

The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement

Executive Summary

The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement

Executive Summary

September 2008

Michael S. Garet
Stephanie Cronen
Marian Eaton
Anja Kurki
Meredith Ludwig
Wehmah Jones
Kazuaki Uekawa
Audrey Falk
American Institutes for Research

Howard S. Bloom
Fred Doolittle
Pei Zhu
Laura Sztejnberg
MDRC

Marsha Silverberg
Project Officer
Institute of Education Sciences

U.S. Department of Education

Margaret Spellings
Secretary

Institute of Education Sciences

Grover J. Whitehurst
Director

National Center for Education Evaluation and Regional Assistance

Phoebe Cottingham
Commissioner

September 2008

This report was prepared for the Institute of Education Sciences under Contract No. ED-01-CO-0026/0020. The project officer was Marsha Silverberg in the National Center for Education Evaluation and Regional Assistance.

IES evaluation reports present objective information on the conditions of implementation and impacts of the programs being evaluated. IES evaluation reports do not include conclusions or recommendations or views with regard to actions policymakers or practitioners should take in light of the findings in the reports.

This report is in the public domain. Authorization to reproduce it in whole or in part is granted. While permission to reprint this publication is not necessary, the citation should be: Garet, Michael S., Stephanie Cronen, Marian Eaton, Anja Kurki, Meredith Ludwig, Wehmah Jones, Kazuaki Uekawa, Audrey Falk, Howard Bloom, Fred Doolittle, Pei Zhu, and Laura Szejnberg. *The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement* (NCEE 2008-4030). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

To order copies of this report,

- Write to ED Pubs, Education Publications Center, U.S. Department of Education, P.O. Box 1398, Jessup, MD 20794-1398.
- Call in your request toll free to 1-877-4ED-Pubs. If 877 service is not yet available in your area, call 800-872-5327 (800-USA-LEARN). Those who use a telecommunications device for the deaf (TDD) or a teletypewriter (TTY) should call 800-437-0833.
- Fax your request to 301-470-1244.
- Order online at www.edpubs.org.

This report also is available on the IES website at <http://ies.ed.gov/ncee>.

Upon request, this report is available in alternate formats such as Braille, large print, audiotape, or computer diskette. For more information, please contact the Department's Alternate Format Center at 202-260-9895 or 202-205-8113.

ACKNOWLEDGMENTS

This study represents a collaborative effort of school districts, schools, teachers, researchers, and professional development providers. We appreciate the willingness of the school districts, schools, and teachers to volunteer for the study, participate in the professional development, and respond to many requests for data, feedback, and access to classrooms. We were also fortunate to have the advice of an expert technical working group. Members included Tom Cook, Northwestern University; Linnea C. Ehri, City University of New York; Barbara Foorman, Florida State University; Mary M. Kennedy, Michigan State University; Andrew C. Porter, University of Pennsylvania; Brian Rowan, University of Michigan; Latrice M. Seals, educational consultant for the Houston Independent School District; Michael Seltzer, University of California, Los Angeles; William Shadish, University of California, Merced; and Joseph Torgesen, Florida State University. We also benefitted from the informed feedback on the study's statistical analyses and report from the following people at the American Institutes for Research (AIR) and MDRC: George Bohrnstedt, Terry Salinger, James Kemple, Charles Michalopoulos, and Gordon Berlin.

We would like to thank all those who provided the professional development during the study, including the coaches within the study districts; the LETRS facilitators at Sopris West, and the coaching facilitators at the Consortium on Reading Excellence (CORE), as well as the members of the intervention team who provided monitoring support: Kirk Walters, Judith Littman, and Terry Anstrom. We also thank Michelle Cantave, Amber Noel, Sara Yonker, Consuelo Aceves, Kristen Hodge, Shelley Rappaport, and Jeanna Hicks for coordinating the classroom observations and survey administration and data processing; Sandra Tang and Jeannette Moses for all their support to the staff conducting data collection and processing; Lynne Blankenship and the conference staff for all their support in managing many of the study's professional development activities; Susan Sepanik and Adam Wodka for their excellent research assistance with the student records; all of the staff at REDA International, Inc., MDRC, and AIR who helped us collect and process data throughout the study; and the AIR and MDRC staff who helped us start the study up during the early years: Reuben Jacobson, Courtney Tanenbaum, Steve Hurlburt, Robert Ivry, Jason Snipes, Kristin Porter, and Jean Eisberg. Finally, we would like to thank our report editors, Holly Baker, Mike Rollins, and Maria Stephens who helped to make the report useful and understandable.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST¹

The research team for this study consisted of a prime contractor, American Institutes for Research (AIR), and two subcontractors, MDRC and REDA International, Inc. None of these organizations or their key staff has financial interests that could be affected by findings from the Early Reading PD Interventions Study. No one on the seven-member Expert Advisory Panel, convened by the research team one to two times a year to provide advice and guidance, has financial interests that could be affected by findings from the evaluation.

¹ Contractors carrying out research and evaluation projects for IES frequently need to obtain expert advice and technical assistance from individuals and entities whose other professional work may not be entirely independent of or separable from the particular tasks they are carrying out for the IES contractor. Contractors endeavor not to put such individuals or entities in positions in which they could bias the analysis and reporting of results, and their potential conflicts of interest are disclosed.

EXECUTIVE SUMMARY

THE IMPACT OF TWO PROFESSIONAL DEVELOPMENT INTERVENTIONS ON EARLY READING INSTRUCTION

Professional development (PD) of teachers is viewed as a vital tool in school improvement efforts (Hill 2007). The importance of professional development (PD) for teachers is underscored in several major federal education initiatives, including the No Child Left Behind (NCLB) statute. For example, Title II of NCLB provided \$585 million to states and districts for PD activities during the 2002-2003 school year alone in order to meet the goal of having a highly qualified teacher in every classroom (U.S. Department of Education, 2005). Two years later, Title II funding for PD remained at over \$500 million (U.S. Department of Education 2007).

Are teachers receiving the PD that they need? A recent national study of state and local NCLB implementation indicated that 80 percent of elementary teachers reported participating in 24 hours of PD on reading instruction or less during the 2003–2004 school year and summer (U.S. Department of Education 2007). Reading and PD experts have raised a concern that this level of PD is not intensive enough to be effective, and that it does not focus enough on subject-matter knowledge (Cohen and Hill 2001; Fletcher and Lyon 1998; Foorman and Moats 2004; Garet, Porter, Desimone, Birman, and Yoon 2001).

