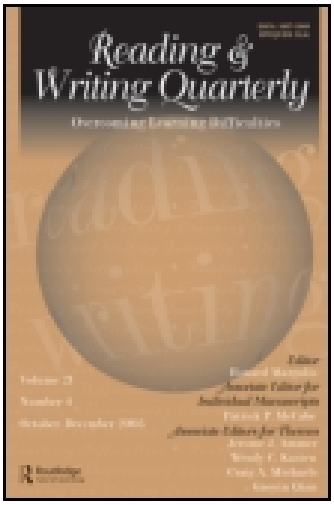

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First-Grade Teachers' Response to Three Models of Professional Development in Reading

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First-Grade Teachers' Response to Three Models of Professional Development in Reading

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The purpose of this study was to compare 1st-grade teachers' responses to professional development (PD) programs in reading that differed in means and degree of support for teachers' learning and efforts to improve their reading instruction. We compared 3 models of PD: the 1st model provided only seminars for the teachers, the 2nd model provided seminars and support for teachers' evaluations of their instruction, and the 3rd model included these 2 components as well as a literacy coach to support teachers' integration of new methods into their teaching. We used surveys and observations of practices to assess teachers' views of the PD program, their knowledge about reading, and their instructional practices. Results showed that the teachers in the most intensive 3-component model were distinguished from the teachers in the other 2 conditions primarily in the changes in their instructional practices across the year. Results suggest that extensive support for teachers in their schools and classrooms is most likely to lead to changes in their practices that are responsive to current research on effective reading instruction for 1st graders.

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The current drive to improve teacher quality has placed increased emphasis on the value of high-quality professional development (PD) opportunities for teachers. PD is seen as the most promising means of improving teachers' knowledge in the content area(s) in which they teach and, as a result, improving their instruction. Well-designed programs in PD are particularly important for teachers in high-poverty schools because these schools are characterized by high percentages of student underachievement and high percentages of teachers who are not well prepared to provide high-quality instruction (Darling-Hammond, 2004). A discouraging finding is that few efforts to improve teachers' professional knowledge have had "detectable effects" on instruction (Cohen & Ball, 1999). No wonder researchers have called for studies of components of PD programs that are likely to deepen teachers' professional knowledge and bring about improvements in their instruction (Borko, 2004; Desimone, 2002).

Cohen and Ball (1999) have argued that a central problem with most PD programs is that they are not designed to provide teachers with the kinds of opportunities to learn that would lead to meaningful changes in their classroom instruction. The challenge, then, is to identify components of PD programs that lead to improvement in teachers' *instructional capacity*, defined as the capacity to produce worthwhile and substantial learning (Cohen & Ball, 1999, p. 2). What kinds of support do teachers need to integrate new practices into their existing curriculum and instructional regimes? Answers to such questions are critical if PD programs are to serve the purpose of improving the quality of reading instruction in the elementary grades.

The study reported in this article compares teachers' response to PD programs in early reading that vary in their support for teachers' integration of new content knowledge into their classroom practices. The most intensive model was made up of three different components, whereas the other two stepped down from this model, providing two or one of the three components. In all three conditions, the teachers received high-quality seminars in reading; in the first condition, that was all that the teachers received. In the second condition, teachers learned to assess students' progress and evaluate the effectiveness of their own instruction. In the third condition, teachers were additionally given opportunities to discuss reading instruction with one another and to receive support from a literacy coach. The major question addressed by the study is the extent to which a PD program with all three components leads to better outcomes for teachers than a PD program that offers two components (seminars and evaluation of teaching) or only one component (seminars only).

As opposed to studying individual features of PD programs, the study design used a stepped-down procedure because two of the conditions included components that might well be interrelated and synergistic (e.g., Wilson & Berne, 1999). In addition, although the most intensive PD model (i.e., the one involving a literacy coach) was the most promising, it also

required a major commitment of financial and human resources. As a result, it seemed important to determine whether this model was most beneficial for teachers and schools.

COMPONENTS OF EFFECTIVE PD

Previous studies of PD have identified features that are likely to distinguish effective from less effective PD programs. Among these are (a) subject matter knowledge and knowledge about how students learn that content, (b) extended duration and time commitment, (c) coherence and integration (e.g., alignment of subject matter knowledge and the curriculum, standards, and methods of assessment used by the teachers), (d) collective participation and active learning opportunities, and (e) institutional and professional support (e.g., Baker & Smith, 1992; Borko, 2004; Desimone, 2002; Garet, Porter, Desimone, Birman, & Kwang, 2001; Wilson & Berne, 1999). As the term *professional development* covers many different ways to provide instruction or opportunities to learn for teachers, it is not surprising that delivery systems vary widely.

Because the general consensus is that teachers need high-quality, up-to-date knowledge about reading and reading instruction and sufficient time for extended learning, our study was designed so that teachers participating in all three models attended nine seminars across a year. However, improvements in teachers' practices are not necessarily going to come about just because teachers are presented with opportunities to improve their knowledge about reading (Elmore, 2006). As a result, we selected components of PD programs that held the promise of fostering teachers' learning and interest in improving their practices. This involved providing teachers with opportunities to learn to evaluate and reflect on the effectiveness of their own teaching and to receive guidance in translating knowledge about reading into classroom practices (Snow, Griffin, & Burns, 2005). These components of PD are discussed in turn.

