Loucks-Horsley, 2002).

The research base supporting lesson study is emerging.   According to some of the field's better known researchers, there are no research studies documenting its effectiveness in Japan (Perry, Lewis & Akiba, 2002). While Japanese teachers collect extensive classroom evidence on student learning, researchers there do not ask the general question of overall effectiveness of the approach itself.   In the US, there are individual case studies documenting the success of lesson study in particular instances, but there have not been large-scale studies. For this reason, we can say that it is "research-based," in that it has the aforementioned characteristics that we know produce positive effects, but it is not "research-tested."

Studies of US teachers engaged in well-designed lesson study at particular sites have documented several positive results. For example, teachers show increased subject matter knowledge, increased knowledge of instruction and increased ability to observe

students. They also participate in stronger collaborative networks and make stronger connections between their daily practice and their long-term goals (Lewis, 2002; Perry, Lewis, & Akiba, 2002).

Examining Student Work

Giving teachers opportunities to closely examine student work in collaboration with their colleagues has the potential to be a very powerful professional development activity. Any type of assignment can be used, as long as it is detailed enough to offer insights into students' thinking. Because this strategy focuses directly on student learning, it forces teachers to recognize the discrepancies between what they think they have taught and what students seem to have learned. In order for teachers to get the most insight into how to analyze and respond to student thinking, it is helpful for teachers to have the support of someone with content expertise (Loucks-Horsley et al., 1998).

In the past decade, several national organizations have launched programs specifically designed to help groups of teachers look collaboratively at student work. One of the best known of these national efforts was started in 1995 by a group of teachers and administrators from the Coalition of Essential Schools. With funding from the Annenberg Institute for School Reform, they designed a program to train coaches who would lead Critical Friends Groups in individual schools. In 1996 the Annenberg Institute commissioned a three-year study of sixty Critical Friends Groups to determine their effect on teacher practice and ultimately, student achievement. Researchers found through observations and surveys that teachers who participated in CFGs had higher expectations for students and were more likely than non-CFG teachers to change their approaches if some students in the class were not doing well. They also reported higher job satisfaction (Dunne, Nave & Lewis, 2000). An in-depth case study examination of a particular school within the larger study found that changes in instructional practices did positively influence student achievement (Nave, 2004).

The Fostering Algebraic Thinking Toolkit is another example of a strong professional development program designed around close examination of student work. Teachers using the toolkit begin by solving and discussing challenging mathematical problems themselves. They then introduce the problems to their students and follow-up by bringing student work to their next professional learning session for further discussion. Anecdotal evidence suggests that teachers involved in this process increase not only their own mathematical knowledge, but they gain a more in-depth understanding of student thinking regarding mathematical ideas (Driscoll, 2001).

Some of the strongest studies to date documenting the impact that examining student work has on teacher behavior and student achievement have been conducted by the Cognitively Guided Instruction (CGI) project at the University of Wisconsin–Madison. After analyzing the development of children's mathematical thinking in the early grades, researchers Carpenter and Fennema developed a professional development program designed to share their findings with teachers. Through close examination of student work and through videotapes of lessons in which students explain their thinking, teachers

are encouraged to think hard about the relationship between this new knowledge and their own teaching (Carpenter, Fennema, Franke, Levi, & Empson, 2000).

In several different studies that explore how CGI affects teachers' knowledge, their instruction, and student achievement, the results have been very promising. In both an experimental study comparing participants with a control group, and a longitudinal study examining how participants' teaching changed over time, researchers found that CGI teachers had higher expectations and knew more about their students' thinking. In addition, they found that students in CGI classes had significantly higher levels of achievement in problem solving than control classes had, and also scored as well on tests of number skills (Carpenter et al., 2000). Case studies confirm that teachers attribute changes in their practice to the process of thoroughly examining student work. More research is needed to see if efforts in other disciplines produce similar results.

Coaching

Coaching is a process in which two or more educators work together to improve their practice. Over the years, several forms of coaching relationships have evolved so the term has been used to describe different practices. Traditionally, coaching involved a more experienced teacher in a supervisory role observing classes led by a less experienced colleague. In this model, participants typically use a cycle of preconferencing, observation and postconferencing. According to Loucks-Horsley et al. (2002), coaching as a form of professional development has more recently become less supervisory and more collaborative.

Effective peer coaching relationships typically focus on learning and improvement, although the specific topics vary according to need and interest. For example, teachers might choose to focus on specific instructional strategies, curriculum content, assessment practices or student work. They might also choose to engage in a more or less formal partnership depending on their needs. In order to be successful, coaches need to have a good working relationship; they need some skill in communication and observation; and they need time to develop an understanding of each other's strengths and to try out new practices (Loucks-Horsley et al., 1998).

In their earlier studies of peer coaching, Joyce and Showers (1988) experimented with a form of coaching similar to the more formal relationship described above. They developed a training design that began with modeling and practice under simulated conditions, followed with classroom practice supported by feedback from a more experienced colleague. The purpose of these initial studies was to look at whether coaching helped facilitate the use of new skills. Following 30 hours of initial schoolwide training in a new instructional strategy, the treatment groups engaged in ongoing peer coaching, while the control group did not. Joyce and Showers (1988) found that the coached teachers practiced the new strategies more frequently, adapted them to other contexts, and used them more appropriately than the uncoached teachers. In addition, students of coached teachers were more likely to understand the nature and definition of new concepts and to use them independently.

More recently, Joyce and Showers (2002) have broadened their definition of what constitutes "coaching." Their experience in schools and their more recent research have convinced them to redefine the peer-coaching process in schools. First, they now expect *all* teachers and administrators in a school to participate in peer-coaching teams. Second, they have eliminated feedback as a coaching component. The primary activity of peer-coaching study teams in the schools they now work with is collaborative planning and development of curriculum and instruction that meet specific goals for student learning. According to their more recent research, omitting feedback in the coaching process has not hurt implementation or student growth (Joyce, Calhoun, & Hopkins, 1999). Third, when classroom observations occur, it is the teacher who is the "coach," helping the observer to learn from the teacher's efforts to adopt a new behavior. Results with this new type of coaching have been impressive. While studies of training sessions that include presentations, demonstrations, and practice sessions have shown no effect on transfer to the workplace, studies that examine the effect size when regular peer coaching is added to these other components have demonstrated a large increase in transfer of training.