To help states and districts make informed decisions about the PD they implement to improve reading instruction, the U.S. Department of Education commissioned the Early Reading PD Interventions Study to examine the impact of two research-based PD interventions for reading instruction: (1) a content-focused teacher institute series that began in the summer and continued through much of the school year (treatment A) and (2) the same institute series plus in-school coaching (treatment B). The study team consists of AIR, MDRC, and REDA International, Inc., who conducted the research activities, and Sopris West and the Consortium on Reading Excellence (CORE), who delivered the teacher and coach PD.

The Early Reading PD Interventions Study used an experimental design to test the effectiveness of the two PD interventions in improving the knowledge and practice of teachers and the reading achievement of their students in high-poverty schools. It focused specifically on second grade reading because (1) this is the earliest grade in which enough districts collect the standardized reading assessment data needed for the study; and (2) later grades involve supplementary (pull out) instruction, which was outside the scope of the study. The study was implemented in 90 schools in six districts (a total of 270 teachers), with equal numbers of schools randomly assigned in each district to treatment A, treatment B, or the control group, which participated only in the usual PD offered by the district. This design allowed the study team to determine the impact of each of the two PD interventions by comparing each treatment group's outcomes with those of the control group, and also to determine the impact of the coaching above and beyond the institute series by comparing treatment group B with treatment group A.

This report describes the implementation of the PD interventions tested, and examines their impacts at the end of the year the PD was delivered. In addition, we investigate the possible lagged

effect of the interventions, based on outcomes data collected the year after the PD interventions concluded.

The study produced the following results:

- ***Although there were positive impacts on teacher’s knowledge of scientifically based reading instruction and on one of the three instructional practices promoted by the study PD, neither PD intervention resulted in significantly higher student test scores at the end of the one-year treatment.*** Teachers in schools that were randomly assigned to receive the study’s PD scored significantly higher on the teacher knowledge test than did teachers in control schools, with standardized mean difference effect sizes (hereafter referred to as “effect sizes”) of 0.37 for the institute series alone (treatment A) and 0.38 for the institute series plus coaching (treatment B). Teachers in both treatment A and treatment B used explicit instruction to a significantly greater extent during their reading instruction blocks than teachers in control schools (effect size of 0.33 for treatment A and 0.53 for treatment B). However, there were no statistically significant differences in achievement between students in the treatment and control schools.
- ***The added effect of the coaching intervention on teacher practices in the implementation year was not statistically significant.*** The effect sizes for the added impact of coaching were 0.21 for using explicit instruction, 0.17 for encouraging independent student activity, and 0.03 for differentiating instruction, but these effects may be due to chance.
- ***There were no statistically significant impacts on measured teacher or student outcomes in the year following the treatment.***

The PD Interventions Evaluated

The study team drew on the research on reading instruction as summarized by the National Reading Panel (NRP) (National Institute of Child Health and Human Development; NICHD 2000) and on the PD literature to determine the types of interventions to be evaluated.² Several criteria guided the selection of both the models of interest (institute series and coaching) and the specific interventions. We sought PD interventions that:

- Included content on the five components of reading instruction that were identified as “essential” by the National Reading Panel (NICHD 2000): phonemic awareness, phonics, and fluency (“word-level” content) and vocabulary and comprehension (“meaning-level” content);

² See, for example, Ball 1996; Carpenter et al. 1989; Cohen and Hill 1998; Cohen and Hill 2001; Desimone et al. 2002; Elmore 2002; Garet et al. 2001; Grant, Peterson and Shojgreen-Downer 1996; Hargreaves and Fullan 1992; Kennedy 1998; Knapp 1997; Lieberman 1996; Lieberman and McLaughlin 1992; Little 1993; Loucks-Horsley et al. 1998; McCutchen et al. 2002; Stiles, Loucks-Horsley and Hewson 1996; Talbert and McLaughlin 1993.

- Provided intensive PD—that is, PD of longer duration than is typical in similar districts;³
- Promoted the use of three specific classroom practices—explicit instruction, guiding students in independent practice of reading activities, and differentiating instruction to meet individual students’ needs—that research suggests may support student learning (NICHD 2000);
- Could be connected directly to the core reading program used in the district, through similarity in content focus, the sequencing and pacing of topics covered, and the use of teachers’ basal texts in some PD activities and exercises; and
- Encouraged active teacher participation and practice as part of the PD.

In addition, we sought interventions that would be relevant to practitioners, because they were being used in districts and schools similar to those in the study. To provide the institutes and seminars, we selected Language Essentials for Teachers of Reading and Spelling (LETRS). To provide training for the in-school coaches, we selected the Consortium for Reading Excellence (CORE).⁴ (See the text box on the following page.)

Study Participants

To test the effectiveness of the PD interventions in a variety of local contexts that served the study’s population of interest, the study sought a sample of schools from six urban school districts that serve substantial numbers of non-English language learner (ELL) students from low-income households.⁵ The study was further limited to districts that:

- Administered a standardized reading achievement test in the second grade that could be used as the study’s key outcome measure
- Were not already providing districtwide professional development in reading instruction of the same type and level of intensity as that being provided by the Early Reading PD Interventions Study

³ Data on the number of hours of PD participation are available from two nationally representative surveys. As mentioned above, a survey of NCLB implementation indicated that 80 percent of early elementary teachers reported participating in 24 hours of PD in reading or less during 2003-2004 (U.S. Department of Education 2007). According to a survey conducted as part of an evaluation of Reading First, teachers in Reading First schools—where funds are provided to increase access to professional development—reported receiving on average 40 hours of PD in reading (U.S. Department of Education 2006). The Reading First survey also reported data on participation in coaching. According to the study, 86 percent of the teachers in Reading First schools reported receiving coaching on reading instruction, compared to 50 percent of teachers in non-Reading First Title I schools. Each full-time Reading First coach was responsible for providing support to an average of 22 grade K-3 teachers. In contrast, in the coaching condition (Treatment B) in the study reported here, each full time coach worked with an average of 5.9 teachers.

⁴ The teacher institute series provider (Sopris West’s LETRS team) was selected by the study staff during the proposal stage, after a review of PD providers meeting the study criteria. The coach training provider was selected after the study began, using a competitive process; study staff reviewed available coaching training providers and invited proposals from three organizations that had relevant experience in coach training. External advisors with expertise in PD or reading reviewed the proposals and recommended the selected provider.

⁵ Schools met the criteria if they had 50 percent or more students eligible for free or reduced price lunch and less than 50 percent of students identified as ELL.