TEACHING TEACHERS TO EVALUATE THEIR PRACTICES

One challenge in designing effective PD is finding a way to help teachers develop a willingness to improve their teaching—including overcoming resistance and raising teachers' standards and expectations. According to Hill and Cohen (2005), PD is likely to affect instruction when the content is linked to teachers' daily experiences, primarily through connecting subject matter or "content" knowledge to curricular materials, district and state standards, and accountability measures. The link to teachers' daily experiences in the classroom requires that teachers be given an opportunity to see how instruction might be carried out differently—and evidence that new instructional

methods have been found to be effective. This involves raising teachers' standards and expectations and challenging their thinking about their own practices (Desimone, Porter, Garet, Yoon, & Birman, 2002; Timperley & Phillips, 2003).

Teachers are likely to become receptive to new ideas and willing to examine the effectiveness of their reading instruction through the process of learning to assess their students' learning. "Being confronted with evidence of student learning provides teachers with evidence of student capacity, and indirectly, of their own capability" (Cohen & Ball, 1999, p. 8). Timperley and Phillips (2003) have argued that there is a close relationship between teachers' self-efficacy and their expectations. Teachers with low expectations for their students' progress in reading are also those who believe either that no teacher could be successful with the students or that some teacher could be, but personally they could not. Learning to assess the effectiveness of their own teaching, often through systematic study of students' progress, is a pivotal step in the evaluation of teaching. Researchers have found that teachers' self-assessment plays a pivotal role in their professional growth (Ross & Bruce, 2007) and that self-efficacy is an excellent predictor of teacher behaviors that foster student achievement (Woolfolk & Hoy, 1990). In short, compelling arguments and research evidence suggest the potential value of teaching teachers to evaluate their instruction through evaluating students' progress.

SUPPORT THROUGH COACHING AND FACILITATING TEACHER COLLABORATION

Effective PD programs are characterized by components that in one way or another give teachers opportunities for collective participation and provide them with guidance and support in making changes in practices—processes that tend to take time, experimentation, and reflection. In the field of early reading, school-based teacher collaboration has helped teachers support one another's learning, provided opportunities for teachers to evaluate their instructional practices, and increased teachers' satisfaction with their work (Johnson, 2002; Richardson, 1994; Taylor, Pearson, Clark, & Walpole, 2002). However, teacher collaboration does not necessarily result in substantive changes in teachers' instructional practices (Elmore, 2006; Richardson & Placier, 2001).

One advantage of a literacy coach who functions as a part of the PD program is that this person can not only serve as a guide in school-wide efforts to provide opportunities for teachers to work together (e.g., engaging in dialogue around issues of reading instruction) but also provide assistance to teachers in selecting and implementing improved practices (Bean, 2004; Rosemary, Roskos, & Landreth, 2007). Recent publications have promoted the value of a literacy coach (Bean, 2004; International Reading Association,

2004; Poglinco et al., 2003). However, an important unanswered question that we address in this study is the extent to which coaches' assistance is associated with changes in instruction that are aligned with the information on effective instruction presented in the content seminars.

RESEARCH ON PD IN EARLY READING

Although a number of studies have focused on PD that focuses on early reading, many of these have been part of comprehensive school reform efforts (e.g., Desimone, 2002; Taylor et al., 2002). Others have included a PD component to prepare teachers for the delivery of a specific reading intervention or program. Although principles of effective PD programs in reading have been outlined by several researchers (e.g., Baker & Smith, 1999), researchers have been more concerned with the contents of PD programs than the factors (including design features of the programs) that affect teachers' learning and use of improved practices. The primary question has been the extent to which instruction in the linguistic foundations of reading is associated with improvements in teachers' knowledge about reading (Bos, Mather, Narr, & Babur, 1999; Foorman & Moats, 2004; McCutchen et al., 2002; McCutchen & Berninger, 1999). Most of these PD programs involved summer workshops with varying degrees of follow-up from researchers or PD providers across the school year.

One such study was carried out by McCutchen et al. (2002). They studied the effect on teachers' knowledge and instructional practices of a 2-week PD institute designed to teach teachers how to provide explicit instruction in phonological and orthographic awareness. Then, during the school year, treatment teachers were given assessment information about their students and advice about their implementation of recommended strategies. Treatment teachers showed significant growth in knowledge about reading from pre- to posttest. The results showed that on some measures of reading, students in the treatment teachers' classrooms made greater gains than students in the control teachers' classrooms.