A recent study examining the effects of coaching found that ongoing coaching played a key role in teacher's use of new practices following a traditional ½ day in-service training. According to data collected in classroom observations, teachers who had follow-up coaching in the context of a study group continued to use the intervention and used it consistently while teachers in a control group who did not receive follow-up coaching showed a decrease in their use of the intervention (Spencer and Logan, 2003).

To the extent that this new style of coaching is aligned with broader schoolwide goals and is focused on what students need to know in the classroom, it has a stronger probability of success. More research is needed to determine how widespread and long-term the effects of coaching are on teacher practice, and what effect these activities have on student achievement.

Mentoring

In mentoring relationships a more experienced adult conducts observations and offers support to a less experienced adult. The purpose of mentoring is to help both teachers focus on and improve their practice by discussing it with other individuals. According to Loucks-Horsley et al. (2002) mentors may act as content specialists, guides, resource providers, advocates, facilitators, coaches and collaborators. To be most effective, mentors should provide more than practical and logistical advice. They should provide concrete guidance on how to improve student learning.

In more recent years, mentoring has been used as a strategy to improve teacher retention. According to some reports, between 40% and 50% of new teachers leave the profession in their first few years (Ingersoll & Smith, 2003). As states and districts struggle to hire qualified teachers, particularly in schools serving predominantly poor and minority students, induction support for new teachers has become standard practice in many states (Fideler & Halselkorn, 1999 as cited in Strong, 2004). As might be expected, mentoring

programs differ widely in the amount and type of support they offer teachers. There is some research evidence to suggest that the more comprehensive a program is, the more likely it is to positively affect teacher retention (National Association of State Boards of Education, 1998). Teachers who had a helpful mentor from the same field and other components such as common planning time, opportunities to collaborate with other teachers on issues of instruction, and a reduced number of preparations were more likely to stay in the teaching profession (Ingersoll & Smith, 2003, as cited in Ingersoll & Kralik, 2004). One survey found that among new special education teachers who continued to teach for a second year, 20% said that they stayed because of the mentoring support that they had received (Boyer, 1999 as cited in Holloway, 2001).

A recent quasi-experimental study by the Educational Testing Service documenting the effects of a large-scale mentoring program, the California Formative Assessment and Support System for Teachers (CFASST), found that students of teachers with a high level of CFASST engagement scored higher on standardized tests than students of teachers with low CFASST engagement with an effect size that might be seen as equivalent to half a year's growth or more. The study also showed that a high level of participation had a positive impact on teaching practice, particularly in the area of instructional planning (Thompson et al., 2004).

Implications

The available research into the effectiveness of various types of professional development activities suggests that underlying characteristics are the most important factor in determining effectiveness, in particular whether an activity is content based and part of a coherent change strategy. To the extent that certain types of activities—case discussions, for example—appear effective, it is probably because they incorporate these characteristics. That explains why Garet et al. (2001) found that workshops that take place over a longer period of time, and are therefore more likely to be content based and coherent, are just as effective as "reform" types of activities.

For the professional development planner, this information is both helpful and challenging. Despite the fact that there is limited empirical evidence to recommend one type of activity over another, the research indicates that any activity can be better designed to take full advantage of these underlying benefits. The professional development planner needs to ask the following questions: To what extent do different types of activities have these effective characteristics? To what extent can different activities be implemented in such a way that they take full advantage of these benefits?

One aspect of implementation for planners to consider is how a particular activity fits into an overall school improvement or professional development plan. Because activities serve different purposes, they might logically be used at different stages of a professional development effort. According to Loucks-Horsley et al. (1998), strategies such as workshops, for example, are best used at the beginning of a change process because they help participants develop awareness of a new concept. Case discussions, on the other hand, might be designed to help teachers who have already implemented a new

instructional strategy examine how it is working. Some activities are used more powerfully in combination, such as coaching in the context of a study group.

The table on the next page shows the extent to which nine common types of professional development activities have or *could* have the characteristics of effective professional development. Each row represents a different type of activity. Each column represents a characteristic shown by research to make professional development effective. A "Yes" in a cell means that the type of activity *inherently* has the characteristic in question. A "By Design" in a cell indicates that the activity could have the characteristic if designed and implemented with that feature in mind.

What becomes clear in this table is that whether a particular type of professional development activity has merit depends largely on *design*. A wide variety of professional growth experiences can be effective if they are designed to incorporate research-based features and are aligned with the users' context and goals.

Effectiveness by Design: Planning Professional Development Experiences that Affect Teaching and Learning

Activity	Characteristic				
	Focused on content students need to know	Aligned with broader goals	Long-term	Involves active learning	Collaborative effort within the school or district
Involvement With Curriculum	Yes	Yes	By Design	By Design	Yes
Workshops Institutes/ Seminars	By Design	By Design	By Design	By Design	By Design
Action Research	By Design	By Design	Yes	Yes	By Design
Case Discussions	Yes	By Design	By Design	Yes	Yes
Study Groups	By Design	By Design	Yes	By Design	Yes
Lesson Study	Yes	By Design	Yes	Yes	Yes
Examining Student Work	Yes	By Design	By Design	Yes	Yes
Coaching	By Design	By Design	Yes	Yes	Yes
Mentoring	By Design	By Design	Yes	Yes	Yes

Designing Effective Professional Development Experiences—1

About the Author

Lucy Steiner is a consultant with Public Impact, an education policy and management consulting firm in Chapel Hill, North Carolina. She has worked extensively in the area of teacher professional development. She has led a workshop series for principals on designing effective professional development for North Carolina's Principals Executive Program, authored the NCREL® *Guide to Working with External Providers*, developed content for the U.S. Department of Education's *Elevating Teaching to a Year-Round Profession* Web site, and conducted research on effective staff development for the NCREL® *Professional Development: Learning From the Best* toolkit. A former high school English teacher, Steiner holds a Master's in Education and Social Policy from Northwestern University.

Research Criteria for This Review

There is little research that specifically measures the impact of different types of professional development activities. In order to draw some conclusions about what types of activities might have the best results, this review looked first at underlying characteristics of effective professional development and then at studies that measure the effect of specific professional development programs that use these strategies. In the latter case, researchers were not attempting to isolate activity type from other variables associated with the program, and so the conclusions are tentative.

