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Literacy coaching as a component of professional development

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Abstract Current debates concerning effective professional development for teachers of early reading have focused on the potential benefits of a literacy coach in providing sustained support and guidance for teachers' learning from a professional development program. In this study, we compare the response of first-grade teachers to a model of professional development that did or did not include a literacy coach (i.e., PD Coach or PD No Coach) by examining teachers' attitudes toward professional development, their instruction, and student outcomes. We also take into account teachers' views about their school climate, as these might influence their response to professional development activities. Results showed no differences in teachers' attitudes toward the professional development, the support of their principal, or opportunities for collaboration with other teachers. The PD Coach teachers differed from the PD No Coach teachers in aspects of instruction relevant to the professional development program. Further, students in PD Coach teachers' classrooms made greater improvements in word decoding from fall to spring. The support of the principal contributed to these outcomes. The results suggest benefits of a model of professional development in reading that included school-based coaching for first-grade teachers.

Keywords Professional development · Reading · Literacy coaching · Teachers' practices · Student achievement

Introduction

Identifying the characteristics of effective professional development programs in reading for teachers continues to be an area of considerable interest to researchers

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and educators, fueled in part by the drive to improve the quality of reading instruction, as articulated by the teacher quality initiative and the Reading First program in the No Child Left Behind Act of 2001. Recently, Desimone (2009) suggested that to move the research agenda on professional development forward, research should focus on the effects of implementation of programs on teachers' attitudes, instruction, and student outcomes. Given the wide variety of models of professional development, such studies hold the potential of contributing to our understanding of the complex interplay of factors that influence the outcomes of professional development programs (e.g., Borko, 2004).

As Desimone (2009) indicated, research studies have largely resulted in consensus about general characteristics of effective professional development (i.e., content focus, active learning, coherence, duration, and collective participation). However, as these are descriptive categories, there is much work left to be done to examine these features as they are instantiated in different programs and to determine how these influence outcomes. Further, Desimone (2009) raised questions about how best to measure the effects of professional development, suggesting that studies might include measures of teachers' attitudes as well as changes in their instructional practices and their students' gains in achievement. Her call for comprehensive analyses of the effects of professional development on teachers' practices and students' achievement reflects current policy, as expressed through the No Child Left Behind Act of 2001. Title 1 Part B of the NCLB legislation authorized Reading First, which provided funding for states to support improvement in early reading in high poverty schools with chronic underachievement in early reading (US Department of Education, 2002). The law requires states and districts to provide high quality professional development for teachers as a primary means of increasing the likelihood that the quality of instruction and student achievement will improve.

The Reading First legislation has had an influence on the amount and kind of professional development that many early elementary teachers receive. A federally funded study of Reading First implementation (Moss, Fountain, Boulay, Horst, Rodger et al., 2008) showed that a greater percent of teachers in Reading First schools than other Title 1 schools reported participating in professional development (90% versus 73%). Reading First schools were also more likely than other Title 1 schools to have a literacy coach (98% versus 88%). While survey results show that reading coaches in Reading First schools and other Title 1 schools reported a similar variety of instructional support activities for teachers, literacy coaches in Reading First schools were less likely to provide direct instruction to students and more likely to carry out various administrative roles (e.g., compiling assessment data). At the time states were designing their Reading First plans, literacy coaching was quickly becoming a national trend even though there were few studies that had considered whether a school-based literacy coach was a valuable component of a program of professional development in reading. Perhaps the most important question that needed to be answered was whether the support of a literacy coach provides benefits that go beyond those of high quality professional development opportunities that do not include school-based literacy coaches.

In response, we designed a study in which we compared first-grade teachers' participation in a professional development program with and without a literacy coach. All teachers attended seminars during one school year to provide opportunities for them to improve their knowledge of reading and reading instruction; they also were taught a method to assess students' progress in order to evaluate the effectiveness of their instruction. Some teachers were in Reading First schools that employed a literacy coach to support teachers' learning and collaboration (PD Coach model), while others were in other high poverty schools that did not provide such support as part of the professional development program (PD No Coach model).

In examining professional development with and without a coach in this context, we realized that other aspects of Reading First might influence the outcomes. It is important to consider the major features of Reading First, which were all focused on improving teachers' reading instruction—namely, opportunities for professional development in reading, instructional support linked to this professional development, and the use of materials, programs and assessments supported by reading research. It would have been ideal to control for this last feature (e.g., including only teachers whose schools adopted such materials). The way to do so would be to have teachers in both conditions using the same materials, and this was simply not feasible. Instead, we gathered information about the materials they did use for instruction, as will be reported later. It remains the case that the results of the study might reflect differences between teachers in Reading First schools and in other high poverty schools that we did not measure.

Along with examining the effects of professional development with and without a literacy coach on teachers' attitudes toward professional development, instructional practices, and the progress of their students in reading, we studied aspects of the school culture that might affect teachers' response to the professional development program. In focusing on the school context in which professional development took place, we were influenced by findings that schools vary in their capacity to support teachers' professional learning (e.g., Correnti, 2007; Park & Datnow, 2008). Previous studies suggest that reform efforts are more effective when teachers feel supported by the principal, have opportunities to work collaboratively, and trust one another (e.g., Desimone, 2002). In theory, teachers' attitudes toward these aspects of school climate might affect (i.e., either facilitate or undermine) their response to the professional development program.

Support for teachers' efforts to improve their reading instruction

A central purpose of professional development is to improve teachers' understanding of effective instruction in their content area (Shulman, 1986), and research has shown that teachers knowledge about reading improves when they participate in intensive, extended programs of professional development in reading (Brady, Gillis, Smith, Lavalette, Liss-Bronstein et al., 2009; Carlisle, Katz, & Cortina, in press; Garet, Cronen, Eaton, Kurki, Ludwig et al., 2008; McCutchen, Green, Abbott, & Sanders, 2009). However, improved knowledge about reading and reading practices does not necessarily lead to improvements in teachers' practices or, as a result, their

students' academic achievement (e.g., Cirino, Pollard-Durodola, Foorman, & Francis, 2007; Garet et al., 2008).

This apparent disconnect has led researchers to focus on features of professional development programs that lead to improvements in teachers' instructional capacity, defined by Cohen and Ball (1999) as "the capacity to bring about worthwhile and substantial learning" (p. 2). Studies have reported benefits of teaching teachers to examine the effectiveness of their practices, to evaluate their students' achievement, and to recalibrate the expectations they have for their students' learning and achievement (Desimone, Porter, Garet, Yoon, & Birman, 2002; Timperley & Phillips, 2003). Teachers' self-assessment plays a pivotal role in their professional growth (Ross & Bruce, 2007)—a component we therefore included in the two models of professional development in the present study.

Other studies have examined methods for sustained support for teachers' learning from a professional development programs. Teachers have been found to benefit from being shown alternative, effective methods when they have guided opportunities to learn how these might apply to their students' learning (Anders & Bos, 1992), but methods to provide guidance vary. In some cases, support comes from a teacher assigned the role of mentor or consultant. Sometimes the mentor is an external agent of change, an expert in reading who makes scheduled, periodic visits to schools and classrooms (e.g., Brady et al., 2009). At present, teacher collaboration and school-based literacy coaching are considered particularly promising means of providing sufficient support for teachers so that they derive benefits from professional development (e.g., Cantrell & Hughes, 2008; Nielsen, Barry, & Staab, 2008; Vescio, Ross, & Adams, 2008).

Collaboration is thought to help teachers support each other's learning and provide opportunities for them to share views about effective instructional practices (Johnson, 2002; Taylor et al., 2002). Support through collaboration has been associated with improvements in teachers' individual and collective self-efficacy (Cantrell & Hughes, 2008) and with changes in instructional practices and improvements in students' reading (Vescio et al., 2008). However, teacher collaboration has not consistently led to improved instruction. Providing opportunities for teachers to work together can lead to improved social connectedness and communication among teachers without affecting their instruction (Tschannen-Moran, 2001). Even teachers who express satisfaction with collaborative arrangements do not consistently use discussion and materials made available in group meetings to make substantive changes in the way they teach reading (Elmore, 2006; Richardson & Placier, 2001).