One study that compared teachers' response to different PD programs was carried out by Foorman and Moats (2004). These researchers investigated the effects of a PD initiative for early elementary teachers in 17 high-poverty, low-achieving schools in Washington, DC, and Houston, Texas. The PD programs at the two sites differed in structural features. In Washington, the program consisted of a 2- to 4-day summer workshop, several courses for credit on foundations for teaching reading, bimonthly classroom visits from observers, semiannual meetings for principals and school-change facilitators, and regular informal contacts from project staff. In Houston, the program was less intensive. It consisted of 4 days of workshop across the year taught by master teachers. Teachers in both conditions showed modest improvements

on a test of knowledge about the linguistic foundations of reading. Interviews of the Washington teachers showed that their attitudes toward the PD program and the support they had received improved over the course of the year. These teachers also felt that their students were becoming better readers. Overall, the results suggest that teachers' assessment of their own learning and the effectiveness of their teaching might be important indices of the effectiveness of PD programs in early reading.

Although these studies show that PD programs can lead to improvements in teachers' knowledge about reading, they provide limited insights into teachers' response to the program or subsequent changes in their reading instruction.

DESIGN OF THE STUDY

The present study was motivated in part by an interest in evaluating the PD program provided by the Reading First (RF) program in Michigan, which was the three-component model described previously. Although critical evidence of the value of a PD program would be students' improvement in reading, such a distal measure was beyond the scope of the present study. Rather, our goal was to determine whether the teachers learned from their PD program, whether they showed increasingly positive views of their teaching of reading and their students' progress in reading, and whether they made changes in their practices that seemed responsive to the contents of the PD program.

Because so little is known about the components of PD in early reading that foster teachers' learning and professional growth, this study was designed to compare three models of PD in reading that varied in the amount and kind of support provided for teachers. In the first model, teachers only attended a series of seminars to improve their knowledge of reading and reading instruction. We refer to this as the *K* model because the goal was simply improving teachers' *knowledge*. The second model added to the K component a system for teachers to learn to *evaluate* their own teaching; this model we refer to as *KE*. That is, they were taught to administer measures of early reading and to use the results to gauge the effectiveness of their reading instruction. The third model added to the KE program a literacy coach who could support teachers' learning and provide opportunities for them to *consult a coach* and *collaborate* with one another; this model we refer to as *KEC*. The teachers participated in their PD program (one of the three models) for a year. We assessed their knowledge, their satisfaction with their work, and their instructional practices in an effort to determine whether teachers responded more positively to the models with support for their learning and changes in instructional practices. The research questions are as follows: (a) Do teachers in the three conditions differ in their acquisition

of content knowledge across the year? (b) Do teachers in the three conditions differ in terms of changes in their satisfaction with their work across the year? (c) Do teachers in the three conditions vary in the extent to which they change time spent on different components of reading instruction across the year? (d) Do content knowledge, self-efficacy, and time spent on different components of reading distinguish the teachers in the three PD conditions?

METHOD

Research Design

To carry out a comparison of the three models, we recruited one group of first-grade teachers from RF schools that were starting their first year of implementation in 2003–2004. These teachers made up the three-component KEC model described previously. We recruited teachers for the K and KE conditions from schools in Michigan districts that qualified for but did not apply for RF funding. Teachers in schools who volunteered to participate were randomly assigned to the two-component KE model or the one-component K model. They too were involved in study activities for the entire school year.

Participants

Participants were 111 first-grade teachers who came from 62 schools in 9 districts. RF teachers (the KEC condition) were recruited from six districts that began their RF programs in the fall of 2003 ($n = 43$). The remaining teachers came from schools in four districts that were eligible for RF funding. (In one district, teachers from both RF and other elementary schools participated.) To assign teachers to the KE and K conditions, we rank-ordered the other schools that were not participating in RF on the basis of the percentage of students underachieving in fourth-grade reading on the state achievement test. We then assigned every other school (including all participating teachers in that school) to the KE or K condition. This resulted in 33 teachers in the KE condition and 35 in the K condition. Schools in the three conditions were compared on the percentage of fourth graders underachieving in reading on the state's achievement test; the results were as follows: 40.3% ($SD = 15.8$) for KEC, 32.3% ($SD = 18.5$) for KE, and 35.6% ($SD = 20.3$) for K. Analysis of variance showed that the differences in these percentages were not significant, $F(2, 59) = 1.05$, $p = .35$.

Teachers filled out a Teacher Information Form at the beginning of the study. The self-reported information was used to determine differences in teaching experience, racial/ethnic background, and educational attainment for teachers in the three conditions. As Table 1 shows, teachers in the three conditions were similar in terms of gender and number of years teaching.

TABLE 1 Characteristics of Teachers by Condition

Characteristic	KEC	KE	K
Number of teachers	43	33	35
Gender (% female)	96.0	96.9	93.5
Ethnicity/race (% within condition)[a]			
White	74	94	71
Black	12	6	16
Highest degree is master's (%)	40	78	58
Years teaching			
M (*SD*)	12.2 (11.4)	12.2 (8.4)	13.0 (9.5)
Range	0–38	3–33	0–33
Years teaching (% with 5 years or less in first grade)	56	53	58

Note. KEC = knowledge, evaluation, and consultation and collaboration condition; KE = knowledge and evaluation condition; K = knowledge condition.

[a]Hispanic, Asian, and other categories, when present, were a very small percentage of the teachers in the three conditions.