In order to determine how much "weight" to assign a given finding, the review asked the following questions:

1. What is the study designed to measure?

Most research designed to measure the impact of professional development examines whether professional development influences teachers. One level of impact is teacher attitudes: Are teachers more positive about using a specific instructional strategy because they participated in a professional development activity? Other studies measure a higher level of impact: Do teachers' behaviors and practices in the classroom change as a result of their participation? In both cases, teacher surveys are frequently used to determine the level of impact. Occasionally, researchers provide independent verification of changes by observing classes and examining teacher materials.

In addition to these studies of teacher change, a small but growing number of studies hold professional development to an even higher standard by asking how it impacts student learning. Unfortunately, this is a difficult task. Schools, particularly those that are in the midst of a reform effort, are complex environments. It is difficult to isolate the effect professional development has on student achievement relative to other simultaneous influences. A few of the studies included in this review do meet this standard.

2. How was the study designed?

Experimental studies are desirable because they allow the researcher to control for extraneous variables that might affect the outcome. But since they require random assignment to either a control or a treatment group, this method is rarely employed in professional development research. In a few of the studies included in this review, teachers are randomly assigned to either a control or treatment group; therefore, they do meet the criteria for an experimental study. In all cases, experimental studies are noted in the text with a description of how teachers are randomly assigned.

Quasi-experimental studies do not use random assignment, but they still provide researchers some way of comparing a group that received the treatment with a group that did not. The most rigorous type of quasi-experimental study has a pretest and posttest with a well-matched control group, but not all quasi-experimental studies have either a pretest or a matched control group. The more rigorous the study, the more it allows the researcher to measure growth and reduces the chances that the change is a result of other

factors. It also increases the generalizability of the results. There are a few quasi-experimental studies included in this review.

Descriptive studies do not allow researchers to draw conclusions about the effects of a treatment. Case studies, for example, describe and seek to explain events at a particular site. Because so little research is available, the majority of the studies in this review are descriptive. One important role that this kind of research plays is to point the way for further research. It is hoped that these case studies, which do present a compelling case for the link between professional development and student achievement, will help researchers design studies that measure what aspects of professional development have the most impact on teacher practice and student learning.

Annotated Bibliography

Barnett, C., & Friedman, S. (1997). Mathematics case discussions: Nothing is sacred. In E. Fennema & B. Scott-Nelson (Eds.), *Mathematics teachers in transition.* Hillsdale, NJ: Lawrence Erlbaum. This chapter is a descriptive examination of the "case method" and its usefulness for math teachers in transforming their classroom practices. Specific examples of the case method illustrate teachers' transitions in thinking and teaching. The chapter attempts to explain the underlying theory, process, and reasoning which will lead teachers to change their classroom practices.

Baumann, J. F., & Duffy, A. M. (2001). Teacher-researcher methodology: Themes, variations, and possibilities. *Reading Teacher, 54*(6), 608-615. The authors use a meta-analysis summarizing the findings from published teacher-research studies to investigate the methodological decisions that teachers make. The summary consists of a qualitative analysis of 34 studies, and reveals the common themes of teacher-research and its benefits as well as the variation in this type of research. The study emphasizes that the main benefit of teacher research is its ability to transform teachers and their practices to better understand their students.

Berman, P., & McLaughlin, M. (1977). *Federal programs supporting educational change: Factors affecting implementation and continuation* (VOl. 7). Santa Monica, CA: Rand. This quasi-experimental study questions the success of national programs to support school reform. It explores 4 research questions addressing how federal policy and funding support implementation and dissemination of new reform projects. Research efforts included a review of relevant literature, a nationwide survey of 293 change agent projects, interviews and observations of classrooms. Results are presented as a set of key components of effective execution, ranging from project characteristics, to institutional setting, to federal policy.

Brown Easton, L. (2004) *Powerful designs for professional learning*. Oxford, OH: National Staff Development Council. This is a comprehensive guide to various types of professional development. The book goes beyond presenting workshops to introduce complete professional learning strategies. Each chapter explains the benefits of a professional development strategy, lists the steps involved in implementation, and supplies a list of additional resources for further investigation.

Calhoun, E.F. (1994). *How to use action research in the self-renewing school.* Alexandria, VA: Association for Supervision and Curriculum Development. This descriptive study is written as a guide for introducing action research into school culture. Calhoun collaborated with 61 schools in Georgia and 11 schools in Iowa to create an outline for conducting school wide action research. The goal of this program is to enhance student achievement and improve the work environment for educators.

Carpenter, T., Fennema, E., Franke, M., Levi, L., & Empson, S. (2000). *Cognitively guided instruction: A research-based teacher professional development program for elementary school mathematics* (Report No 003). Madison, WI: Wisconsin Center for Educational Research. The authors present an experimental study focused on improving student achievement through content based teacher development. A series of studies examine the effects of Cognitively Guided Instruction professional development program on teacher practices. Teachers who understood thinking process of their students altered their teacher practices, and their students showed significant gains in problem solving abilities.

Carpenter, T.P., Fennema, E., Peterson, P.L., Chiang, C., & Loef, M. (1989). Using knowledge of children's mathematics thinking in classroom teaching: An experimental study. *American Educational Research Journal, 26*(4). This article describes an experimental study examining teachers' use of research based knowledge and how it impacts student's achievement. Forty first-grade teachers were randomly assigned to an experimental or control group. The experimental group participated in a month long workshop studying research on children's development of problem solving skills, which resulted in teachers teaching problems solving skills to their students significantly more than the control group. Students of the teachers in the experimental group succeeded more in problem solving, expressed more understanding and more confidence in their abilities.

Cohen, D. K. (1990). A revolution in one classroom: The case of Mrs. Oublier. *Educational Evaluation and Policy Analysis, 12*(3), 311–329. This descriptive essay presents the case study of one teacher and her attempts to transform her teaching practices to conform with a new California state instructional policy. The teacher actually changes some of her practices and buys in to the new system, but does not fully understand the depth at which real change must take place. Her traditional practices have remained even in her best attempts to revise her teaching strategies.