- Were using one of the two scientifically based reading series targeted by the study as the core second grade reading program, and had been using the program for at least one year prior to the study.⁶

Summary of the PD Interventions Evaluated

Teacher Institute and Seminar Series (Treatment A)

Treatment A involved eight content-focused institute and seminar days, implemented during summer 2005 and the 2005–2006 school year. The teacher institute and seminar series was based on *Language Essentials for Teachers of Reading and Spelling* (LETRS), a professional development curriculum developed by Louisa Moats (2005) and modified for the purposes of the study. LETRS consists of topic-based modules that align with the NRP's essential components of reading instruction. The LETRS developer and lead facilitator, with oversight from the study's intervention team, designed the eight institute and seminar days (48 hours of PD) to focus on topics relevant to second grade reading instruction, relying primarily on the module contents and accompanying trainer materials. The topics of the eight institute and seminar days were: (1) the challenge of learning to read; (2) phoneme awareness; (3) spellography/phonics; (4) fluency and analyzing student work samples; (5) vocabulary; (6) review of phonemic awareness, phonics, analyzing student work samples, and an introduction to differentiated instruction; (7) reading comprehension; and (8) review of vocabulary, reading comprehension, analyzing student work samples, and differentiated instruction.

Added In-School Coaching (Treatment B)

In addition to the institute and seminar days, treatment B provided a half-time coach in each participating school to work with second grade teachers (an average of three teachers per school). The study's coaching model was designed to increase teachers' understanding of the content learned in the institute series and to provide ongoing practice and support for applying their new knowledge and implementing their core reading program effectively. It was expected that teachers would receive, on average, 60 hours of coaching during the school year.

Coaches received three types of training to prepare them for their roles and responsibilities. First, the study coaches attended all LETRS institute and seminar days with their assigned school(s) to become familiar with the content. In addition, AIR contracted with the Consortium on Reading Excellence (CORE) to deliver a three-day coaching institute and four on-site follow-up trainings in the coaches' schools during the implementation year that focused on the coach's role in implementing effective reading instruction in the classroom; coaching individual teachers using a multi-step cycle; drawing on assessment data to identify and address student needs; and organizing grade level teacher meetings to build teachers' capacity to examine student work and plan instruction.

⁶ The study focused on schools that used one of two core reading programs to ensure compatibility between the content of the PD and the instructional context in which the content would be applied and to minimize variability in the reading curriculum while still providing a test of the PD in multiple settings. The two reading programs were selected based on their fit with the planned PD and input from a panel of reading and PD experts. The Early Reading PD Interventions Study is a study of the impact of the specific PD interventions used; it is not designed to test the effectiveness of the reading programs used in the participating districts.

Six eligible districts agreed to participate, located in urban or urban fringe areas across four eastern and mid-western states. Each district provided six to 24 study schools, producing a total sample size of 90 schools, which met the study’s recruitment target. Table E-1 shows that in comparison to the average urban/urban fringe school, the study schools had a significantly higher percentage of students eligible for free or reduced-price lunch, a significantly higher percentage of African American students, and a significantly lower percentage of White and Hispanic students. Study schools had an average of three second grade teachers and 61 second grade students in regular classrooms. (Self-contained special education classes were excluded.) This resulted in an analysis sample in the 90 schools of 270 teachers and about 5,500 students for the spring of the treatment year (table E-2), 250 teachers for fall of the follow-up year, and 254 teachers and 4,614 students for spring of the follow-up year.

Table E-1. Characteristics of Study Schools and Average Urban or Urban Fringe U.S. Elementary Schools, 2005–2006

Characteristics	Average Urban/Urban Fringe U.S. School	Average Study School
Number of Students Per Teacher	16.6	16.0*
Number of Students Per School	527.6	460.2*
Percentage of Students Eligible for Free or Reduced Price Lunch	48.6	78.3*
Student Race/Ethnicity (percent)		
White	45.3	14.8*
African American	22.2	78.4*
Hispanic	25.3	4.6*
Asian	6.3	1.8*
Native American	0.8	0.4
Number of Schools	24,275	90

SOURCE: 2005–2006 *Common Core of Data*.

NOTES: The national sample of schools upon which these statistics are based was drawn from the CCD. The sample was restricted to districts characterized in the CCD as regular districts in the 50 states and District of Columbia serving Large City, Mid-Size City, and Urban Fringe of Large City locales. The sample of schools from these districts was restricted to schools characterized in the CCD as regular (school type) primary (school level) schools serving more than 12 second grade students.

Ns for all study school statistics were 90. Ns for average urban/urban fringe U.S. schools were 24,275 except for students per teacher (N = 24,177) and students eligible for free or reduced price lunch (N = 24,181).

*Indicates a statistically significant difference between national and study sample means ($p < .05$).

Table E-2. Number of Schools, Teachers, and Students in Spring 2006 Sample, Overall and by Group

Treatment Status	Number of Schools	Number of Second Grade Teachers		Number of Second Grade Students	
		Total Number	Average Per School	Total Number	Average Per School
Treatment A	30	93	3.1	1,983	66.1
Treatment B	30	88	2.9	1,738	57.9
Control	30	89	2.9	1,809	60.3
Total	90	270	3.0	5,530	61.4

SOURCE: Early Reading PD Interventions Study Teacher Rosters and District Enrollment Records.

Study Design

The 90 study schools were randomly assigned in spring 2005 so that equal numbers within each district received treatment A (the institutes), treatment B (the institutes plus coaching), and no treatment (the district's "business as usual" PD). A variety of data were collected from the teachers and students in these schools, primarily in the fall and spring of the implementation year (2005-06) and the fall and spring of the follow-up year (2006-07). Based on these data, several outcome measures were constructed:

- **Teachers' knowledge about reading instruction.** The study team administered a Reading Content and Practices Survey (RCPS) to all treatment and control teachers in fall and spring of the implementation year and the spring of the follow-up year.⁷ Although the overall knowledge score is the main measure for this outcome, we also computed two subscores—a word-level subscore, measuring teachers' knowledge of word-level components of reading instruction (phonemic awareness, phonics, and fluency), and a meaning-level subscore, measuring teachers' knowledge of meaning-level components of reading instruction (vocabulary and reading comprehension). The two subscores were included to permit exploration of possible differences in the impact of the PD on the domains of knowledge it addressed.⁸ The teacher knowledge measures were standardized based on the control group mean and standard deviation so that impacts can be displayed as effect sizes. The first administration of the RCPS (prior to delivery of the PD) was used as a baseline measure of teacher knowledge.
- **Teachers' use of research-based instructional practices.** Trained observers visited all second grade classrooms in study schools in the fall and spring of the implementation year and in the fall of the follow-up year, tallying activities that occurred during each three-minute interval over a full period of reading instruction. Outcome measures derived from the observations of reading instruction included scores for *explicit teaching methods*, *independent student activity* (i.e., guided student practice), and *differentiation of instruction* to address students' diverse needs, three areas of teachers' practice that the PD was intended to affect.⁹ Again, so that the impacts can be displayed as effect sizes, each classroom instruction measure was standardized based on the control group mean and standard deviation.
- **Students' reading achievement.** Students' reading achievement was the primary outcome for the study. The key measure was the standardized *average reading score*, obtained from the district assessments. Because the tests used in the six study districts

⁷ The outcomes of the teacher knowledge assessment, like other achievement or aptitude tests, are scaled in logits, which represent the log of the odds of getting correct answers to each test item.

⁸ The word-level material in the PD curriculum emphasized foundational knowledge underlying "best practices" in phonics and fluency instruction, topics believed to be unfamiliar to most teachers (Moats 2002). The meaning-level material in the curriculum emphasized teaching strategies for building students' vocabularies and comprehension skills, both of which were built into the lesson structure of the core readers the teachers used.

⁹ The measures of explicit instruction and independent student activity were scaled in logits, paralleling the scales used for the teacher knowledge outcomes. Logits are commonly used in situations in which the purpose is to measure the proportion of occasions in which an event occurs. Each teacher's logit score represents the log of the odds of the teacher engaging in explicit instruction or independent student activity during each three-minute observation interval. The differentiated instruction measure was not scaled in logits because the majority of teachers did not engage in differentiated instruction during the classroom observation; logits cannot be calculated for zero occurrences.

differed, there was no one consistent test metric. Hence the scaled scores reported by the districts were standardized within each district so that they can be compared across districts.¹⁰ Standardizing the achievement scores makes it possible to interpret the impact estimates as effect sizes. It is possible that the PD interventions might not have an impact on average achievement, but the interventions might affect the achievement distribution. For that reason, a secondary, *dichotomous measure* was constructed. First, the average reading test score in the 2004–2005 school year (latest baseline year) for all second grade students in the study schools within each district was chosen as a cut-point. Each student’s implementation year and follow-up year test scores were compared to this cut-point, and each student was categorized as achieving above or below that cut-point in the implementation year as well as the follow-up year tests. This metric reflects the percentage of students who performed at or above the mean baseline performance level. The analysis based on this measure focused on the impact of the PD treatment on the proportion of students with above average achievement in the study schools.

We also surveyed teachers to gather data on their backgrounds and on the amount and type of PD they participated in during the study years. Study staff obtained information on the implementation of the two interventions by observing the institutes and from logs maintained by coaches that recorded the nature of each coach interaction with each teacher.

The basic analytic strategy for assessing the impacts of the PD interventions was to compare outcomes for schools that were randomly assigned within each district to each of the three study conditions. Because we used data on students, nested within teachers’ classrooms, nested within study schools, three-level multilevel models were used to estimate the impacts of professional development on student reading achievement and two-level models were used for estimating impacts on the teacher measures. The impact model uses the sample of teachers and students present in the study schools as of the spring 2006 (implementation year) and 2007 (follow-up year) data collection periods. The estimates provide an intent-to-treat analysis of the impact of the interventions because they reflect the PD effects on the targeted (or “intended”) sample, whether or not all the teachers in the treatment schools participated fully in the PD provided.

A summary of the study sample and design is provided in the following text box.

¹⁰ The standardized scores were calculated by subtracting the second grade student reading test average for the district’s study schools in 2004–2005 from each student’s total reading score and then dividing it by the standard deviation for the second grade students in the district’s study schools in 2004–2005.

Study Sample and Design Summary

Participants: Six districts, 90 schools, and 270 second grade teachers participated in the study during the year that the PD interventions were implemented. During the follow-up year (which included only data collection), the number of teachers participating was 250 in the fall and 254 in the spring. Participating districts used one of two commonly used scientifically based reading programs. Schools selected for the study were high-poverty urban or urban fringe public elementary schools in which fewer than half the students were designated as English language learners (ELL). Schools were screened out if they were already receiving Reading First funding (and therefore might already be participating in intensive PD) or if they planned to receive this funding during the first year of the study.

Research Design: Within each district, schools were randomly assigned in equal numbers to treatment A, treatment B, or the control group. Each group therefore consisted of 30 schools and 88 to 93 teachers during the implementation year or 81 to 85 teachers during the follow-up year. School-level student achievement data were collected from district records for student cohorts from the two years prior to the study as pretest data, and teachers took a teacher knowledge pretest before participating in any study PD. Outcomes data collected consisted of student achievement scores from spring of the implementation and follow-up years, obtained from district records; teacher knowledge scores from posttests administered in spring of the implementation and follow-up years; and classroom observations conducted during fall and spring of the implementation year and during fall of the follow-up year. These data were collected from all three study groups. Because students were clustered within classrooms and classrooms were clustered within schools, effects for the study were estimated using hierarchical linear models.

Outcomes: The study examined impacts on three sets of outcomes: teachers' knowledge of reading instruction, based on data from the Reading Content and Practices Survey (RCPS); teachers' reading instructional practices, based on observations by trained observers; and student reading test scores, collected from district records.

Study Findings

Implementation

On average:

- 93 percent (45 of 48 hours) of the planned institute and seminar hours were delivered in the districts.
- Treatment group A and B teachers attended 35 of the 45 implemented hours of study-provided PD (78 percent), according to institute and seminar attendance records.
- Teachers in treatment A and B reported receiving significantly more hours of reading-related institutes and seminars during the implementation year—including both study-provided PD and PD not related to the study—than did teachers in control schools (39 hours and 47 hours compared with 13 hours).

- Coach logs indicate that teachers in treatment B schools received an average of 62 hours of coaching over the course of the year, consistent with the guidelines provided in the coach training (approximately 2 hours per teacher per week over about 30 weeks). Almost 80 percent of the coaching hours (49 of 62 hours) were spent on topics that were a focus of the study's PD.¹¹
- Teachers in the treatment B schools reported participating in significantly more coaching in reading instruction during the implementation year (71 hours) than did teachers in treatment A (4 hours) or control (6 hours) schools.