An alternative favored by many educators and researchers is hiring a literacy coach who can facilitate the delivery of the professional development program as well as provide sustained support for teachers' collectively and individually. Professional organizations (e.g., the International Reading Association, 2004) and experts in the field of early reading (e.g., Bean, 2004; Walpole & McKenna, 2004) have advocated the use of a literacy coach to provide support and guidance for teachers. The International Reading Association defines a literacy coach as "a reading specialist who focuses on providing professional development for teachers by giving them the additional support needed to implement various instructional

programs and practices" (International Reading Association, 2004). In some models, coaching is itself considered a form of professional development. In other models, the coach is viewed as providing a link between formal opportunities to learn (e.g., seminars) and the practical aspects of learning to use new knowledge to modify the materials and methods used to teach reading (Garet et al., 2008).

When the coach is a member of the school staff, the theoretical framework includes possible school-wide benefits. Bean (2004) emphasized the leadership role of the coach not just in providing guidance for teachers in their classrooms but also in working with the school and community. This model appears to be common in Reading First schools (Moss et al., 2008), as survey results show that coaches provide a wide variety of support services for teachers (e.g., helping them secure needed materials, providing feedback after observing instruction) and also work closely with the principal and serve as a link to organizations in the community (e.g., preschool programs). In this model, the coach might facilitate communication around literacy issues and foster collaboration among teachers as well as collaboration between the principal and the teaching staff (see also Walpole & McKenna, 2004). Coaches might foster the development of a positive school climate, a good working relation among teachers, and an expectation that teachers in the school can improve the literacy outcomes for students (Bean, 2004; International Reading Association, 2004; Poglinco, Bach, Hovde, Rosenblum, Saunders et al., 2003).

There is some evidence that suggests a literacy coach can provide needed support for teachers' professional learning, self-efficacy, and engagement in the process of improving instruction. Nielsen et al. (2008) studied the combined effects of literacy coaching and collaborative groups; the results of this 2-year study suggest that coaches with teaching experience were influential in helping kindergarten through grade 3 teachers improve their reading instruction, even when they changed grade levels from the first to the second year. Somewhat similarly, Cantrell and Hughes (2008) found that middle-grade teachers' individual and collective efficacy improved through the support that came from both a coach and collaborative teacher meetings.

While at present coaching is a promising component of school-based professional development in reading, there still is the need to determine the extent to which coaching adds to the value of high quality professional development (Neufeld & Roper, 2003). Thus, our study was designed to compare the effects of professional development with and without the assistance of a literacy coach by examining differences in changes in teachers' practices and student outcomes. Research findings to date are not consistent for either outcome. A few studies have shown positive effects of professional development on student outcomes (e.g., Correnti, 2007; Desimone et al., 2002). Carlisle, Katz, and Cortina (in press) found that professional development with coaching for first-grade teachers led to improvements in the content focus of instruction, when compared to professional development conditions without a coach or without both a coach and guidance in evaluating the effectiveness of instruction. These results suggest the possibility that literacy coaching, combined with a substantive program to improve teachers' knowledge about reading, might influence teachers to adopt instructional practices

introduced in the professional development program and lead to gains in students' reading.

In contrast, Garet and his colleagues (2008) found that teachers who participated in two models of professional development (with and without a coach) did not show significant changes in instruction or improvements in their students' outcomes. The schools in this study were characterized by high poverty and low achievement; the professional development program was Moats' (2003) *Language Essentials for Teachers of Reading and Spelling*. Results showed greater improvements in teachers' knowledge about reading for the two professional development groups than for the control group. However, the teachers in the three groups (including a no treatment control) did not differ significantly in their instructional practices (e.g., time spent providing explicit instruction). Similarly, the three groups did not differ significantly in students' gains on the districts' reading achievement. Another study that examined the relation of coaching and student outcomes also did not report positive effects (e.g., van Keer & Verhaeghe, 2005).

These differences in research findings should be explored, especially given the promise of high quality professional development and the strong belief in the value of literacy coaching. As Desimone (2009) and Borko (2004) pointed out, the complexities of implementing professional development programs in different contexts are likely to require a number of studies, so that we rely on a consensus approach to determine the features of professional development programs that are most effective.

School factors that might mediate the effects of coaching

In an analysis of features associated with effective professional development, Corcoran, McVay, and Riordan (2003) suggested that institutional support is needed for professional development to gain more than a flimsy foothold within the school. For our study, then, an important consideration was how features of the school environment interact with the presence or absence of a coach as a component of a professional development program. Does a supportive environment add to the benefits provided by a coach or not? Does a supportive environment, when there is no coach, lead to comparable gains in student achievement as those found in schools with a coach? While programs of professional development in early reading have commonly focused on individual teachers, in theory the climate of a school could affect a literacy coach's success in working with teachers.

School factors associated with effective professional development have been studied within the context of comprehensive school reform (Desimone, 2002). Here the intent is not only improving staff knowledge in content areas involved but also enhancing the commitment to the process of improving the quality of education for students. Desimone found that effective programs have been characterized by well-organized implementation, good communication, professional development to help teachers learn how to use new materials and programs, and strong leadership. The principal, in particular, has a strong influence on the success of the change process, in part through encouraging teachers to "buy in" to the reform effort and to contribute meaningfully to the change process. The results of other studies have also

suggested the importance of the leadership of the principal (including providing support for teachers' collaboration) along with efforts to develop the professional capacity of the school to successful school improvement (e.g., Sebring, Allensworth, Bryk, Easton, & Luppescu, 2006). A principal's support for change in the school has been positively linked to high quality communication and collaboration around literacy issues (Berebitsky, Goddard, Carlisle, & Feng, 2009). Teachers' attitudes toward the school climate appear to be influenced by support from the principal in the form of taking an interest in teachers' concerns and ideas and providing needed resources for teachers (e.g., opportunities to meet together). Tschannen-Moran (2001) also found a close connection between collaboration and trust.

Given the potential benefits of school-based coaching for whole-school reform, as proposed by Bean (2004) and Neufeld and Roper (2003), we considered it important to examine teachers' views of the support from school leaders and of the climate (communication, collaboration) when professional development did and did not include a literacy coach. Results might suggest factors that either offset the need for a coach (e.g., the principal has provided sufficient support for a collaborative and cohesive focus on improving reading instruction) or else reinforce the role of the coach (e.g., strong school leadership and a positive school climate add to the benefits of coaching for teachers).

The effects of professional development on reading instruction and achievement

As noted above, Desimone (2009) has placed on the forefront of research issues determination of the effects of different professional development programs (and components thereof) on teachers' instruction and students' academic achievement. Her model also acknowledges the possibility that the school context influences teachers' attitudes and instruction and student achievement. The focus of our study is the potential benefits of having a coach as one component of a program of professional development in early reading; the design involves a comparison of teachers' attitudes, instruction and student outcomes in schools with or without a literacy coach as part of the professional development program.

The study is part of a larger quasi-experimental research project designed to compare three models of professional development in early reading. In this project, one model involved teacher participation in seminars taught by reading experts using Moats' *Language Essentials for Teachers of Reading and Spelling* (LETRS)—therefore, close to the design of a traditional professional development program (Garet, Porter, Desimone, Birman, & Kwang, 2001). In the second model, teachers attended the same seminars but also had opportunities to learn and use a method to assess their students' progress in reading and the effectiveness of their instruction. In the third model, both of these components were included; additionally, teachers had a literacy coach to extend and support their use of research-based instructional practices. Teachers in the first and second models were randomly assigned to condition. This was not possible for teachers in the third model, as the teachers were recruited from Reading First schools, all of which had a literacy coach. For the study we report in this paper, we did not include the teachers in the first model because they did not administer students' reading assessments.

Thus, for the present study, participants in the second model were the PD No Coach teachers and in the third model were the PD Coach teachers.

Because teachers attended the LETRS seminars throughout the first year of the study, the study we are reporting here focuses on teachers' second year of participation. At this point all teachers had attended the seminars, making it likely that any integration of the content into their teaching would take place that year (e.g., Desimone et al., 2002; Nielsen et al., 2008). In this second year, teachers in the PD Coach condition continued to receive support from a literacy coach in their school, whereas teachers in the PD No Coach condition received assistance from our research team in administering student assessments only. During the second year, we administered surveys, observed instruction, and assisted in the administration of student assessments; the surveys included measures of teachers' attitudes toward the school climate. We examined differential effects on student outcomes, given measures of the support provided by the principal and a positive, collaborative school climate. Our research questions were as follows:

- Did teachers in PD Coach and No Coach conditions differ in their evaluation of their professional development and the school climate?
- To what extent did teachers in the PD Coach and No Coach conditions differ in time spent on phonics and small group instruction across the school year? And to what extent did their views of professional development and school climate account for variance in their observed instruction?
- Did teachers' participation in the PD Coach or PD No Coach condition account for variance in students' word decoding, when taking into account attitudes toward the professional development program, school climate, and time spent on key aspects of their reading instruction? In addition, did PD Coach or PD No Coach condition influence the spring risk status for students found to be at risk in the fall, based on assessment of their word decoding?