Cohen, D.K., & Ball, D.L. (1999). *Instruction, capacity, and improvement* (CPRE Research Report Series RR-43). Philadelphia: Consortium for Policy Research in Education. This is a descriptive study exploring the relationships inherent in instructional capacity. Cohen and Ball argue that previous efforts have failed because they focus on one variable of learning rather than the relationships between variables. In order to improve, programs must be understood in terms of the relationships between factors by which they are mediated.

Cohen, D.K. & Hill, H. (1998). *Instructional policy and classroom performance: The mathematics reform in California* (CPRE Research Report Series RR-39). Philadelphia: Consortium for Policy Research in Education. This quasi-experimental study uses data from a 1994 survey of California elementary school teachers and compares these findings with 1994 California Learning Assessment Systems (CLAS) scores of students. The study examined whether professional

development specific to a new mathematics reform had the same effect on teacher classroom practices as professional development not linked to the new math reforms. The sample of 162 teachers demonstrated that teachers who had been exposed to 8 or more hours of reform-based training incorporated the new math framework at higher rates and had students score higher on the CLAS assessment.

Cohen, D.K., & Hill, H. (2001). *Learning policy: When state education reform works.* New Haven, CT: Yale University Press. This quasi-experimental study is a report on California's effort to reform the math teaching practices in all public schools, where student achievement is the ultimate goal. A survey of nearly 600 elementary teachers and a close examination of teaching materials used in these schools were done to understand the relationship between policy, practice, and what efforts create meaningful change. Results showed that when teachers experienced consistency in materials, tests, curricula, and new techniques, students benefited – scoring higher on assessments of math achievement.

Cohen, S. (2004). *Teachers' Professional Development and the Elementary Mathematics Classroom: Bringing Understandings to Light*. Mahwah, NJ: Lawrence Erlbaum Associates. This book is based on a descriptive study of teacher learning that followed two DMI seminars and the classroom practices of seminar participants. It involved both teachers' own reports of what they were learning, and direct observations of participants' classroom practices. The data include case stories about individuals, as well as a return to data by the whole group to determine the representativeness of each story.

Darling – Hammond, L. (1996). What matters most: A competent teacher for every child. *Phi Delta Kappan*, 78(3), 193-201. This summary of the report from the National Commission on Teaching and America's Future asserts that teachers in the US are not properly qualified. Darling-Hammond contrasts our system with other countries and explains our current barriers to success. This descriptive paper examines strategies used in other countries that have proven to be successful. The author assesses the challenges facing America's educational culture and offers five steps to improve the existing structure.

Darling – Hammond, L., & McLaughlin, M. (1996). Policies that support professional development in an era of reform. In M. McLaughlin & I. Oberman (Eds.), *Teacher learning: New policies, new practices* (pp. 202-218). New York: Teachers College Press. This descriptive article explains that for professional development to be effective, teachers must be viewed in a dual role of teacher and learner, simultaneously. The authors study new approaches to staff development and examine how they are being supported. They theorize on how current practices can be redesigned to support new ideas, and ways in which the education system inhibits or promotes teachers' willingness to acquire new skills.

Driscoll, M. (2001). *Fostering algebraic thinking toolkit*. Westport, CT: Heinemann. These materials are designed for the professional development of mathematics

teachers in grades 6 to 10, who want to improve their teaching of algebraic thinking. The underlying assumption in these tools is that the most effective teaching can only take place when teachers understand how mathematics is learned. The tools are intended to be used with a group of teachers working together over the course of a year to improve their teaching of algebraic concepts.

Dunne, F., Nave, B., & Lewis, A. (2000). Critical friends groups: Teachers helping teachers to improve student learning. *Phi Delta Kappa Research Bulletin* (28). This article reports on an evaluation commissioned in 1996 by the Annenberg Institute for School Reform to examine the effectiveness of Critical Friends Groups in 60+ schools that joined the Critical Friends Network in the summer of 1997. In this descriptive study, evaluators surveyed all of the teachers in these schools during the 1997-98 school year and again during the 1998-99 school year. They also observed meetings and collected written evidence of what occurred during CFG meetings.

Elmore, R. F., Peterson, P. L., & McCarthey, S. J. (1996). *Restructuring in the classroom: Teaching, learning, & school organization*. San Francisco: Jossey-Bass. This book takes a close look at the process of school restructuring and how real teachers react and change their practices as a result of structural changes within a school. The book offers 3 case studies, each school at different places in their organizational changes, to give a detailed account of how individual teachers reacted to these changes in school policy. The book and case studies are intended to spark debate about the relationship between school restructuring and changes in the classroom.

Ferrini-Mundy, J. (1997). Reform efforts in mathematics education: Reckoning with the realities. In S. N. Friel & G. W. Bright (Eds.), *Reflecting on our work: NSF teacher enchancement in K-6 mathematics* (pp.113-132) Lanham, MD: University Press of America. This paper is a descriptive study showcasing findings from the National Council of Teachers of Mathematics project, Recognizing and Recording Reform (R^3M). This study sought to identify and document math reform efforts in order to develop an understanding of flourishing "sites of reform" where teachers and students are achieving. The discussion highlights five common themes in all reform efforts and discusses many "counterintuitive observations," which may help schools begin a successful reform process.

Finnigan, K.; O'Day, J. (2003). *External support to schools on probation: Getting a leg up?* Chicago, IL: Consortium on Chicago School Research. This descriptive report examines the design and implementation of the school probation policy in Chicago's elementary schools. The report is based on data from multiple sources over a two year period (1999 – 2001) including random and selected interviews, observations, and written materials.

Garet, M.S., Porter, A.C., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? The paper presents results from a national

sample of teachers. *American Education Research Journal*, 38(4), 915-945. This quasi-experimental study was designed to examine the effect of specific characteristics of professional development activities on teacher practices. A national probability sample of 1,027 math and science teachers was tested to evaluate the Eisenhower professional development program. Regression analyses show three core features of professional development that teachers report to have a significant effect on their knowledge, skill, and classroom practices. Peer reviewed.

Guskey, T.R., (2000). *Evaluating professional development*. Thousand Oaks, CA: Corwin Press. Guskey's descriptive work is written as a guide to help educators ask the right questions to determine the effectiveness of their professional development programs. The book discusses Guskey's five critical levels of development that should be examined to understand the effects of any staff development program, which range from participant reactions to effects on students. He emphasizes that to be successful; professional development must be intentional, ongoing, and systemic. Along with these guidelines, Guskey provides an example of an evaluation strategy that will work for large organizations or individuals who are trying to evaluate a program.