Ethnic/racial background did not differ significantly by condition. The percentage of teachers whose highest degree was a master's degree (as opposed to a bachelor's degree) differed significantly, Pearson $\chi^2(4, N = 111) = 11.79$, $p < .05$. A greater number of KE teachers reported having a master's degree than was the case for teachers in the KEC and K conditions.

Eleven teachers dropped out of the study during the year, generally for personal reasons (e.g., child care); they constituted 10% of KEC, 3% of KE, and 18% of K teachers. Most teachers said that their personal lives made it difficult to participate. Differences in attrition were not significant, Pearson $\chi^2(2, N = 111) = 5.03$, $p = .08$.

Delivery of the Components of PD

During the 2003–2004 year, the participating teachers attended nine PD seminars in *Language Essentials for Teachers of Reading and Spelling* (LETRS; Moats, 2003), one to cover each of the nine modules in this program—with one meeting every 3 or 4 weeks, starting in October. Each seminar meeting lasted 3 hr, so 27 hr of instruction were provided to all teachers. Experts in LETRS, trained by the publisher's staff, served as the seminar leaders. All had previous experience teaching teachers in other PD programs in reading in Michigan. All seminar leaders 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 involved in discussion of the lesson

content—a positive sign of engagement, albeit a factor that affected the 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.

Coaches and Coaching

The KEC teachers were in 21 schools, each of which had a literacy coach as part of the PD program. Twenty of the 21 coaches were female; 16 had earned a master's degree and 9 had endorsements as reading specialists. On average, the teachers had taught 15.9 years ($SD = 10.5$), with a range of 2 to 34 years. Self-reported racial/ethnic background indicated that 16 of the coaches were White and 4 were African American/Black (1 coach did not respond to this item). As a condition of participation in the RF program, schools were required to hire a literacy coach to work with teachers in kindergarten through Grade 3. The coaches served as part of the PD program that was a requirement for participation in the state program, as it was in the federal law (Michigan Department of Education, 2002). All but one of the coaches began their role as a coach in an RF school in the fall of 2003. According to the state's RF plan, coaches were to initiate and maintain teacher collaboration and address issues of reading instruction in Grades K–3. The coaches were school-based staff engaged in implementing the PD program and providing support for teachers learning from the program (Michigan Department of Education, 2002). As part of their PD activities, they were required to lead or assist in leading weekly grade-level meetings. The coaches and the state-employed facilitators were trained by professionals hired by Sopris West (the publisher of the LETRS program) over the summer and fall; in addition, coaches attended a full-day meeting twice during the year organized by the state RF coordinators; they attended further PD sessions and received training in coaching from an organization that specialized in professional dialogues.

A survey of the coaches showed that 100% agreed or strongly agreed that grade-level meetings occurred once a week and that grade-level

meetings were an opportunity to work closely with teachers; 95% agreed or strongly agreed that these meetings provided opportunities for teachers to share ideas, whereas 80% agreed or strongly agreed that literacy instruction was the primary topic at these meetings. In another survey, coaches were asked to express their level of agreement with statements about aspects of a coach's job. As Table 2 shows, the coaches were consistent in identifying working with teachers one on one as an important part of their job.

Measures of Teachers' Attitudes and Practices

Teachers completed survey measures titled Language and Reading Concepts (LRC) and Satisfaction With My Work. Teachers filled out the surveys at their PD seminar. We carried out three observations of the teachers' reading instruction using an observation system called Teachers' Instructional Practices (TIP). Each of these data sources is described here.

LRC FORMS A AND B

This measure was used to assess teachers' learning about reading from the content of the seminars that they attended. Specifically, LRC was aligned with the content of the LETRS program (Moats, 2003). LETRS was used in the seminars to improve teachers' understanding of research-supported aspects of early reading instruction. The LRC had 20 items in Forms A and B; the items on the two forms tapped identical domains of knowledge and used the same item formats—only the specific content differed. Form A was administered at the first seminar; Form B was administered at the end of the ninth and final seminar. The tests were intentionally short, as pilot-testing had indicated that teachers did not complete long surveys. Both forms had an internal reliability (Cronbach's alpha) of .75.

TABLE 2 Results of a Survey of Coaches' Views of Their Daily Work

To what extent do you agree with the following statements about your daily work as a literacy coach?	Strongly agree or agree
1. Modeling literacy lessons for teachers is an important part of my job.	95%
2. I often coteach lessons with teachers.	60%
3. I spend a majority of my time visiting K–3 classrooms.	95%
4. Teachers view me as a resource for advice and ideas about how to teach literacy better.	85%
5. My job as literacy coach is an administrative position.	45%
6. I am comfortable helping teachers use student assessment results to make instructional decisions.	85%
7. I often conduct professional development seminars where teachers are given opportunities for hands-on practice.	55%
8. Meeting one on one with teachers is an important part of my job.	100%
9. I work closely with the principal or vice principal in my school.	85%