Method

Participants

The professional development that is the focus of this study was designed for teachers in the Reading First program in Michigan. As noted earlier, the Reading First legislation required that the state, districts, and schools provide high quality, research-supported professional development for teachers. In Michigan, the model of professional development included a literacy coach whose job it was to assist in the delivery of the content and to support teachers' understanding and use of effective practices through weekly grade-level meetings and through assistance in the classroom. As noted above, first-grade teachers in RF schools in Michigan were recruited to participate in the PD Coach condition. We recruited teachers for the PD No Coach condition from schools eligible for RF funding that did not participate in the program and did not have a school-based literacy coach dedicated to working with the early elementary teachers. Teachers in the PD Coach condition could not be

Table 1 Average 1st grade demographic differences between PD Coach and No Coach schools

	PD Coach (%)	PD No Coach (%)
% of minority[a]	67.3	33.5
% of FRL[a]	57.1	26.2
% of limited English proficient	3.1	6.3
% of Special education[a]	11.7	6.5

[a] Means of two conditions are significantly different based on independent samples *t*-test

randomly assigned to condition because they were recruited in RF schools in Michigan, which were required to hire a literacy coach. The remaining first-grade teachers had been randomly assigned to the PD No Coach condition or the seminar-only condition by school, after rank ordering the schools for percent of 4th graders underachieving in reading the previous year (see Carlisle, Katz & Cortina, in press).

In the first year, 43 PD Coach first-grade teachers came from 23 schools in five districts participating in Reading First, and 33 PD No Coach teachers came from 25 schools in four other districts, eligible for but not participating in Reading First. The schools in the two conditions were demographically different with the PD Coach schools having, on average, more minority (non-White, non-Asian) 1st graders, more 1st graders eligible for free/reduced price lunch, and more 1st graders designated as special education, but the two conditions did not differ in average number of limited-English proficient students (Table 1).

Of the 76 teachers who completed the first year of the study, seven teachers, four PD Coach and three PD No Coach, dropped out of the study before the second year for personal (e.g., child care) or professional (e.g., left the district) reasons. Fifteen teachers were assigned a classroom at a different grade in the second year of the study, and we asked these teachers to still complete the survey instruments. However, as these teachers did not administer the 1st grade DIBELS assessments, we could not include them in any analysis containing student achievement. Therefore, in the second year, we had 54 first-grade teachers (34 PD Coach and 20 PD No Coach) who administered DIBELS, were observed teaching, and completed surveys. Unfortunately, eleven teachers (nine PD Coach and two PD No Coach) were missing one of the three observations, and thus they could not be included in any analysis where measures of instruction were included. Consequently, the analyses have a maximum of 54 and a minimum of 43 teachers.

A survey of teachers' instruction in the fall indicated that 95% of the PD Coach teachers were in schools that used a comprehensive or "core" reading program, in comparison to 87% of the PD No Coach teachers. Almost all teachers in both conditions indicated that they used supplemental materials to teach phonics (both about 92%) and fluency (both 87%). Furthermore, nearly all of the teachers said that they had used the materials in previous years of teaching reading (92% for PD Coach and 97% for PD No Coach).

Delivery of the components of professional development

The teachers attended nine seminars designed to deepen their knowledge about reading and reading instruction, using *Language Essentials for Teachers of Reading and Spelling* (LETRS) (Moats, 2003). One module of this program was covered in each of the nine seminar meetings. Teachers attended one meeting every 3 or 4 weeks, starting in October. Each seminar meeting lasted 3 h, so that 27 h of instruction were provided to all teachers. Experts in LETRS, trained by the publisher's staff, served as the seminar leaders. All seminar leaders had previous experience teaching teachers in other professional development programs in reading in Michigan and used the same instructional plans and materials for the nine seminars (e.g., specific sections and pages from LETRS). They could amend the lessons in small ways (e.g., changing an activity or supplemental materials). The seminar leaders were asked to keep a log in which they recorded the details of their lesson plans; then after each seminar, they indicated any aspect of the plan that had changed in the actual seminar session. The logs showed that the seminar leaders had some difficulty covering all of the content as teachers became increasingly eager to discuss relevant issues—a positive sign of engagement, albeit a factor that affected coverage of each lesson plan.

To assess fidelity of treatment, we observed about 10% of the seminars, using the lesson plan for the module as a guide. Information from the observations provided answers to the following questions: Were the major sections of the lesson plan covered? Were the exercises and activities included in each section carried out? Were additional materials/activities relevant to the lesson? Analyses of the ratings for each of these categories indicated that the lessons conformed to the plan for that seminar. For 80% of the observed seminars, all major sections of the lesson were covered completely, and for 90% of the seminars most recommended exercises and activities were included. In 60% of the observed lessons additional materials were included, and these were judged to be relevant to the lesson. For example, in one seminar, the leader passed out a brief research report on the importance of fluency in reading (the topic of the seminar), referred to the article in the discussion, and encouraged the teachers to read the article on their own.

All teachers completed an experimental measure of teacher knowledge called Language and Reading Concepts (LRC) at both the beginning and the end of the first year of their participation in the professional development study. This measure was used to assess teachers' learning about reading from the content of the LETRS program. The assessment had an internal reliability (Cronbach's alpha) of 0.75. The proportions of correct responses on the questionnaires were scored for each teacher with unanswered questions counting as misses. Statistical tests showed that PD Coach and No Coach teachers did not differ on either assessment indicating that the two groups had similar knowledge of reading and language concepts both before and after the professional development (see Carlisle, Katz & Cortina, in press).

Literacy coaches and their roles

The 39 PD Coach teachers were in 21 schools that had a literacy coach as part of the professional development program. Twenty of the 21 coaches were female; 16 had

Table 2 Literacy coaches' views of teacher and student needs

To what extent do you agree or disagree with the following opinion statements?	Percent strongly agree
1. It is important for K-3 teachers to know how to use literacy centers in their classrooms effectively	80
2. It is important that K-3 teachers administer the DIBELS assessment to their students	70
3. It is important for students to read books at their instructional or independent reading level	85

Note: $n = 21$

Table 3 Coaches' views of their primary responsibilities

To what extent do you agree with the following statements about your daily work as a literacy coach?	Percent strongly agree or agree
Meeting one-on-one with teachers is an important part of my job	100
Modeling literacy lessons for teachers is an important part of my job	95
I spend a majority of my time visiting K-3 classrooms	95
Teachers view me as a resource for advice and ideas about how to teach literacy better	85
I am comfortable helping teachers use student assessment results to make instructional decisions	85
I work closely with the principal or vice-principal in my school	85

Note: $n = 21$

earned a master's degree, and 9 had endorsements as a reading specialist. Coaches averaged 15.9 years of teaching experience (10.5 SD), ranging from 2 to 34 years. Self-reported racial/ethnic background indicated that 16 of the coaches were white and 4 were African American/black (one did not complete this question). The literacy coaches completed a coach survey as part of their participation in the evaluation of Reading First in Michigan in the spring of 2005. Some results of the survey are shown in Tables 2 and 3. The most commonly cited areas of the coach's daily work included visits to teachers' classrooms, working one-on-one with teachers, modeling methods of instruction, and serving as a literacy resource (e.g., explaining teaching methods). In addition, asked about knowledge that was important for their jobs, coaches rated as very important knowing how to use literacy centers, administer DIBELS, and target materials to student needs.