Haycock, K. (1998). Good teaching matters…a lot. *Thinking K-16 3*(2), 3-14. This article reviews the research on how teacher quality affects student learning. The report concludes that quasi-experimental studies show that highly qualified teachers can have a significant effect on student learning.

Heller, J.I. and Kaskowitz, S.R. (2002). *Science cases for teacher learning: Evaluation of impact on teachers, classrooms, and students, Project Year 3, 2000-01*. Oakland, CA: Heller Research Associates. This quasi-experimental study attempts to determine the impact of a case-based professional development program for science teachers. Heller and Kaskowitz selected target outcomes and measured them using a combination of data collection methods including written surveys, content tests, interviews and focus group discussions. When students were given a pre-and post-test of related science content and their scores were compared with a comparison groups, students in classes with participating teachers scored significantly higher.

Hill, H.C. & Ball, D. L. (in press). Learning Mathematics for Teaching: Results from California's Mathematics Professional Development Institutes. *Journal of Research in Mathematics Education*. Hill and Ball, using a quasi-experimental design, administered a pre- and post- assessment to measure growth in teacher's pedagogical and content knowledge of mathematics after participation in one to three week summer institutes. Assessments were not randomly assigned and there were no treatment or control groups. The researchers analyzed their data using statistical analysis, including simple descriptive statistics and a covariate adjustment model. They found that participating in the summer institutes did improve teaching practice.

Holloway, J. (2001). Research link: The benefits of mentoring. *Educational Leadership* *58*(8), 85-86. Review of research on mentoring as a professional development strategy. The article lists the benefits of mentoring for both the new and veteran teachers. The need for training of mentors is highlighted and a handful of model programs are discussed as evidence for the benefits of a structured mentoring program.

Hord, S. (1998). *Creating a professional learning community: Cottonwood Creek School*. Washington, DC: Office of Educational Research and Improvement. This descriptive case study of one school identified five dimensions of a professional learning community and examined how the school staff did or did not exhibit these characteristics. Data was collected through interviews.

Ingersoll, R. & Kralik, J.M. (2004). The impact of mentoring on teacher retention: What the research says. *ECS Research Review*, Denver, CO: Education Commission of the States. This paper is a review of existing empirical studies on teacher induction programs. The objective of this study is to report on what is known about the impact of induction and mentoring programs on teacher retention.

Ingersoll, R. & Smith, T. (2003). The wrong solution to the teacher shortage. *Educational Leadership, 60*(8), 30-33. In this empirical study looking at the effects of mentoring and induction programs on teacher retention, the authors analyze the Schools and Staffing Survey (SASS) and its supplement, the Teacher Followup Survey (TFS) conducted by the National Center for Education Statistics. They focus specifically on beginning teachers and present new data on the reasons they leave teaching.

Joyce, B., Calhoun, E., & Hopkins, D. (1999). *The new structure of school improvement: Inquiring schools and achieving students*. Buckingham, UK, and Philadelphia: Open University Press. This book is written as a guide to creating an "evolutionary school," where improvement is a continuous process. Through a number of case studies from the US and the UK, the authors demonstrate what steps are involved in changing the structure of a school to value student learning. From the smallest refinements to complete redesigns, the levels of reform are placed on a continuum of school improvement. The authors explain baseline characteristics of effective school improvement initiatives.

Joyce, B., & Showers, B. (1988). *Student achievement through staff development*. New York: Longman. This is a step by step guide to shaping the teaching and learning environment of a school, addressing the challenges of making significant change. The goal is to promote a culture of perpetual growth and experimentation to enhance student outcomes. The authors encourage a more effective use of current resources and organizational structures and provide guidelines for assessing outcomes.

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd edition). Alexandria, VA: Association for Supervision and Curriculum Development. This book is designed to examine the structure and effectiveness of professional development strategies through the use of descriptive case studies, experimental research, and "conceptual illustrations." The text provides assistance in designing and examining effective staff development programs, which have the most impact on teachers and student achievement. The focus is not on one particular practice, but on techniques for individual and schoolwide growth.

Kennedy, M.M. (1998). *Form and substance in inservice teacher education.* Madison, WI: National Institute for Science Education, University of Wisconsin-Madison. Retrieved October 10, 2002, from http://www.msu.edu/~mkennedy/publications/PDValue.html. For this review of available randomized studies, the author examined 12 studies documenting the effects math and science professional development programs had on student achievement. Programs were grouped into four categories based on the type of content. Results show that a focus on content had larger effect on student achievement than the program's form or structure; most effective being programs based on understanding the processes behind student learning.

Killion, J. (1999). *What works in the middle: Results-based staff development.* Oxford, OH: National Staff Development Council. Killion examines program descriptions of 26 content focused professional development programs, which were considered "outstanding" by the National Staff Development Council. Each middle school program was given a 1-5 rating based on how many NSDC standards it met. This descriptive article concludes with a list of common characteristics of these 26 successful programs, to be used as a guide for developing and evaluating professional development.

Laine, S.W.M. (with Otto, C.). (2000). *Professional Development in education and the private sector: Following the leaders.* Oak Brook, IL: North Central Regional Educational Laboratory. This report is based on a descriptive study to better understand how organizational culture encourages or discourages educational opportunities for staff. Two case studies were conducted including observations, interviews, and analysis of documents and websites of one private and one public school. Results are organized into noted strengths and weaknesses of these staff development programs to be used when designing policy or programs in public education.

Lewis, C. (2002). *Lesson study: A handbook of teacher-led instructional change.* Philadelphia: Research for Better Schools. This is a handbook type of guide to implementing lesson study as a form of professional development in schools. The book discusses the basic steps involved, common misconceptions of what lesson study involves, and how to initiate a lesson study program. In addition, the authors explain what can be expected in terms of impact on teaching and learning.

Lieberman, A. (1996). Practices that support teacher development: Transforming conceptions of professional learning. In M. McLaughlin & I. Oberman (Eds.), *Teacher Learning: New policies, new practices* (pp. 185-201). New York: Teachers College Press. This descriptive study attempts to change the conventional view of professional development, basing new ideas on more current research. This literature review summarizes new studies to explain how more effective professional development would allow teachers to be more involved in planning of curriculum and structuring goals. The article concludes that teacher knowledge and experience must be utilized for long term restructuring of schools and in understanding ideas of learning.