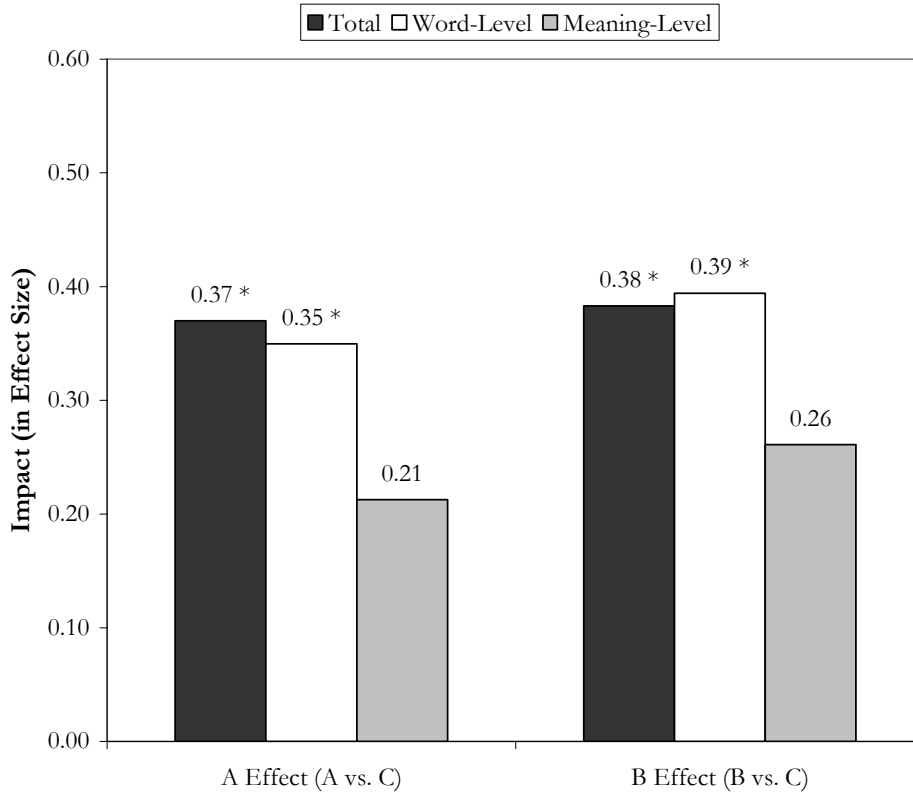
Effects of the PD Interventions During the Implementation Year

Teachers' Knowledge of Early Reading Content and Instruction

- Teachers who were assigned to the institute series only group (treatment A) or the institute series plus coaching group (treatment B) scored significantly higher on the overall teacher knowledge total score, in comparison with the control group teachers (effect sizes = 0.37 and 0.38, respectively; see figure E-1). In addition, treatment group A and B teachers scored significantly higher than control group teachers on the word-level subscale (effect sizes = 0.35 and 0.39, respectively). The estimated effects were not statistically significant for the meaning-level subscale (effect sizes = 0.21 for treatment A and 0.26 for treatment B), although they were positive.
- The institute series was designed to nurture teacher knowledge, whereas the coaching was designed to help teachers translate this knowledge into practice. Therefore, coaching was not expected to have an impact on teacher knowledge. The additional PD delivered through coaching (tested by comparing treatment B with treatment A) did not produce a statistically significant added effect on overall teacher knowledge or either of the teacher knowledge subscales (effect sizes for the difference in impacts between treatments B and A were 0.01 on the total score, 0.04 on the word-level subscale, and 0.05 on the meaning-level subscale).

¹¹ It should be noted that the treatment B teachers reported an average of 71 hours of coaching rather than the 62 reported by the study coaches; however, the teacher survey item this estimate is based on did not limit teachers' responses to only the study-provided coaching. Therefore, teacher estimates may also include coaching and mentoring from other sources.

Figure E-1. Effects of the PD Interventions on Teachers' Total, Word-Level, and Meaning-Level Reading Knowledge Score, Implementation Year Spring Sample



SOURCE: Reading Content and Practices Survey (RCPS), Spring 2006. Covariate measures were taken from baseline RCPS and teacher background survey, 2005.

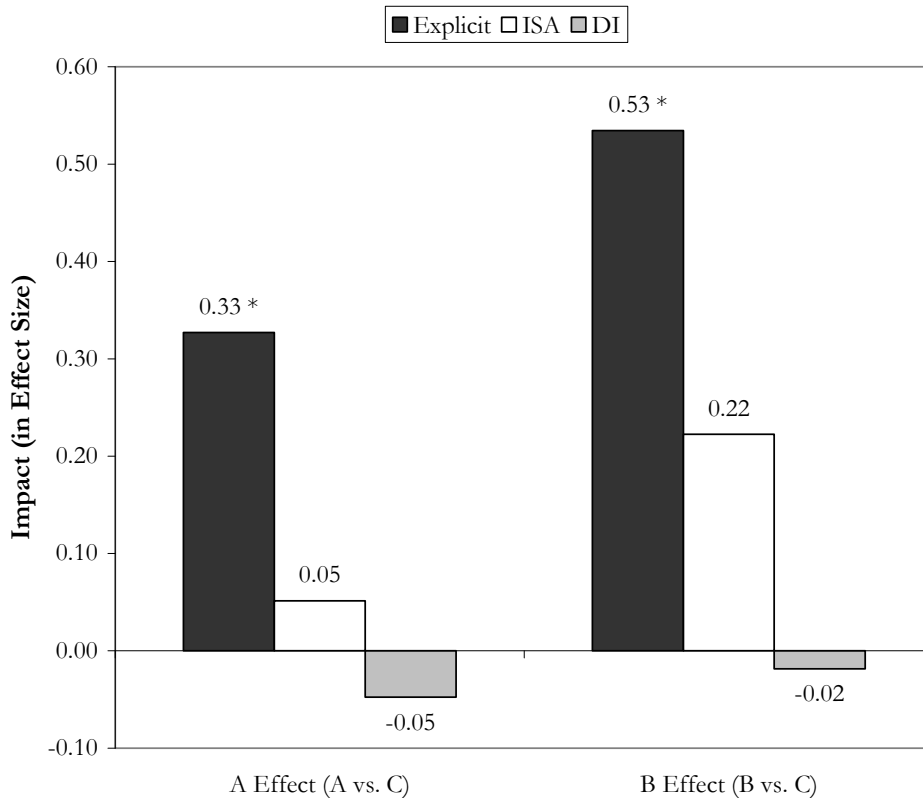
NOTE: *Indicates an impact estimate found to be statistically significant ($p < .05$).