Student data

Participating first-grade teachers administered subtests of *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS) to their students (https://dibels.uoregon.edu). We report the performance of students on Nonsense Word Fluency (NWF), a subtest administered in the fall, winter, and spring. On this subtest students pronounced nonsense words made up of two or three letters; the score is the number of letters

correctly pronounced in 1 min. Alternate form reliability for NWF was reported in a document on the DIBELS website (Assessment Committee, 2002); for NWF, the median was 0.83 for first graders. First graders' performance on NWF was significantly correlated with spring performance on Iowa Test of Basic Skills (ITBS), Word Analysis subtest: fall .54, winter .57, and spring .59; in addition, first graders' performance on NWF was significantly related to performance on ITBS Reading Total measure: fall .57, winter, .60, and spring .60 (Schilling, Carlisle, Zeng, & Scott, 2007).

Teachers' surveys

Teachers completed survey measures in a self-administered questionnaire called Teachers' Quest in the fall, winter, and spring. In the winter and spring, survey measures were used to gather information about teachers' attitudes toward their principal as an instructional leader, the school climate, and the professional development program. Each of these is described below. Items can be found in the Appendix.

(a) *Attitudes towards Professional Development* (administered spring 2005). This survey was developed by researchers in the Consortium on Chicago School Research. It is made up of 9 items that focus on teachers' views of the quality of the professional development experiences, as well as the support they received and the opportunities to work with other teachers to share ideas with other teachers. Teachers responded on likert scale with four options (strongly disagree, disagree, agree, strongly agree). Principal components factor analysis of the survey on professional development yielded a variance explained of 53.61% (Cronbach's alpha of 0.89).

(b) *Communication around Literacy* (administered winter 2005). This survey, also developed by the Chicago Consortium, is made up of items that focused on the quality of communication and collaboration around issues of literacy in the school specifically asking about the sharing of ideas with teachers in their school and other schools, building communication, and procedures for sharing and reporting on early literacy and assessment data. Teachers responded by noting the frequencies of events, using a likert scale with four options (less than once a month, 2–3 times a month, 1–2 times a week, almost daily). Exploratory principal components factor analysis led to the emergence of a 5-item factor that explained 47.9% of the variance (Cronbach's alpha of 0.67).

(c) *Principal's Support for Change* (administered spring 2005). This survey, also adapted from the Chicago Consortium, focuses on teacher's attitudes towards the principal's support for change in the school. Teachers responded by noting the frequencies of events, using a likert scale with four options (less than once a month, 2–3 times a month, 1–2 times a week, almost daily). Previous use of the scale included other items that discussed change throughout the school but did not focus specifically on the principal's role in this. We chose to focus exclusively on the principal in this instance. The 4-item factor explained 79.8% of the variance (Cronbach's alpha of 0.92).

(d) *Reflective Dialogue* (administered spring 2005). This scale, developed by the Chicago Consortium, taps the ways in which teachers discuss issues of teaching and learning. Specifically, items ask teachers about the frequency with which they have conversations centering on school goals and curriculum, as well as items that ask about the frequency of communication among the whole faculty. Reflective dialogue is theorized to be an integral component of professional learning communities (Kruse, Louis, & Bryk, 1995) and teacher collaboration (Brownell, Yeager, Rennells, & Riley, 1997). This 7-item factor explains 55.3% of the variance (Cronbach's alpha of 0.80).

(e) *Teacher information.* Teachers' Quest also included a Teacher Information section that provides information about teaching experience, professional trainings, and certification.

Teachers' instructional practices (TIP)

This instrument was used to code central features of instruction during participating teachers' literacy blocks. TIP was designed to gather information about features of reading instruction and practices used in early elementary classrooms. Trained observers used TIP to record observations of the literacy block for each participating teacher three times during the year. The system employed time sampling to gather information about instruction; every 5 min, the observer looked around the classroom for 15 s and then checked descriptive codes in fields that represent key features of instruction. These included purpose of instruction, modality, grouping arrangements, adults present in the classroom, and material(s) used for instruction. The observation was carried out through the entire literacy block or 90 min, whichever came first.

The validity of the fields coded in the observation protocol was determined by drawing on reading research on the components and features of effective literacy instruction in first grade (e.g., Baker & Smith, 1999; Juel & Mindon-Cupp, 2000; National Reading Panel, 2000; Pressley, Wharton-McDonald, Allington, Block, Morrow, Tracey et al. 2001; Snow, Burns & Griffin, 1998; US Department of Education, 2002). These include explicit instruction in phonics and phonemic awareness and comprehension skills, the use of small groups to provide appropriate instruction, high levels of engagement in literacy-related activities, and dedication of a large block of time for literacy instruction. Coding of the purposes of instruction included the five components of reading required by the Reading First legislation (phonemic awareness, phonics, fluency, vocabulary, and comprehension) as well as writing. To establish inter-observer reliability, we had pairs of observers code the instruction during the literacy block in one classroom at the same time. Averaged across 3 to 5-min intervals, the agreement for the five pairs for all fields was at least .9.

To answer our research question regarding whether PD Coach and PD No Coach teachers differed in key aspects of reading instruction, we selected two areas considered critical for first graders to acquire foundational reading skill and central to the LETRS program: teachers' time spent teaching phonics and time spent providing small group instruction (SGI). The LETRS program places heavy

emphasis on teaching phonemic awareness and phonics, as they provide students with an understanding of the alphabetic code in first grade. SGI, which is often carried out while students are working in literacy centers, provides teachers an opportunity monitor students' progress in reading and provide instruction to meet their learning needs. Differentiating instruction is a key principle in the LETRS program and more generally in the Reading First program. To assess teachers' instruction in these areas, we calculated the proportion of time spent in phonemic awareness and phonics instruction during each observation. This was done by summing the number of 5-min intervals in which phonemic awareness or phonics was coded as occurring and then dividing that number by 18 (as there are 18 5-min intervals in a 90-min literacy block).

Results and discussion

Teacher characteristics and professional background

Of the 69 teachers participating in the second year, PD Coach ($n = 39$) and No Coach ($n = 30$) conditions did not differ significantly in years of teaching experience: 15.2 years (11.0 SD) for PD Coach; 12.0 years (8.0 SD) for PD No Coach. Furthermore, the PD Coach and PD No Coach groups had similar percentages of female (100 and 97%, respectively) and racial/ethnic minority (18 and 10%, respectively) teachers. The teachers in the two conditions did differ significantly in the percentage with a master's degree, favoring the PD No Coach condition (53.8% for PD Coach and 83.3% for PD No Coach).

Comparison of PD Coach and No Coach teachers' attitudes and beliefs

Our first research question asks whether PD Coach and No Coach teachers differed in their assessment of professional development, school climate, and school support. To answer this query, we performed independent-samples *t*-tests comparing the mean scores of the two conditions on each of our four factors: attitudes towards professional development, communication around literacy, principal support for change, and reflective dialogue. In all four analyses, overall, the two groups responded similarly, as any observed differences were not statistically significant. This indicates that teachers in the two conditions had similar views of the climate of their schools. Nonetheless, for two items of particular relevance for this study, responses of teachers in the two conditions provide interesting information. On the item, *the professional development deepened my understanding of subject matter*, 83% of the PD Coach and 90% of the PD No Coach teachers agreed or strongly agreed. These ratings suggest that teachers learned about reading from the LETRS seminars. On another item, *the professional development led me to make changes in my teaching*, there was a noticeable difference in response by condition; 86% of the PD Coach agreed or strongly agreed, whereas only 70% of the PD No Coach teachers agreed or strongly agreed.

Comparison of observed instruction in reading

Comparisons were made of the PD Coach and PD No Coach teachers' observed reading instruction in the fall, winter, and spring to answer our second research question. As we had measures on the use of both phonics and SGI in the fall, winter, and spring, we used repeated measures ANOVA to assess whether or not the presence of the coach had an influence on instruction. In addition to the PD Coach/No Coach conditions, we tested measures of the reading ability of the class at the beginning of the year (as measured by the average Fall NWF performance), teacher experience (years teaching and whether or not the teacher held a master's degree), attitudes towards professional development, communication around literacy, reflective dialogue, and principal support for change. To maintain analytic sample size, non-significant covariates were dropped from each analysis.

PD Coach teachers, on average, spent marginally less time on lessons on phonics for their class than their No Coach peers. Furthermore, all teachers spent significantly less time teaching phonics when the entering ability of the class was higher. As can be seen in Fig. 1, the PD Coach and No Coach groups also significantly differed in their pattern of phonics instruction over the year. That is, controlling for covariates in the model, the PD Coach teachers remained relatively consistent in time devoted to phonics instruction across the year, while time devoted to phonics instruction for the class decreased dramatically from fall to winter for PD No Coach teachers (Table 4).