Satisfaction with my work

The purpose of this survey was to gather information about teachers' evaluation of their teaching, their interest in improving their teaching learning, and the professional support they receive in their schools. The survey was administered in the fall, winter, and spring in order to determine whether teachers' evaluations of their teaching changed during the year in which they received PD in reading. The 17-item measure used a Likert response scale ranging from *strongly agree* to *strongly disagree*. Factor analysis (ProMAX rotated factor loadings) indicated that the scale was best explained by three factors. The first factor (hereafter, Self-Efficacy) included seven items focused on teachers' self-efficacy. Examples of two items with the highest loadings are "I feel I am good at teaching reading and writing" and "I have a good understanding of how children acquire language and literacy skills." The second factor (hereafter, Improvement in Teaching Reading) was made up of four items that assessed teachers' interest in opportunities to improve their teaching. Items with the highest loadings were "I wish I had more opportunities to discuss how to teach reading with other teachers" and "I would like to learn methods to help children develop their oral language." The third factor (hereafter, Sources of Teaching Support) included six items focused on support for their teaching. Items with the high loadings were "I have benefited from opportunities to learn more about methods for teaching reading" and "The literacy coach supports my efforts to teach reading effectively."

TIP

Trained observers carried out systematic observations of the literacy block for each participating teacher three times during the year. We designed TIP to gather information about instructional practices actually used in first-grade classrooms. The system used 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 represented key features of instruction. These included purpose of instruction, modality, grouping arrangements, adults present in the classroom, and material(s) used for instruction. Following the observation, the teacher completed a post-observation form that provided additional information (e.g., how the teacher planned the lesson). We report comparisons of teachers' instruction at each of the three time points for features of instruction closely associated with recommendations for instruction that emerged from the LETRS program. These include time spent on key components of early reading (e.g., phonics); time devoted to instruction with small groups; and time spent using a systematic, comprehensive program. From the post-observation surveys, we report teachers' responses to additional questions related to the PD program and to a question concerning how comfortable they were having an observer in

the classroom. 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 & Minden-Cupp, 2000; National Reading Panel, 2000; Pressley et al., 2001; Snow, Burns, & Griffin, 1998; U.S. Department of Education, 2002). These included explicit instruction in word 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 RF legislation (phonemic awareness, phonics, fluency, vocabulary, and comprehension) as well as writing.

To establish interobserver reliability, we compared agreement in the coding of five pairs of field researchers who observed the literacy block in one classroom at the same time. Averaged across three 5-min intervals, the agreement for the five pairs was 97%.

Classroom Instruction

Districts that received funding to participate in the state's RF program were required to purchase one of five comprehensive "core" programs that teachers would use to organize their reading instruction (see Michigan Department of Education, 2002, for further details). The teachers in the Professional Development in Reading program (both those in RF schools and those in other schools) used a variety of core programs. Of the nine districts, four used Houghton Mifflin materials, two used Harcourt Brace, one used Scott Foresman, one used McGraw-Hill, and one used "the Arkansas model (Dorn) and leveled books." Although RF teachers were encouraged to use the teachers' guide and publishers' materials for instruction, none of the five approved programs could be considered "scripted" programs. Observation results indicated that even when teachers in all three conditions used the anthology for whole-class instruction, they used a wide variety of reading materials (e.g., trade books, little books) for small-group instruction.

RESULTS

Changes in Reading Knowledge and Self-Efficacy

The first research question concerned changes in knowledge about reading and in self-efficacy from the fall to the spring for the teachers who participated in the three different PD programs. To answer this question, we used results of the LRC and Satisfaction With My Work surveys. Survey mean comparisons were carried out with condition as the between-subjects factor

(three levels) and time (fall, winter, spring) as the within-subjects factor. LRC Forms A and B were analyzed as repeated measurement with two levels. The Satisfaction With My Work scale was analyzed as the three scales based on the ProMAX factor analysis described earlier.

Table 3 shows the proportion of LRC items correct for each condition in the fall and spring. Table 4 shows the within-subjects contrast. There was a general time effect, $F(1, 88) = 4.65$, $p < .05$. This effect was due to an increase in the number of items correct for the KE and K conditions; however, the interaction was not significant. The results suggest that the KEC teachers started their participation in the seminars with somewhat better performance on LRC but that the KE and K teachers caught up by the end. We anticipated growth of knowledge on LRC for all three conditions but no differences by condition because teachers in the three conditions received the same seminar. The findings suggest that other aspects of the PD program that KE and KEC teachers experienced did not affect their performance on a test of the knowledge disseminated at the PD seminars.

Factor analyses indicated that the Satisfaction With My Work items provided information about teachers' evaluations of their teaching of reading, their interest in learning and further PD, and the professional support they receive in their schools. As a follow-up, a separate principal component analysis of the 17 items for the three occasions was carried out; results suggest a stable three-factor structure explaining 41% of the total variance for the first measurement in the fall, 39% for the second, and 41% for the last data collection in the spring. Using items with item loadings >.5 consistently across the three waves, we created three scales that indicated the level of perceived Self-Efficacy (SEFFIC), perceived Improvement in Teaching Reading (IMPROV), and perceived Sources of Teaching Support (SUPPORT).