Teachers' Instructional Practice: Use of Explicit Instruction, Independent Student Activity (ISA), and Differentiated Instruction (DI) During Reading Instruction

- The treatment group A and B teachers used explicit instruction to a significantly greater extent than control group teachers (effect sizes = 0.33 and 0.53, respectively). See figure E-2.
- There were no statistically significant impacts on the use of the other two types of instructional practices focused on in the study (independent student activity and differentiated instruction), although a comparison of teachers in treatment group B and teachers in the control group showed an estimated effect size of 0.22 for the use of independent student activity.
- The differential impact of coaching on teacher practices was not statistically significant. The estimated effect size for the impact of the intervention on explicit instruction was 0.53 for teachers who participated in coaching along with the institute series (treatment B), and 0.33 for teachers who participated only in the institute series (treatment A), a difference of 0.21. Similarly, the estimated effect size for the impact on independent student activity was 0.22 for treatment group B teachers, and 0.05 for treatment group A

teachers, a difference of 0.17. The estimated effect sizes for differentiated instruction, however, were negative for both treatment A and treatment B (-0.05 and -0.02, respectively) with a difference of 0.03. None of these differences between treatment A and treatment B were statistically significant.

Figure E-2. Effects of the PD Interventions on Teachers’ Use of Explicit Instruction, Independent Student Activity (ISA), and Differentiated Instruction (DI), Implementation Year Spring Sample



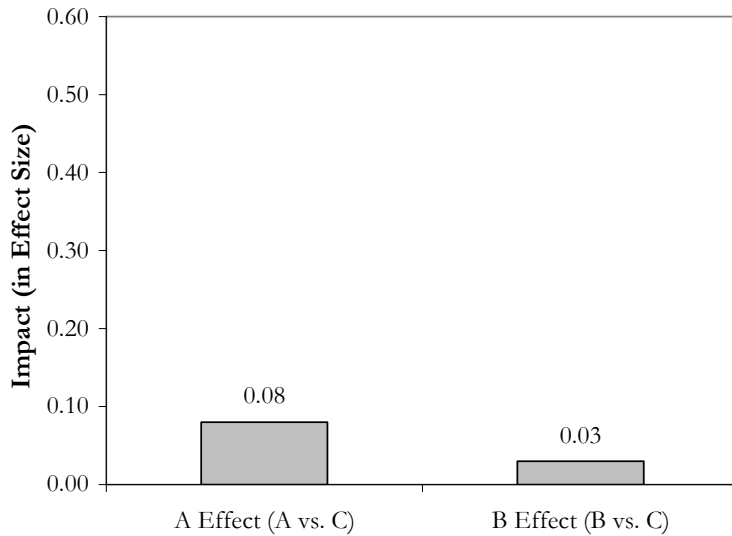
SOURCE: Early Reading PD Interventions Study Classroom Observations, Spring 2006. Covariate measures were taken from baseline RCPS and teacher background survey, 2005.

NOTE: *Indicates an impact estimate found to be statistically significant (p < .05).

Students’ Reading Achievement

- The improvement in teacher knowledge and the increased explicitness of teachers’ instruction caused by the PD intervention did not translate into improvements in student reading achievement as measured by standardized tests given by each district. Neither the institute series alone (treatment A) nor the combination of institutes, seminars, and coaching (treatment B) produced a statistically significant impact on the main outcome measure: standardized student reading test scores (effect sizes = 0.08 and 0.03, respectively; see figure E-3). Nor was there a statistically significant effect on the percent of students scoring at or above the overall baseline mean reading score (3.48 and -2.35 percent, respectively).

Figure E-3. Effects of the PD Interventions on Standardized Student Total Reading Test Scores, Implementation Year Spring Sample



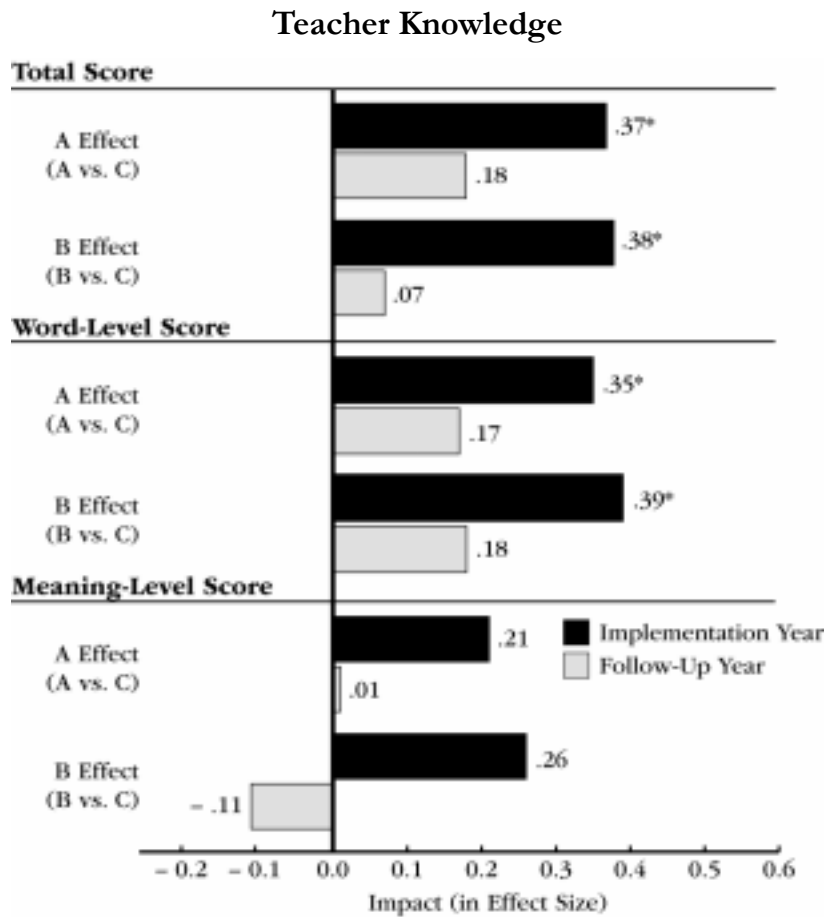
SOURCE: Student records from each individual school district for 2003–2004 and 2004–2005 school years.