Use of SGI showed a much more consistent picture than phonics, as both groups were somewhat constant in their use of SGI over the year. However, across the year,

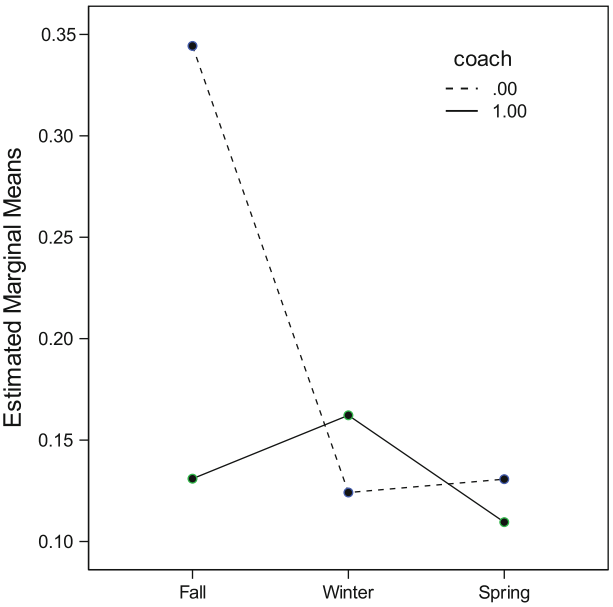

Fig. 1 Covariate adjusted time spent teaching phonics in PD Coach and PD No Coach classrooms

Table 4 Results of repeated measures ANOVA for time spent using phonics ($n = 43$)

Variable	Mean square	*df*	*F*
Within-subject effects			
Phonics	0.218	2	10.109**
Phonics* PD Coach	0.147	2	6.834*
Phonics* Fall NWF	0.161	2	7.447**
Error	0.022	80	
Between-subject effects			
Intercept	1.427	1	42.475***
PD Coach	0.124	1	3.685 ~
Fall NWF	0.517	1	15.381***
Error	0.034	40	

Note: Sphericity is violated and lower-bound estimates are thus given

~ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5 Results of repeated measures ANOVA for time spent in small group instruction ($n = 43$)

Variable	Mean square	*df*	*F*
Within-subject effects			
SGI	0.031	2	0.511
SGI* PD Coach	0.051	2	0.855
SGI*principal support	0.063	2	1.046
SGI* Fall NWF	0.028	2	0.476
Error	0.060	78	
Between-subject effects			
Intercept	0.093	1	1.326
PD Coach	2.287	1	32.507***
Principal support	0.378	1	5.376*
Fall NWF	1.142	1	16.229***
Error	0.070	39	

Note: Sphericity is assumed

* $p < .05$; ** $p < .01$; *** $p < .001$

PD Coach teachers spent significantly more time using SGI than PD No Coach teachers. Beginning of the year reading ability for the class (Fall NWF) was again significant, but in this case the effect was positive with more SGI occurring when the class's fall NWF was higher. In addition, the level of a principal's support for change significantly and positively influenced use of SGI across the year (Table 5; Fig. 2).

Gains in reading

We carried out analyses to examine the possibility that gains in reading differed for students in the first-grade classrooms of teachers in the PD Coach and PD No Coach conditions. The question was whether teacher characteristics, including professional background, teaching practices, and the professional development condition explained gains in NWF made by students in their classrooms. Analyses focused on students' performance on NWF at the end of first grade. As noted earlier, the

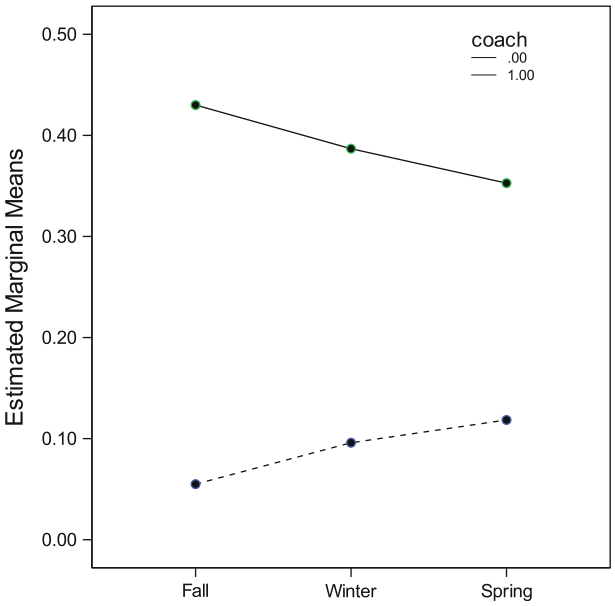

Fig. 2 Covariate adjusted time devoted to small group instruction in PD Coach and PD No Coach classrooms

analytic sample included only those teachers teaching first grade in the second year of the study (54 teachers with 981 students). We carried out two different analyses to answer this question—one focused on changes in the status of the students that were in the "at-risk" category in the fall across the year for the two professional development conditions, and the other focuses on improvements in decoding from fall to spring for all students, again comparing the two professional development conditions.

At-risk students

First, we focused on students who were designated as at risk in the fall, based upon their fall NWF performance, and shifts in their risk status for the spring. In the DIBELS system, risk status involves benchmarks that set cut points to distinguish high-risk and low-risk performance, as determined by studies that examined the probability of achieving grade-level reading by the end of the year, given a student's fall NWF score (Good, Simmons, Kaminski, & Wallin, 2002). As Fig. 3 shows, the PD No Coach students did not experience the same degree of movement from the at-risk category to the some-risk or low-risk categories as was found for the PD Coach students. Of the 224 PD Coach students classified as at risk in fall, 41% moved into the some-risk category, and 46% moved into the low-risk category by the spring. Of the 92 PD No Coach students classified as at-risk in the fall, 49% moved into the some-risk category, and only 11% moved into the low-risk category

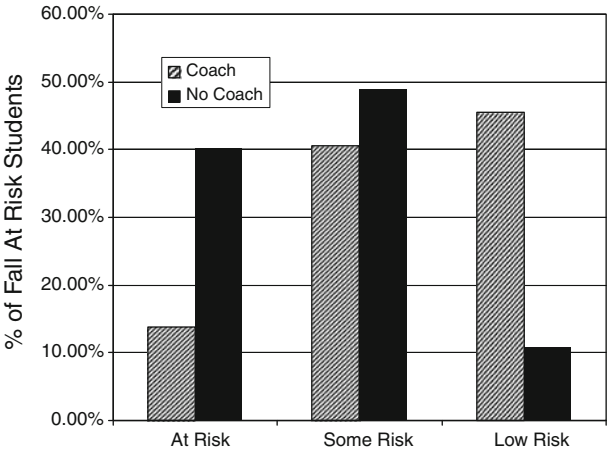

Fig. 3 Spring risk category of first graders at risk in the fall on NWF by PD Coach and PD No Coach condition

by spring.

A chi-squared test revealed that these differences were statistically significant ($\chi^2 = 45.64$, $p < .001$).

However, this analysis does not take into account the nesting of students in classrooms, nor does it include covariates that might account for changes in risk status. To better estimate the difference between the PD Coach and PD No Coach conditions in this area, we used Hierarchical Generalized Linear Modeling (HGLM), which allowed us to parse out the variance between the student and teacher levels. HGLM, as opposed to traditional HLM, is necessary because our outcome, NWF risk category, is nominal in nature. HGLM also allowed us to investigate the effects of other variables on changes in students' risk status; specifically, we tested the time spent in phonics or SGI in each season, classroom entering ability (as measured by the average classroom performance on the fall NWF assessment), and teachers' attitudes toward professional development, reflective dialogue, communication around literacy, and principal's support for change.[1] However, the only significant covariates were teacher's assessment of a principal's support for change and the class fall NWF average, so the other covariates were dropped from the model. Results of the HGLM can be found in Table 6.

The negative and significant coefficients for the coach variable at each level indicate that for students who were designated at risk in the fall, the probability of being designated as at risk or some risk as compared to low risk in the spring *decreased* more when the student was in a PD Coach classroom than when the student was in a PD No Coach classroom. That is, students in PD Coach classrooms were significantly more likely to move to lower risk categories than their peers in

[1] Three teachers did not have valid scores on the principal factor and were thus dropped.