For the three scales on the Satisfaction survey (SEFFIC, IMPROV, SUPPORT), there was a significant increase overall, $F(6, 364) = 5.48$, $p < .001$, independent of condition. The interaction of time and condition was not significant. In general, teachers tended to feel more competent, to see more

TABLE 3 Fall and Spring Performance on LRC by Condition

Time	Condition	*M*	*SD*	*N*
LRC Form A (fall)	KEC	.76	.18	37
	KE	.70	.14	31
	K	.70	.14	23
LRC Form B (spring)	KEC	.75	.12	37
	KE	.75	.16	31
	K	.74	.13	23

Note. Included were teachers who completed both fall and spring LRC. LRC = Language and Reading Concepts; KEC = knowledge, evaluation, and consultation and collaboration condition; KE = knowledge and evaluation condition; K = knowledge condition.

TABLE 4 Tests of Within-Subjects Contrasts for Language and Reading Concepts

Source	Time	Type III sum of squares	*df*	Mean square	*F*	Significance
Time	Linear	.039	1	.039	4.654	.034
Time × Condition	Linear	.027	2	.014	1.599	.208
Error (time)	Linear	.746	88	.008		

value in PD, and to see more support in their work environment between the fall and the spring. However, the trend was small and not systematic across the three time points for IMPROV and SUPPORT. Accordingly, post hoc analyses suggest that the time effect is exclusively due to an increase in self-efficacy over time (SEFFIC). In the univariate follow-up for this variable, the Time × Condition interaction was significant, $F(2, 92) = 2.64$, $p < .038$. As Figure 1 shows, KE teachers' satisfaction with their teaching of reading and their sense of competence as literacy professionals improved more than that of the teachers in the KEC and K conditions, particularly between the winter and the spring.

Analyses of certain individual items showed variation in responses by PD condition. For one such item, "The literacy coach supports my efforts to teach reading effectively," the percentage of the teachers in the KEC condition

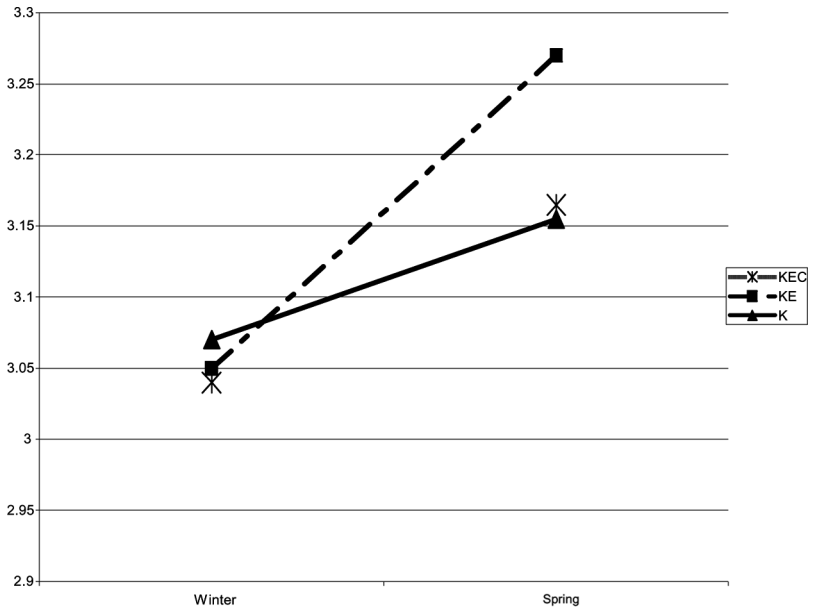

FIGURE 1 Changes in self-efficacy by condition. KEC = knowledge, evaluation, and consultation and collaboration condition; KE = knowledge and evaluation condition; K = knowledge condition.

agreeing or strongly agreeing with this statement was significantly higher in the fall compared to the percentage of teachers in the other two groups. However, their initial enthusiasm leveled off in the winter and spring. The percentage of teachers in the K condition who felt supported by a coach increased from winter to spring, reaching the level of the KEC teachers. From interview data, we learned that most of the schools in which the KE and K teachers taught had some staff member with expertise in reading, including a Reading Recovery coordinator, district literacy consultant, or Title I teacher (to name a few), but most K teachers reported that they had only occasional support for their work; Title I teachers generally worked with specific students, not the teacher. As a result, it is not clear what led to this perception of support. However, there was no increase in the percentage of teachers in the KEC condition who agreed with this statement. Another item of interest focused on self-efficacy by asking for teachers' agreement with the statement "I feel I am good at teaching reading and writing." Here there was an increase in the percentage of the teachers in all three groups who agreed with the statement, but the K teachers showed the smallest gains.

Changes in Reading Instruction

We begin by reporting teachers' responses to two questions about the literacy instruction we observed in the fall, winter, and spring. First, we felt it was important to know whether the observed lessons were typical of other lessons that the teachers taught. When asked how typical the observed literacy block was of other unobserved blocks, more than 60% teachers in each condition responded "very typical," except for the KEC teachers in the spring, when the percentage dropped to 47%. The difference in typicality of lessons by condition was not significant for the fall and winter ($p > .05$) but was for the spring, $\chi^2(4, N = 91) = 9.32$, $p < .05$.