NOTE: There were no significant impacts on this outcome (all p 's > .05).

Effects of the PD Interventions During the Follow-Up Year

- The year after the PD was concluded, there was no statistically significant effect of either the institute series alone (treatment A) or the institute series plus coaching (treatment B) on teacher's knowledge of reading content (figure E-4) or their use of the instructional practices encouraged by the study PD (figure E-5). With one exception (see below), the difference in teacher impacts between the implementation year and the follow-up year was not statistically significant; thus, we cannot conclude with confidence that any positive impacts during the implementation year declined over time.
- The estimated effect of treatment B on the use of explicit instruction was lower by a statistically significant margin in the fall of the follow-up year (-0.03) than in the implementation year (0.53; figure E-5).

Figure E-4. Impact of the PD on Teacher Knowledge Total Score, Word-Level Score, and Meaning-Level Score: Implementation vs. Follow-Up Year



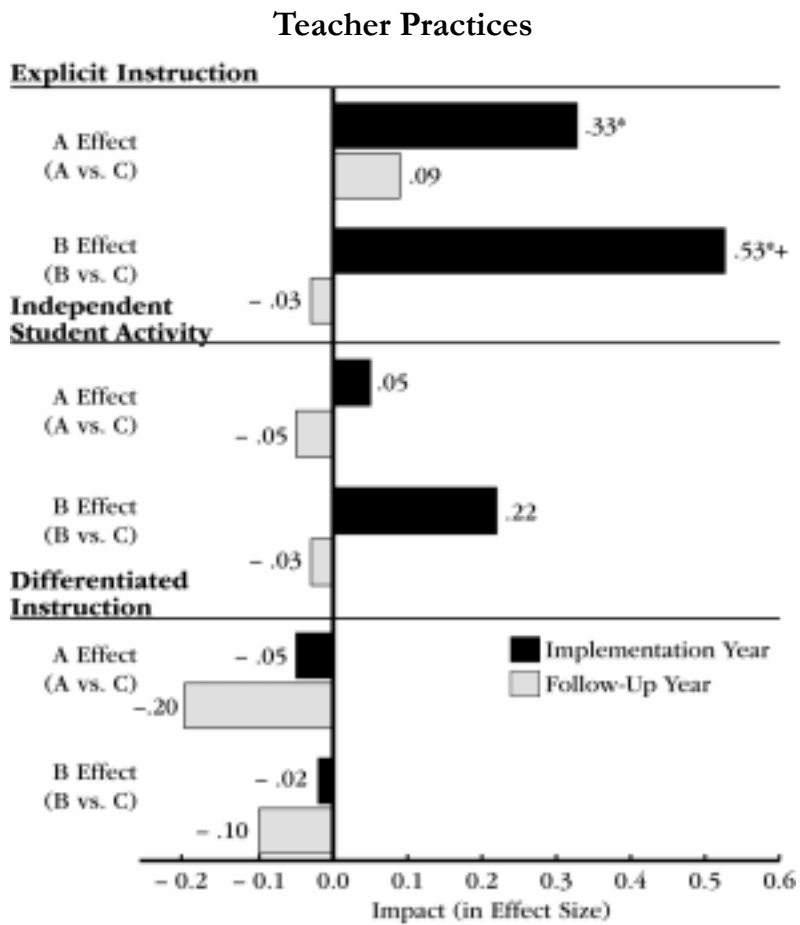
SOURCE: Reading Content and Practices Survey (RCPS), Spring 2006 and 2007; covariate measures were taken from baseline RCPS and teacher background survey, 2005 and 2006.

NOTES: Covariate measures were taken from baseline RCPS and teacher background survey, 2005 and 2006.

*Indicates an impact estimate found to be statistically significant ($p < .05$).

There were no statistically significant implementation year vs. follow-up year comparisons (all p 's $> .05$).

Figure E-5. Impact of the PD on Explicit Instruction, Independent Student Activity, and Differentiated Instruction: Implementation vs. Follow-Up Year



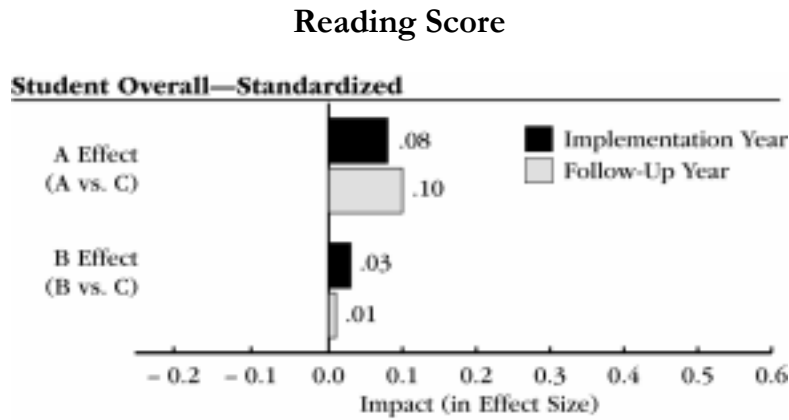
SOURCE: Early Reading PD Interventions Study Classroom Observations, Spring and Fall 2006; Covariate measures were taken from baseline RCPS and teacher background survey, 2005 and 2006.

NOTES: *Indicates an impact estimate found to be statistically significant ($p < .05$).

+Indicates a statistically significant implementation year vs. follow-up year comparison ($p < .05$).

- Neither treatment had statistically significant impacts on student achievement in the follow-up year (figures E-6 and E-7).
- There were no statistically significant differences between the follow-up and implementation year impacts for either the standardized student test score (figure E-6) or the dichotomous outcome (figure E-7).

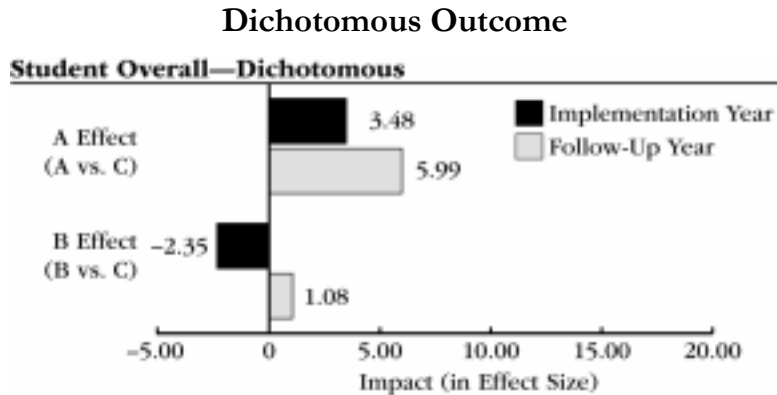
Figure E-6. Impact of the PD on Standardized Student Total Reading Scores: Implementation vs. Follow-Up Year



SOURCE: Student records from each individual school district for 2003–2004, 2004–2005, and 2006–2007 school years.