Table 6 Multinomial HGLM analysis of the effects of PD Coach on at-risk students ($n = 307$ students and 50 teachers)

Variable	Coefficient (in log odds)	SE	Odds ratio
At risk			
Intercept	1.620**	0.532	5.053
PD Coach	−2.720***	0.663	0.066
Principal support	−0.818*	0.338	0.441
Fall NWF class	0.071	0.042	1.073
Some risk			
Intercept	1.719**	0.446	5.576
PD Coach	−1.453**	0.510	0.234
Principal support	−0.400	0.238	0.670
Fall NWF class	0.066*	0.030	1.068

Note: All coefficients are in comparison to the low risk

* $p < .05$, ** $p < .01$, *** $p < .001$

PD No Coach classrooms. For a PD Coach classroom with an average principal support for change and an average classroom fall NWF score, a student picked at random has 12.6% chance of being at risk in the spring, 49.5% chance of being some risk, and 37.9% chance of being low risk. However, those predicted probabilities are quite different in a PD No Coach classroom. A student picked at random in a No Coach classroom with an average principal support for change and fall NWF class mean has a 43.4% chance of being at risk in the spring, 47.8% chance of being some risk, and only 8.6% of being low risk. Put simply, an initially at-risk student had a much better chance of improving over the year if he or she was in a PD Coach classroom.

Furthermore, as teachers saw their principals as more supportive of change, the probability of a student being designated as at risk in the spring, as compared to low risk, decreased. In comparing the some-risk category to the low-risk category, fall at-risk students struggled more if they were in an initially high achieving class. Potentially, the teacher had a more difficult time targeting at-risk students if they were the minority in the classroom.

All students

The previous analysis focuses on the students at risk for not achieving grade-level benchmarks as of the fall. We also examined the effects of professional development condition on all students' gains in reading. To do so, we employed Hierarchical Linear Modeling (HLM) with the students' spring NWF as an outcome. With the sample of 981 students in 53 different classrooms,[2] we parsed out the variance in the outcome by running a fully unconditional model; 12.6% of the

[2] One teacher did not have winter observation information and was thus dropped from the analysis.

Table 7 HLM analysis of the effect of PD Coach on students' gains in NWF ($n = 981$ students and 53 teachers)

	Coefficient	Robust SE	T-ratio
Student level			
Intercept	53.263***	2.325	22.907
Fall 2004 NWF score[a]	0.833***	0.054	15.287
Teacher level			
PD Coach	9.079**	3.176	2.858
Winter % of time in SGI[b]	11.194 ~	6.293	1.779
Class average fall 2004 NWF[b]	0.711**	0.215	3.301

[a] Variable is group mean centered

[b] Variables are grand mean centered

~ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

variance in spring NWF occurred between classrooms, while 87.4% of the variance occurred within the classroom.

At the student level, we controlled for the fall NWF and focused on students' reading gains over the year. Also at the teacher level, we tested the same variables used in the HGLM analysis above: percent of time spent on phonics and SGI in fall, winter, and spring; class entering ability; and teachers' attitudes towards professional development, communication around literacy, reflective dialogue, and their principal's support for change. Non-significant covariates were dropped from the model. In the final model, shown in Table 7, the results showed that a student's individual fall NWF performance positively and significantly impacted a student's spring NWF. At the teacher level, we found three significant predictors which were all positive (see Table 7), whether or not the teacher was in the PD Coach group, percent of time spent in SGI in the winter observation, and the average fall NWF score of the classroom. When the effects of the other variables in the model were accounted for, a student in a PD Coach classroom, on average, identified just over 9 more nonsense words than a peer in a PD No Coach classroom. In addition, when the teacher used more SGI in the winter observation, students tended to score higher on the NWF measure at the end of the year. Finally and not surprisingly, students benefited from being in a classroom with a higher average entering ability. Our model accounted for 40% of the within-classroom variance and 29% of the between-classroom variance. In addition, we investigated the possibility of interaction effects between the Coach variable and the four measures of teacher attitudes. None contributed to the model and were thus left out of our final analyses.

General discussion

Professional development in reading, in which a school-based literacy coach provides support for teachers' learning, is currently viewed as a promising means of

improving the quality of reading instruction and thus students' acquisition of reading skill, particularly for high poverty schools with chronic underachievement in reading. The programmatic requirements of the Reading First initiative were based on the premise that high quality professional development would foster improvements in reading instruction (US Department of Education, 2002), and most states included a literacy coach as an important component of their professional development programs (Moss et al., 2008). However, relatively little research has examined the promise of such programs.

In this study, we considered the possibility that school-based literacy coaching would result in better outcomes than the same professional development program without coaching, but we also examined the role of school climate on the effects of these two models of professional development. In the first year of the study, participating first-grade teachers all attended nine seminars covering modules from Moats' (2003) LETRS program and received support in learning to use reading assessments design to monitor students' progress in reading (DIBELS). As has been found in other studies (e.g., Bos, Mather, Narr & Babur, 1999; Garet et al., 2008; McCutchen et al., 2009), teachers felt that the professional development improved their knowledge about reading. However, overall, we found that teachers in the PD Coach and No Coach conditions did not differ in their attitudes toward the professional development program, the support they received from their principal, or the collegial climate of the school. On the other hand, compared to the PD No Coach teachers, the PD Coach teachers showed patterns of reading instruction that could be seen as responsive to their particular professional development program. In particular, PD Coach teachers frequently used small group instruction (SGI), and they tapered off the amount of whole class phonics instruction across the year, more so than the PD No Coach teachers. Furthermore, their students made greater progress in basic word reading skill across the year.

The results of the present study suggest that there are benefits to having a school-based literacy coach to support and guide teachers' application of their new understanding of high quality reading instruction that they picked up in the seminars. It is particularly interesting that the results of our study are different from those of the Garet et al. (2008) study, as the two studies are comparable in many respects. Garet and his colleagues did not find significantly different patterns of reading instruction for teachers in the two professional development models with and without a coach and the control group; similarly, student achievement outcomes did not differ for these groups of teachers. While this study, like ours, was carried out in districts and schools characterized by high poverty and underachievement in reading, our study differs in that the PD Coach condition was within the framework of the Reading First program. Thus, there might have been sustained district and state guidance and support for change in the PD Coach schools in our study; this might not have been the case for the teachers who participated in the professional development coaching model in Garet et al.'s study (2008). Other differences in study design might also account for differences in findings. For example, in our study, we used DIBELS NWF to assess reading progress because teachers used this measure to make instructional decisions. Garet et al. used standardized measures from each district's reading assessment, which might have been less directly related

to teachers' reading instruction. We explore the results of our study further in the sections that follow.

Teachers' views of school climate

Numerous studies have indicated that professional development programs are not likely to be effective in changing instruction and student achievement unless the teachers view the program as beneficial (e.g., Timperley & Phillips, 2003). For this reason, it is important to determine how teachers evaluate the professional development that they are given with the express purpose of helping them improve instruction. Similarly, a key feature of effective professional development is opportunities for teachers to work together to improve instruction (e.g., Corcoran et al., 2003; Tschannen-Moran, 2001). Given these findings, we felt that it was important to ask teachers to respond to surveys designed to assess their attitudes. Overall, teachers' responses of professional development they had received were quite positive for both groups. Still, we found no significant differences between the PD Coach and PD No Coach teachers on survey scales assessing their attitudes toward the professional development, support from the principal for instructional change, and the climate of the school (e.g., communication among teachers).

We might interpret these results as indicating that, overall, school climate was simply not judged to be different for teachers in the two conditions, but it is also possible that our assessment of factors that might influence implementation of professional development was narrow in scope. Sebring and her colleagues (2006) reported that successful school improvement depends on the interplay of different kinds of supports, including leadership, professional capacity, student-centered learning climate, and ambitious instruction. Nonetheless, we did find that a teacher's view of the principal's support for change was associated with greater use of small groups to differentiate instruction. Similarly, a teacher's view of the principal's support for change significantly decreased the likelihood that a student would be at risk for underachievement in reading in the spring. Both of these findings occur when controlling for the PD Coach condition, which indicates that the support of a principal has an effect regardless of whether or not the school is a Reading First school.