Little, J.W. (1993). Teachers' professional development in a climate of educational reform. *Educational Evaluation and Policy Analysis*, 15(2), 129-151. Professional development is examined in terms of reform and politics in this descriptive study. Little reveals the weaknesses of the prevailing "training model" and offers alternatives that are more in line with assumptions of reform. Four alternatives are discussed to show how reform policy can fit with professional development efforts.

Loucks-Horsley, S., Hewson, P., Love, N., & Stiles, K. (1998). *Designing professional development for teachers of science and mathematics.* Thousand Oaks, CA: Corwin Press. This is a descriptive look at the current state of professional development, which the authors argue is failing teachers and students. The book aims to help schools take the necessary steps to make professional development the resource it should be. While this is not a "how to" type guide, this book provides a framework for educators to design their own programs by identifying key characteristics, describing strategies, providing examples, and discussing challenges.

Loucks-Horsley, S., Hewson, P., Love, N., Stiles, K., & Mundry, S. (2002). *Designing professional development for teachers of science and mathematics, second edition.* Thousand Oaks, CA: Corwin Press. This is a revised version of the guide described above.

Louis, K., Marks, H. (1998) Does professional community affect the classroom? Teachers work and teachers experiences in restructuring schools. *American Journal of Education*, 106, University of Chicago. This quasi-experimental study examined the impact of school professional community and classroom social and technical organization on student achievement. Using both qualitative and quantitative methods, 24 schools (8 elementary, 8 middle schools, and 8 high schools), 910 teachers, and 5. 493 students participated in the study. Data were collected via 4 observational points, 2 separate assessment tasks, surveys, in-depth case studies, and interviews of classroom teachers. Findings indicate that both professional community and social support for achievement have a positive

relationship to student performance, but the strength of their association with authentic pedagogy accounts for that effect.

Marzano, R. J. (2000). *A new era of school reform: Going where the research takes us.* Aurora, CO: Mid-continent Research for Education and Learning. This meta-analysis summarizes 35 years of research and provides a quantitative review of the research regarding school-, teacher-, and student-level variables that affect student achievement.

McLaughlin, M. & Talbert, J. (1993). *Contexts that matter for teaching and learning.* Stanford, CA: Center for Research on the Context of Secondary School Teaching, Stanford University. This book explores the conditions that exist in schools that develop strong learning communities. The authors describe a five-year case study they conducted of nearly 900 educators that found that teachers who belonged to strong professional communities were better able to adapt to the challenges of teaching today's students

Murphy, C.U. & Lick, D.W. (1998). *Whole-faculty study groups: A powerful way to change schools and enhance learning*. Thousand Oaks, CA: Corwin Press. This descriptive guide to professional study groups leads anyone through the process of implementing study groups in a professional setting. The authors provide a step by step method for implementing study groups, examples from real study groups, and offer and assessment of the benefits and drawbacks of each type of study group. The focus is on a cultural change at the school level and enhanced learning in the classroom.

National Association of State Boards of Education. (1998). *The numbers game*. Alexandria, VA: Author. This is a descriptive report prepared by a NASBE study group examining teacher development, supply and demand. The authors examine the evidence and make policy recommendations.

National Commission on Teaching and America's Future. (1996). *What matters most: Teaching for America's future.* New York: Teachers College, Columbia University. This report outlines the steps which need to be taken in order to ensure that America's classrooms are led by competent and caring teachers – the most important strategy for academic success. The Commission identifies barriers to this goal and offers recommendations to overcoming these challenges and reaching their goal. The report emphasizes that a successful plan will involve complete systemic change in thinking and practices.

Nave, B. (2004). Critical friends group transforms writing instruction: Case study of a CFG at Beech Elementary School. Paper presented at the 2004 Annual Meeting of the American Educational Research Association held in San Diego, CA.. This paper presents a case study that is part of a larger three-year national study of Critical Friends Groups (CFGs) conducted in the late 1990s. The study analyzes

the factors that led to improved student writing skills over the two years that teachers participated in CFGs evidenced by student writing samples.

Newmann, F.M. (1996). *Authentic achievement: Restructuring schools for intellectual quality*. San Francisco: Jossey-Bass. Through a quasi-experimental study, this peer-reviewed article attempts to determine what conditions are necessary for school restructuring to promote authentic student achievement. Data came from a five-year study of 24 public schools taking part in the School Restructuring Study (SRS); all 24 schools had recently been significantly restructured. One year was spent at each school conducting observations, surveys, interviews, examinations of student work, and reviews of teacher assessment tasks. Results show that drastic school restructuring can bring about higher quality teaching and student achievement, regardless of SES, race, ethnicity, or gender.

Parsad, B., Lewis, L., & Farris, E. (2001). *Teacher preparation and professional development: 2000* (NCES Publication No. 2001-088). Washington, DC: National Center for Education Statistics. Authors share results from a survey that examined three indicators of teacher quality: education of teachers, participation in professional development, and feelings of preparedness. Two NCES surveys in 1998 and 2000 measured responses of 5,253 full and part time teachers in 50 states. Teachers reported that the number of hours spent in professional development activities was related to the extent to which they thought participation in professional development improved teaching. Teachers who spent eight or more hours on professional development reported feeling "very well prepared" for those activities.

Perry, R.; Lewis, C.; & Akiba, M. (2002). *Lesson study in the San Mateo-Foster City School District.* Paper presented at the 2002 Annual Meeting of the American Educational Research Association, New Orleans, LA. The authors present a description of a collaboration between researchers and practitioners at one U.S. study site, San Mateo-Foster City School District . Data on the program (observations, interviews and written reflections) document that lesson study activities helped teachers deepen their subject matter and instructional knowledge.

Porter, A., Garet, M., Deimone, L., Yoon, K., & Birman, B. (2000). *Does professional development change teaching practice? Results from a three-year study.* Washington, DC: US Department of Education. This quasi-experimental study utilizes surveys, interviews and observational data from a longitudinal study of all math and science teachers in 30 schools, across 5 states. This research, sponsored by the US Department of Education, attempts to determine if teachers' experiences in Eisenhower assisted professional development activities, contribute to changes in their teaching practices. Self-report data suggests that six features of professional development are essential to effectively improving teacher practices.