NOTE: There were no statistically significant impacts or implementation year vs. follow-up year comparisons (all p's > .05).

Figure E-7. Impact of the PD on Student Dichotomous Outcome: Implementation vs. Follow-Up Year



SOURCE: Student records from each individual school district for 2003–2004, 2004–2005, and 2006–2007 school years.

NOTE: There were no statistically significant impacts or implementation year vs. follow-up year comparisons (all p's > .05).

REFERENCES

- Ball, D. L. "Teacher Learning and the Mathematics Reforms: What We Think We Know and What We Need to Learn." *Phi Delta Kappan*, 1996, 77(7): 500–508.
- Carpenter, T. P., Fennema, E., Peterson, P. L., Chiang, C., and Loef, M. "Using Knowledge of Children's Mathematics Thinking in Classroom Teaching: An Experimental Study." *American Educational Research Journal*, 1989, 26(4):499-531.
- Cohen, D. K., and Hill, H. C. *Instructional Policy and Classroom Performance: The Mathematics Reform in California* (RR-39). Philadelphia, PA: Consortium for Policy Research in Education, 1998.
- Cohen, D. K., and Hill, H. C. *Learning Policy: When State Education Reform Works*. New Haven, CT: Yale University Press, 2001.
- Desimone, L., Porter, A. C., Garet, M., Yoon, K. S., and Birman, B. "Does Professional Development Change Teachers' Instruction? Results From a Three-Year Study." *Educational Evaluation and Policy Analysis*, 2002, 24(2): 81–112.
- Elmore, R. *Bridging the Gap Between Standards and Achievement: The Imperative for Professional Development in Education*. Washington, DC: Albert Shanker Institute, 2002. Available online at: http://www.ashankerinst.org/Downloads/Bridging_Gap.pdf.
- Fletcher, J. M. and Lyon, G. R. "Reading: A Research-Based approach." In W. M. Evers (Ed.), *What's Gone Wrong in America's Classrooms*. Stanford, CA: Hoover Institute Press, 1998: 49–90.
- Foorman, B.R., and Moats, L.C. "Conditions for Sustaining Research-Based Practices in Early Reading Instruction." *Remedial and Special Education*, 2004, 25(1): 51–60.
- Garet, M., Porter, A., Desimone, L., Birman, B., and Yoon, K. S. "What Makes Professional Development Effective? Results From a National Sample of Teachers." *American Educational Research Journal*, 2001, 38(4): 915–945.
- Grant, S. G., Peterson, P. L., and Shojgreen-Downer, A. "Learning to Teach Mathematics in the Context of Systemic Reform." *American Educational Research Journal*, 1996, 33(2): 502–541.
- Hargreaves, A. and Fullan, M. G. *Understanding Teacher Development*. London: Cassell, 1992.
- Hill, H. C. "Learning in the Teaching Workforce." *The Future of Children*, 2007, 17(1): 111-127.
- Kennedy, M. M. *Form and substance in in-service teacher education* (Research monograph no. 13). Arlington, VA: National Science Foundation, 1998.
- Knapp, M. S. "Between Systemic Reforms and the Mathematics and Science Classroom: The Dynamics of Innovation, Implementation, and Professional Learning." *Review of Educational Research*, 1997, 67(2): 227–266.

- Lieberman, A. (Ed.). “Practices that Support Teacher Development: Transforming Conceptions of Professional Learning.” In M. W. McLaughlin and I. Oberman (Eds.), *Teacher Learning: New Policies, New Practices*. New York, NY: Teachers College Press, 1996: 185-201.
- Lieberman, A., and McLaughlin, M. W. “Networks for Educational Change: Powerful and Problematic.” *Phi Delta Kappan*, 1992, 73: 673–677.
- Little, J. W. “Teachers’ Professional Development in a Climate of Educational Reform.” *Educational Evaluation and Policy Analysis*, 1993, 15(2): 129–151.
- Loucks-Horsley, S., Hewson, P. W., Love, N., and Stiles, K. E. *Designing Professional Development for Teachers of Science and Mathematics*. Thousand Oaks, CA: Corwin Press, Inc., 1998.
- McCutchen, D., Abbott, R. D., Green, L. B., Beretvas, S. N., Cox, S., Potter, N. S., Quiroga, T., and Gray, A. “Beginning Literacy: Links Among Teacher Knowledge, Teacher Practice, and Student Learning.” *Journal of Learning Disabilities*, 2002, 35: 69–86.
- Moats, L. C. *Teaching Reading IS Rocket Science: What Expert Teachers of Reading Should Know and Be Able To Do*. Washington, DC: American Federation of Teachers, 2002.
- Moats, L.C. *Language Essentials for Teachers of Reading and Spelling (LETRS)*. Longmont, CO: Sopris West Educational Services, 2005.
- National Institute of Child Health and Human Development. *Report of the National Reading Panel. Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and its Implications for Reading Instruction: Reports of the Subgroups* (NIH Publication No. 00-4754). Washington, DC: U.S. Government Printing Office, 2000.
- Stiles, K., Loucks-Horsley, S., and Hewson, P. *Principles of Effective Professional Development for Mathematics and Science Education: A Synthesis of Standards* (NISE Brief, Vol. 1). Madison, WI: National Institutes for Science Education, 1996.
- Talbert, J. E., and McLaughlin, M. W. “Understanding Teaching In Context.” In D. K. Cohen, M. W. McLaughlin, and J. E. Talbert (Eds.), *Teaching for Understanding: Challenges for Policy and Practice*. San Francisco, CA: Jossey-Bass, Inc., 1993: 167-206.
- U.S. Department of Education, Office of the Under Secretary, Policy and Program Studies Service. *Improving Teacher Quality in U.S. School Districts: Districts’ Use of Title II, Part A, Funds in 2002-2003*. Washington, DC, 2005.
- U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. *Reading First Implementation Evaluation: Interim Report*. Washington, DC, 2006.
- U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service. *State and Local Implementation of the No Child Left Behind Act, Volume I—Teacher Quality Under NCLB: Interim Report*, Washington, DC, 2007.