Meeting student needs as the focus of reading instruction

To assess teachers' instruction in this second year of the study, we examined the extent to which teachers' observed practices reflected key aspects of the LETRS program. For this purpose, we selected two measures: time spent teaching phonemic awareness and phonics and time spent providing instruction to students in small groups. The National Reading Panel (2000) reported that phonics instruction was most effective when delivered in small group settings. Furthermore, students' acquisition of basic reading skills and differentiated instruction are emphasized in the LETRS program. For example, Modules 1 and 2 provide the rationale for teaching students to understand the relation of sounds and letters; Module 2, in

particular, provides a long list of activities teachers can use to advance their students' understanding of the sound structure and spelling of words. Modules 5 and 8 provide additional focus on foundational skills and on assessment to understand students' strengths and weaknesses in reading and to design instruction to meet students' needs. However, relatively few suggestions are given to help teachers think about how to turn the principles into classroom practices. For example, there are no guidelines for teachers on how to organize the classroom for small group instruction (e.g., how to use flexible grouping, how to organize literacy centers) or how phonics instruction might be designed to meet students' needs.

Observations of reading instruction did show differences by condition in the two areas we targeted as relevant to the LETRS program. First, time devoted to phonics instruction decreased more in PD Coach classrooms than PD No Coach classrooms across the year. In addition, we found a greater shift toward greater differentiation of instruction when we explored the format of instruction. That is, we found that there was a greater decrease in whole class phonics lessons (as opposed to small group or individual lessons) for the PD Coach than for the PD No Coach teachers. For the PD Coach teachers, of the total time spent teaching phonics, whole class instruction was used 76% of the time in the fall, 68% in the winter, and 58% in the spring. In comparison, for the PD No Coach teachers, whole class phonics instruction was used 72% of the time in the fall, 85% in the winter, and 79% in the spring. These results, combined with greater time spent in SGI by PD Coach teachers, suggest a greater emphasis on differentiated instruction than was seen in the reading instruction of PD No Coach teachers. We cannot infer that coaching contributed directly to these differences; we can only surmise that the coach might have provided such guidelines for PD Coach teachers and that observed differences in instruction might be attributable in part to the support and guidance of the coach in the PD Coach condition.

Some support comes from the coach survey, where the results showed that providing advice to teachers was a major part of their job. Further, because the coaches in Reading First schools were required to hold grade-level meetings each week, it is possible that the first-grade teachers in the PD Coach condition had at least some opportunities to share ideas about how to organize classrooms. The coaches considered matching reading materials to a student's reading level and use of literacy centers to be important instructional techniques. Furthermore, they cited one-on-one work with teachers, modeling, and spending time in classrooms as the primary roles that they played. These roles are aligned with the survey results reported for Reading First coaches in the implementation report (Moss et al., 2008) and models of coaching designed to provide teachers with hands-on support for instruction (Bean, 2004; Walpole & McKenna, 2004). While other studies have found collaborative work effective in fostering teachers' self-efficacy and practices (e.g., Nielsen et al., 2008), our study did not include systematic observations of grade-level meetings, and so we do not have evidence to suggest that the coaches in our study fostered collaboration among teachers. Further research is needed to examine aspects of coaching that support teachers' changes in instructional practices.

Finally, we are struck by differences in our observations and those of Garet et al. (2008) with regard to the amount of time spent using SGI. The PD Coach teachers in our study spent more time in small group instruction than the PD No Coach teachers. This result is quite different from that reported by Garet et al., as differentiating instruction did not vary among teachers with and without a coach or the control group. In the first year of our study, as well, time spent using SGI was greater for the PD Coach than the PD No Coach teachers. SGI was used by the PD Coach teachers 24% of the time in the fall, 40% in the winter, and 26% in the spring; in comparison, for the PD No Coach teachers, SGI was used 14% of the time in the fall, 16% in the winter, and 4% in the spring. The results, therefore, show quite consistent differences across 2 years in the use of SGI for the teachers in the two conditions.

Students' gains in reading

A critical (albeit indirect) test of the effectiveness of a professional development program is its impact on students' reading. Acknowledging that many factors affect students' gains in reading across a year, we nonetheless compared student's improvement in reading for teachers in the PD Coach and PD No Coach models. For this purpose, we used a measure of reading intended to help teachers understand students' progress in basic reading skills (DIBELS), which was administered in the fall, winter, and spring. We carried out two types of analyses—one focused on the decrease in the percent of students who were in the at-risk category and the other focused on gains in reading nonsense words for all the students in each teacher's classroom. The results consistently showed that students achieved at higher levels in PD Coach classrooms regardless of teacher experience, use of phonics and SGI, and teacher attitudes. Coaches thus assisted teachers not just in improving learning for all students but also in targeting at-risk students with effective practices. In addition, teachers that reported higher levels of a principal's support for change better improved achievement for at-risk students, regardless of the coach condition. It appears that these teachers were given license by the administration to take necessary risks in improving learning for struggling students. As 85% of coaches reported that they worked closely with the principal and/or vice-principal, it may be that the coach was able to serve as a means of effective change in the school; the principal supported innovation and the coach helped the teacher enact the change. These results are compatible with the findings of Vescio et al. (2008), indicating potential benefits of a school-wide program to foster opportunities for teachers to engage cooperatively in efforts to bring about school improvement in reading (e.g., Vescio et al.).

Limitations of the study

The results of this study suggest that school-based literacy coaching, as a component of professional development within the context of a federally sponsored program, improves the reading achievement of children in high poverty schools.

However, it is possible that the results reflect aspects of the Reading First initiative as implemented in Michigan that were not measured in this study. Further investigation is needed to control for variation in reading curriculum and the specific roles that coaches played.

In addition, the results need to be interpreted cautiously, as the sample was smaller than we would like it to be, and some of the data come from self-reports of teachers and coaches about their views and their activities. While for the larger study we were able to assign teachers in schools randomly to condition (other than the Reading First schools), we recommend further study that employs random assignment to both PD Coach and PD No Coach conditions. Such a design would provide a better basis for determining whether the inclusion of (or activities of) a school-based literacy coach affect teachers' choice of instructional practices and, in turn, students' gains in reading. At present, our results suggest that literacy coaching holds the promise of providing the kinds of support teachers need to benefit from a professional development program designed to improve their understanding of sound and effective methods of early reading instruction.

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Appendix

Items on surveys teachers' completed

Attitudes towards professional development and workplace items
Most of what I learn in professional development addresses the needs of students in my classroom
Overall, my professional development experiences have been sustained and coherently focused, rather than short term and unrelated
Overall, my professional development experiences have led me to make changes in my teaching
Overall, my professional development experiences have helped me understand my students better
Overall, my professional development experiences have deepened my understanding of subject matter
Overall, my professional development experiences have been closely connected to my school's improvement plan
Overall, my professional development experiences have included enough time to think carefully about, try, and evaluate new ideas
Overall, my professional development experiences have included opportunities to work productively with colleagues in my school
Overall, my professional development experiences have included opportunities to work productively with teachers from other schools

Note: Eigen value = 4.86, 54.0% variance explained, Cronbach's alpha = 0.89

Appendix continued

Communication around literacy items
Instructional leaders from my school have helped me understand how to use data from student assessment to make instructional decisions
In my school, there are frequent opportunities to share ideas about how to teach literacy better
My school has a systematic procedure for sharing and reporting student early literacy assessment data
There is poor building-level communication about children's literacy achievement and about curriculum implementation (reversed in analysis)
Weekly grade level meetings are a valuable opportunity to collaborate with colleagues on issues related to literacy

Note: Eigen value = 2.39, 47.9% variance explained, Cronbach's alpha = 0.67

Principal's support for change items
The principal at this school supports and encourages teachers to take risks
The principal at this school encourages teachers to try new methods of instruction
The principal at this school is willing to make changes
Most changes introduced at this school receive strong support from the principal

Note: Eigen value = 3.19, 79.8% variance explained, Cronbach's alpha = 0.92

Reflective dialogue items
This school year, how often have you had conversations with colleagues about what helps students learn best?
Teachers in this school share and discuss student work with other teachers
This school year, how often have you had conversations with colleagues about the goals of this school?
This school year, how often have you had conversations with colleagues about development of new curriculum?
Teachers in this school regularly discuss assumptions about teaching and learning
Teachers talk about instruction in the teachers' lounge, faculty meetings, etc.
This school year, how often have you had conversations with colleagues about managing classroom behavior?