Second, because of the importance of addressing individual students' needs through flexible grouping arrangements (as promoted by the LETRS program), we asked teachers about differentiation of instruction (i.e., whether all students were given the same lesson or whether some were given different lessons). Overall, the KEC teachers were more likely to provide different instruction to different students than were KE or K teachers. The difference by condition was significant for the fall and the winter, as Table 5 shows.

In our analyses of instruction based on the classroom observations (TIP), we were particularly interested in variation in time spent on different purposes of reading instruction for the three time points by condition. As noted earlier, the instructional purposes focused on components that were central topics in the LETRS modules and derived from recommendations of the National Reading Panel report and the RF legislation: phonemic awareness and phonics, fluency, vocabulary, comprehension, and writing. Included in

TABLE 5 Percentage of Teachers in Each Condition Responding That Different Students Were Given Different Work

Condition	Fall	Winter	Spring
KEC	61	75	45
KE	40	43	30
K	39	32	29

Note. For fall, $\chi^2(df = 2) = 12.08$, $p < .01$; for winter, $\chi^2(2, N = 91) = 12.19$, $p < .001$; for spring, differences by condition were not significant. KEC = knowledge, evaluation, and consultation and collaboration condition; KE = knowledge and evaluation condition; K = knowledge condition.

purposes was the time teachers spent with their class working in "literacy centers," when teachers worked with small groups, providing instruction to meet the students' needs and guided practice in reading texts.

An overall multivariate analysis of variance (MANOVA) showed several significant effects, including differences in time spent on different purposes and changes in time spent on purposes across the year (e.g., phonics; interaction FaWiSp × practice [FaWiSp = fall, winter, spring]). The results of the MANOVA are provided in the Appendix. A significant interaction of Purpose × Condition suggests that the three conditions differed in time spent on different purposes. However, tests of the most important interactions were not statistically significant; these were the interaction of condition and time (Condition × FaWiSp) and the three-way interaction of condition, time, and purpose (Condition × FaWiSp × Purpose). The latter would have suggested that changes in the content of instruction over the course of the year differed by condition. Because a lack of power contributed to the lack of statistical significance, separate MANOVAs were run to give a clearer picture of changes in the purpose of instruction.

Of the seven purposes, no significant effects emerged for fluency, comprehension/vocabulary, or writing. Two showed significant changes by condition: phonics and centers, as Figures 2 and 3, respectively, show. For centers, the main effects (condition and time) and the interaction of time and condition were both significant. KEC teachers used centers more often in the fall and the winter than teachers in the other conditions, with a peak in the winter (i.e., the interaction was mainly on the quadratic effect). For phonics, there was a general decline for all three conditions over the school year, but the KEC group reached the floor by the second time point (significant interaction for the quadratic effect FaWiSp × Condition; see Figure 3). These results suggest that over the course of the year, the KEC teachers used literacy centers increasingly more than the KE and K teachers. In contrast, although teachers in all three conditions spent less time working on phonics across the year, the decrease in time spent on phonics was greater for the KEC teachers than for the KE or K teachers. We note that phonics could have been the focus of small-group instruction during centers; that is, the decrease in time

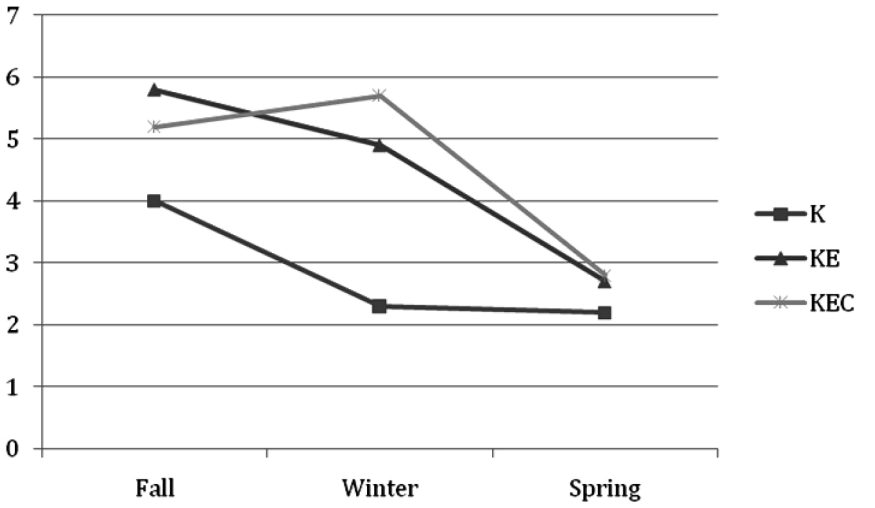

FIGURE 2 Number of intervals in which teachers taught phonics (fall, winter, and spring).

spent on phonics signals a decrease in whole-class instruction in that component of reading.