Richardson, J. (2003, February). The secrets of "can-do" schools: Louisiana team uncovers traits of high poverty, high-performing schools. *Results*, 1, 6. This descriptive study examines 12 high performing, high poverty schools in Louisiana. Researchers used interviews, focus group discussions and observation instruments to document the role professional development played in the success of these schools.

Richardson, V. (Ed.). (1994). *Teacher change and the staff development process: A case in reading instruction.* New York: Teachers College Press. This book attempts to demonstrate that teachers can and do willingly change their classroom practices when effective techniques are presented to them in development programs. From 1986 to 1992 the U.S. Department of Education funded the Reading Instruction Study (RIS) to examine the teaching of reading comprehension. Researchers in six schools engaged in classroom observations, belief interviews, practical argument sessions, and a follow up study. They conclude that teachers change their practices when convincing information is presented to them. Richardson suggests that the best way to make these changes successful is to engage in professional development efforts that involve the entire school as a community where each opinion is respected.

Sanders, W., & Rivers, J. (1996). *Cumulative and residual effects of teachers on future student academic achievement.* Knoxville, TN: University of Tennessee Value-Added Research and Assessment Center. An experimental study seeks to determine if a teacher's effectiveness in facilitating academic growth continues to have an effect after the students advance to higher grades. The research is ongoing; however, this report presents longitudinal results of teacher effects in mathematics on students as they advance from second through fifth grade. Their results show that students who are assigned to more effective teachers have a significant advantage in terms of attaining higher levels of achievement.

Schmidt, W., Houang, R., & Cogan, L. (2002). A coherent curriculum: The case of mathematics. *American Educator*, 26(2). Washington, DC: American Federation of Teachers. Retrieved October 8, 2002, from http://www.aft.org/american_educator/summer2002/curriculum.pdf. This descriptive study discusses results from the Third International Math and Science Study (TIMSS), which was conducted in 1995 across 42 countries. The poor US results are compared with "A+" countries to show that our weaknesses come from a lack of unification in curricula and school culture. The authors argue that until qualified teachers, effective teaching methods, and a unified focus are top priority for the US, students will suffer from lower achievement.

Singer, J., Marx, R.W., Krajcik, J., and Chambers, J.C. (2000). Designing curriculum to meet national standards. Arlington, VA: National Science Foundation. This is an evaluation report of a project to develop curriculum materials that serve diverse populations in an urban setting (Detroit Public Schools), which promote inquiry, connect with research on how people learn, and make extensive usage of learning

technologies. The project evaluation of student learning using a pre-post test of content and processes yielded significant positive effect sizes for four different curriculum units (which were in development). The authors noted that the evaluation was not a controlled experiment and that there were large differences in effects among teachers for each unit.

Snipes, J., Doolittle, F., Herlihy, C. (2002). *Foundations for success: Case studies of how urban school systems improve student achievement.* Washington, DC: Council of Great City Schools. Retrieved October 8, 2002, from http://www.cgcs.org/pdfs/Foundations.pdf. This is a descriptive study that attempts to understand the connection between teaching policies, practices, and strategies at a district level, and actual changes in teaching and student achievement in the classroom. Conclusions are based on retrospective case studies of three urban school districts with very similar demographics where, over the last three years, student achievement has improved, and the gap between white and minority students has narrowed. Results are based on comparisons with other districts that have not succeeded in improving student achievement. Results suggest that political and organizational stability over a prolonged period and consensus on reform strategies are necessary precursors for meaningful change.

Sparks, G.M., & Simmons, J. (1989). Inquiry-oriented staff development: Using research as a source of tools, not rules. In S. Caldwell (Ed.), *Staff development: A handbook of effective practices* (pp. 126-139). Oxford, OH: National Staff Development Council. This descriptive paper serves as a guide to appropriately and successfully using action research in schools. Sparks and Simmons advocate using research as a tool to stimulate thinking, but they warn against blindly adopting new practices. Using positive and negative examples the authors explain the role of research in professional development. The paper ends with recommendations for implementation, ideas for assessing current programs and a look at which skills action research will develop.

Spencer, S.S. & Logan, K.R. (2003) Bridging the gap: A school-based staff development model that bridges the gap from research to practice. *Teacher Education and Special Education* 26(1), 51-62. This descriptive study examined the effectiveness of a coaching model in implementing a specific instructional strategy. Through classroom observations, researchers compared the classroom use of the new strategy among teachers who had an ongoing coach in the context of a study group, and a control group of teachers who did not receive ongoing coaching. They found that over a nine week period, use of the intervention continued to decease in the control group of teachers. In the intervention group, this practice remained much higher and was more consistently implemented.

Stein, M.K., Smith, M.S., & Silver, E.A. (1999). The development of professional developers: Learning to assist teachers in new settings in new ways. *Harvard Educational Review*, 69, 237-269. The authors present a descriptive analysis of two case studies which reveal challenges to reforming a professional development

program. The paper begins with a discussion of current norms in professional development and how new research is attempting to change the structure. The discussion ends with ideas of how to get teachers personally involved to meet the changing needs of their students.

Strong, M. (2004). *Induction, mentoring and teacher retention: A summary of the research.* Paper presented at the Annual Meeting of the Association of Teacher Educators in Europe in Agrigento, Italy. The authors review the research and literature on the effects of induction programs and mentoring on the retention and turnover of new teachers, citing experimental and quasi-experimental studies. They explore why teachers quit, as well as the types of support teachers receive and how it affects attrition.

Supovitz, J., Mayer, D., & Kahle, J. (2000). Promoting inquiry-based instructional practice: A look at the longitudinal impact of professional development in the context of systemic reform. *Educational Policy,* 14(3), 331-356. This paper uses a quasi-experimental design examining a longitudinal data set of teacher surveys from 1992 to 1995. Some 1,475 Ohio teachers were surveyed to measured changes in teachers' attitudes, preparation and practices of "Inquiry-Based" Instruction after participating in the "Discovery" professional development program. The self-report surveys show substantial and statistically significant gains in short term attitudes, preparation, and "Inquiry-Based practice" as well as a smaller, but lingering effect after three years of teaching.