Note: Eigen value = 3.32, 47.4% variance explained, Cronbach's alpha = 0.80

References

Anders, P. L., & Bos, C. S. (1992). Dimensions of professional development: Weaving teaching beliefs and strategic content. In M. Pressley, K. R. Harris, & J. T. Guthrie (Eds.), *Promoting academic competence and literacy in schools* (pp. 457–476). San Diego, CA: Academic Press.

Baker, S., & Smith, S. (1999). Starting off on the right foot: The influence of four principles of professional development in improving literacy instruction in two kindergarten programs. *Learning Disabilities Research and Practice, 14*, 239–253.

Bean, R. M. (2004). *The reading specialist: Leadership for the classroom, school, and community*. NY: Guilford Press.

Berebitsky, D., Goddard, R. D., Carlisle, J., & Feng, D. (2009). Examining the association between principals' support for change and teachers' communication around literacy in Michigan's Reading First schools. Paper presented at the Annual American Education Research Association Conference, San Diego, CA: April 14, 2009.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*, 3–15.

Bos, C. S., Mather, N., Narr, R. F., & Babur, N. (1999). Interactive, collaborative professional development in early literacy instruction: Supporting the balancing act. *Learning Disabilities Research and Practice, 14*, 227–238.

Brady, S., Gillis, M., Smith, T., Lavalette, M., Liss-Bronstein, L., Low, E., et al. (2009). First grade teachers' knowledge of phonological awareness and code concepts: Examining gains from an intensive form of professional development and corresponding teacher attitudes. *Reading and Writing: An Interdisciplinary Journal, 22*, 425–455.

Brownell, M. T., Yeager, E., Rennells, M. S., & Riley, T. (1997). Teachers working together: What teacher educators and researchers should know. *Teacher Education and Special Education, 20*, 340–359.

Cantrell, S. C., & Hughes, H. K. (2008). Teacher efficacy and content literacy implementation: An exploration of the effects of extended professional development and coaching. *Journal of Literacy Research, 40*, 95–127.

Carlisle, J. F., Katz, L. A., & Cortina, K. S. (In press). First grade teachers' response to three models of professional development in reading. *Reading and Writing Quarterly.*

Cirino, P. T., Pollard-Durodola, S. D., Foorman, B. R., Carlson, C. D., & Francis, D. J. (2007). Teacher characteristics, classroom instruction, and student literacy and language outcomes in bilingual kindergartners. *Elementary School Journal, 107*, 341–364.

Cohen, D. K., & Ball, D. L. (1999). *Instruction, capacity and improvement (CPRE Research Report Series, RR-43)*. University of Pennsylvania: Consortium for Policy Research in Education.

Corcoran, T., McVay, S., & Riordan, K. (2003). *Getting it right: The MSIE approach to professional development (CPRE Report Series RR-055)*. University of Pennsylvania: Consortium for Policy Research in Education.

Correnti, R. (2007). An empirical investigation of professional development effects on literacy instruction using daily logs. *Educational Evaluation and Policy Analysis, 29*, 262–295.

Desimone, L. (2002). How can comprehensive school reform models be successfully implemented? *Review of Educational Research, 72*, 433–479.

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*, 181–199.

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis, 24*, 81–112.

Elmore, R. F. (2006). *School reform from the inside out*. Cambridge, MA: Harvard Education Press.

Garet, M. S., Cronen, S., Eaton, M., Kurki, A., Ludwig, M., Jones, W., et al. (2008). *The impact of two professional development interventions on early reading instruction and achievement*. Washington, DC: U.S. Department of Education, National Center for Educational Evaluation and Regional Assistance.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Kwang, S. Y. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*, 915–945.

Good, R. H., Simmons, D., Kaminski, R. A., & Wallin, J. (2002). *Summary of decision rules for intensive, strategic, and benchmark instructional recommendations in kindergarten through third grade (Technical Report No. 11)*. Eugene, OR: University of Oregon.

International Reading Association. (2004). *The role and qualifications of the reading coach in the United States*. Newark, DE: International Reading Association.

Johnson, J. E. (2002). High-performing, high-poverty urban elementary schools. In B. M. Taylor & P. D. Pearson (Eds.), *Teaching reading: Effective schools, accomplished teachers* (pp. 89–114). Mahwah, NJ: Lawrence Erlbaum.

Juel, C., & Mindon-Cupp, C. (2000). Learning to read words: Linguistic units and instructional strategies. *Reading Research Quarterly, 35*, 458–492.

Kruse, S. D., Louis, K. S., & Bryk, A. S. (1995). An emerging framework for analyzing school-based professional community. In K. S. Louis & S. D. Kruse (Eds.), *Professionalism and community: Perspectives on reforming urban schools* (pp. 23–44). Thousand Oaks, CA: Corwin Press, Inc.

McCutchen, D., Green, L., Abbott, R. D., & Sanders, E. A. (2009). Further evidence for teacher knowledge: Supporting struggling readers in grades three through five. *Reading and Writing: An Interdisciplinary Journal, 22*, 401–423.

Moats, L. (2003). *Language essentials for teachers of reading and spelling*. Longmont, CO: Sopris West.

Moss, M., Fountain, A. R., Boulay, B., Horst, M., Rodger, C., & Brown-Lyons, M. (2008). *Reading First implementation report: Final*. Cambridge, MA: Abt Associates.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, DC: National Institute for Child Health and Development.

Neufeld, B., & Roper, D. (2003). *Coaching: A strategy for developing instructional capacity*. Cambridge, MA: Education Matters, Inc.

Nielsen, D. C., Barry, A. L., & Staab, P. T. (2008). Teachers' reflections of professional change during a literacy-reform initiative. *Teaching and Teacher Education, 24*, 1288–1303.

Park, V., & Datnow, A. (2008). Collaborative assistance in a highly prescribed school reform model: The case of success for all. *Peabody Journal of Education, 83*, 400–422.

Poglinco, S. M., Bach, A. J., Hovde, K., Rosenblum, S., Saunders, M., & Supovitz, J. A. (2003). *The heart of the matter: The coaching model in America's choice schools*. Philadelphia, PA: Consortium for Policy and Research in Education.

Pressley, M., Wharton-McDonald, R., Allington, R., Block, C. C., Morrow, L., Tracey, D., et al. (2001). A study of effective first-grade literacy instruction. *Scientific Studies of Reading, 5*, 35–58.

Richardson, V., & Placier, P. (2001). Teacher change. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed., pp. 905–947). Washington, DC: American Educational Research Association.

Ross, J. A., & Bruce, C. D. (2007). Teacher self-assessment: A mechanism for facilitating professional growth. *Teaching and Teacher Education, 23*, 146–159.

Schilling, S., Carlisle, J. F., Zeng, J., & Scott, S. (2007). Are fluency measures accurate predictors of reading achievement? *Elementary School Journal, 107*, 429–448.

Sebring, P. B., Allensworth, E., Bryk, A. S., Easton, J. Q., & Luppescu, S. (2006). *The essential supports for school improvement*. Chicago, IL: Consortium on Chicago School Research.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*, 4–14.

Snow, C. E., Burns, M. S., & Griffin, P. (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

Taylor, B. M., Pearson, P. D., Clark, K., & Walpole, S. (2002). Effective schools and accomplished teachers: Lessons about primary grade reading instruction in low-income schools. In B. M. Taylor & P. D. Pearson (Eds.), *Teaching reading: Effective schools, accomplished teachers* (pp. 3–72). Mahwah, NJ: L. Erlbaum.

Timperley, H. S., & Phillips, G. (2003). Changing and sustaining teachers' expectations through professional development in literacy. *Teaching and Teacher Education, 19*, 627–641.

Tschannen-Moran, M. (2001). Collaboration and the need for trust. *Journal of Educational Administration, 39*, 308–331.

US Department of Education. (2002). *Guidance for the Reading First Program.* Retrieved from www.ed.gov.

Van Keer, H., & Verhaeghe, J. P. (2005). Effects of explicit reading strategies instruction and peer tutoring on second and fifth graders' reading comprehension and self-efficacy perception. *Journal of Experimental Education, 73*, 291–329.

Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education, 24*, 80–91.

Walpole, S., & McKenna, M. C. (2004). *The literacy coach's handbook: A guide to research-based practice*. NY: Guilford.