Supovitz, J.A., & Snyder Taylor, B. (2003). *The impact of standards-based reform in Duval County, Florida, 1999-2002.* Philadelphia: Consortium for Policy Research in Education, University of Pennsylvania. This descriptive study examines the effects of a school system's broad effort to improve student learning by documenting the county's changes in state test performance in comparison to other similar Florida counties. In comparison to other counties, the patterns in Duvall County's elementary school, show strong and persistent gains in performance - relative to its peers. There was virtually no difference in the county's middle school test performance. Supovitz and Snyder Taylor attribute some of the gain to an intensive commitment to the professional development of teachers.

Thompson, M., Paek, P., Goe, L.,& Ponte, E. (2004). *Research summary: Study of the impact of the California Formative Assessment and Support System for Teachers.* Princeton, NJ: Educational Testing Service. The goal of this quasi-experimental design is to assess the impact of the Beginning Teacher Support and Assessment (BTSA) and the California Formative Assessment and Support System for Teachers (CFASST) on teacher practices and student learning. Researchers identified a sample of BTSA graduates who had a high level of engagement with the program and compared them to a sample that had low or no engagement. Using surveys, classroom observations, standardized test scores and face-to-face

interviews, researchers found that a high level of CFASST engagement had a positive effect on teaching practices and student learning.

U.S. Department of Education, Office of the Undersecretary, Planning and Evaluation Service. (1999). *Designing effective professional development: Lessons from the Eisenhower program.* Washington, DC: Author. This is a quasi-experimental study to examine whether professional development activities assisted by the Eisenhower program significantly contributed to changes in teachers' classroom practices. Survey data was gathered at three points in time in a longitudinal study of all math and science teachers in 30 schools (elementary, middle, and high schools). Results from teacher self reports were organized into six key features of professional development which are effective in improving teacher practice.

Venezky, R., & Winfield, L. (1979). *Schools that succeed beyond expectations in teaching* (Studies on Education Technical Report No. 1). Newark, DE: University of Delaware. (ERIC Document Reproduction Service No. ED 177 484). This descriptive study examines urban schools with children of low socioeconomic status to determine what factors were responsible for their achievement in reading. Case studies were performed on two urban schools that were very much alike in their demographics and history, but one school has succeeded at teaching reading and the other has not. Interviews, analysis of test scores, work logs, classroom observations and a review of school memos revealed two primary causes of success to be achievement orientation from the head of the school, and building wide instructional efficiency.

Wasley, P., Hampel, R., & Clark, R. (1997). The puzzle of whole-school change. *Phi Delta Kappan*, 78(9), 690-697. This is a descriptive study of five high schools which attempts to determine how an entire school can make cultural changes that will positively affect students. Each school had been involved in reform for at least seven years and the study used a "collaborative inquiry" technique to create a written "snapshot image" of a school at each point in time. Measures included interviews, note taking, focus groups, and weekly journals which were analyzed to derive seven indicators which other schools can use to evaluate their own reform efforts.

Wenglinsky, H. (2000). *How teaching matters: Bringing the classroom back into discussions of teacher quality.* Princeton, NJ: Educational Testing Service. This quasi-experimental study examined how teacher quality affects student achievement. Three aspects of teacher quality – teacher inputs, classroom practices, and professional development – were compared with scores from over 7,000 eighth graders who took the NAEP math and science assessments in 1996, to determine what effect teacher variables have on each other and on student performance. Results show that teacher input and professional development contribute to student performance and effective classroom practices – suggesting that ongoing development is just as important as high standards in hiring.

Wenglinsky, H. (2002). How schools matter: The link between teacher classroom practices and student academic performance. *Education Policy Analysis Archives*, 10(12). This quasi-experimental study explores the link between classroom practices and student academic performance, by applying multilevel modeling to the 1996 National Assessment of Educational Progress (NAEP). The study found that two topics, addressing special populations of students and higher-order thinking skills are substantially related to student achievement. The amount of time teachers spent in professional development, however, was not significantly related to achievement.

Weiss, I.R., Banilower, E.R., Shimkus, E. (2004). *Local systemic change through teacher enhancement: Year nine cross site report*. Chapel Hill, NC: Horizon Research. Available: http://www.horizon-research.com/LSC/news/cross_site/03cross_site/cross-site03.pdf In this quasi-experimental evaluation, researchers conducted classroom observations of randomly selected teachers (or their backups) in the spring of 2003. Three hundred eighty two classrooms were observed, roughly three-fourths of which were taught by teachers who had participated in at least 20 hours of LSC professional development. In all cases, the data were weighted to represent the total population of eligible teachers in the project. Researchers found that the duration of professional development is related to the depth of teacher change.

WestEd. (2000). *Teachers who learn, kids who achieve: A look at schools with model professional development.* San Francisco: Author. The purpose of this descriptive study was to identify and describe teacher practices that resulted in higher achievement for students. Case studies were performed on eight schools, all winners of the National Awards Program for Model Professional Development from 1996-1998. The discussion of these schools gives concrete examples to aid understanding, but primarily focuses on general conclusions that can be used to create or modify professional development programs in other schools. The case studies note how the programs were implemented, and how environments were changed to support the staff and their learning.

Whitehurst, G. (2002). *Research on teacher preparation and professional development.* Paper presented at White House Conference on Preparing Tomorrow's Teachers, Washington, DC. Retrieved October 8, 2002, from http://www.ed.gov/inits/preparingteachersconference/whitehurst.html. This is a literature review that attempts to construct a common understanding of the quality of preparation and professional development of teachers. This primarily descriptive study explains the shortcomings of previous research and alerts consumers to common reporting errors which can skew perceptions. Both high and low quality studies are discussed to demonstrate how influential research can be in setting policy. The report cautions reader against drawing conclusions based on any single study.

Zeichner, K., Marion, R., and Caro-Bruce, C. (1998). *The nature and impact of action research in one urban school district: Final report*. Chicago: Spencer Foundation. This paper presents a descriptive project evaluation documenting the nature and impact of a school district sponsored action research professional development program. Teachers, principals, and other staff in the Madison Metropolitan School District, Madison, Wisconsin participated in this program. In addition to conducting interviews, researchers collected detailed field notes and examined student work, teacher assignments and documentation related to the action research studies the teachers were engaged in.