Finally, we compared the three conditions on two other aspects of instruction emphasized by the PD program: (a) the percentage of time spent using the comprehension program, trade books, and worksheets; and (b) the percentage of time spent teaching lessons to the whole class and to small groups. As Table 6 shows, with regard to the use of materials, KEC teachers spent significantly more time using the comprehensive program and less time using trade books than the other two groups (both $ps < .001$). Differences in

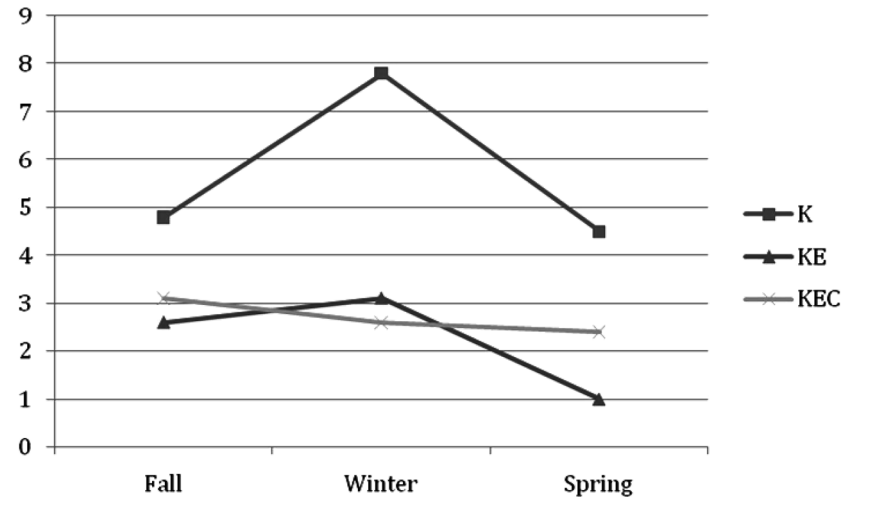

FIGURE 3 Number of intervals in which teachers used literacy centers (fall, winter, and spring).

TABLE 6 Time Spent Using Different Materials (Spring)

Material	KEC	KE	K	*p*
Comprehensive program	14.8	7.8	10.0	.000
Trade book	1.7	16.1	14.0	.000
Worksheet	11.7	16.1	14.0	*ns*

Note. The numbers represent average minutes across the literacy block for teachers in each condition. KEC = knowledge, evaluation, and consultation and collaboration condition; KE = knowledge and evaluation condition; K = knowledge condition.

time spent using worksheets did not differ by condition. With regard to grouping arrangements, time spent teaching the whole class did not differ by condition (e.g., for the winter, KEC = 71%, KE = 68%, and K = 73%); however, teachers in the K condition spent significantly less time teaching small groups (KEC = 13.2%, KE = 12.8%, and K = 7.1%).

To summarize, time spent in phonics decreased more precipitously for KEC than KE or K condition teachers, whereas the time spent using centers increased much more for KEC teachers than KE or K teachers. This reflects greater use of opportunities for students to participate in a variety of literacy activities while the teacher ran guided reading lessons for small groups. KEC teachers were observed using the comprehensive program to teach lessons for more of the instructional time than was the case for teachers in the other conditions.

Distinguishing Teachers in the Three PD Models

The final question focused on the extent to which teachers in the three PD conditions were distinguished by the combination of variables explored in this study. Discriminant function analysis was carried out using data from the fall, winter, and spring. The following variables were entered: for TIP, time spent on phonics, fluency, comprehension, writing, and centers; the three factors from Satisfaction With My Work; and performance on LRC. Results showed that for the fall, the first function was not significant (eigenvalue of .229), Wilks's Λ ($df = 18$) = .742, $p = .11$. In the winter, the variables resulted in significant distinction of the groups—the eigenvalue for function 1 was .337, Wilks's Λ ($df = 16$) = .730, $p = .04$. TIP variables distinguished the groups; specifically, time spent on centers, phonics, writing, and fluency contributed to the significant outcome. In the spring, the first function was significant (eigenvalue of .368), Wilks's Λ ($df = 20$) = .694, $p = .03$. The variables that most distinguished the groups were time spent on centers, fluency, and writing (from TIP).

Classification results also showed a change across the year. In the winter, 76% of the KEC teachers, 42% of the KE teachers, and 48% of the K teachers

were correctly identified by PD condition. At this time, KE teachers who were not correctly classified were likely to be (incorrectly) classified as K teachers (39%). In the spring, the classification results were more accurate for the KE teachers: 72% of the KEC teachers, 70% of the KE teachers, and 30% of the K teachers were correctly classified. Variables did not correctly identify teachers in the K condition, as about one third of the teachers in this group were predicted to be in each of the three conditions. Most notable is the improvement in the classification of KE teachers between the winter and the spring. Because the variables did not distinguish the groups in the fall, but did so in the winter and spring, participation in the teachers' respective PD models apparently contributed to changes that significantly distinguished the groups and led to increasing accuracy in the identification of the teachers in the KE condition. It was primarily time spent on different components of reading instruction that changed across the year, resulting in a profile that particularly distinguished teachers in the KEC and KE groups.

DISCUSSION

To date, most studies of PD programs in early reading have focused primarily on the content knowledge about reading that teachers need to hold, not the structure and delivery system. Findings have shown that teachers participating in intensive PD programs of several weeks' duration have demonstrated increased knowledge about the foundations of reading and have been observed to increase the time they spend providing explicit instruction in areas related to learning the code, such as phonemic awareness or phonics (e.g., Bos et al., 1999; McCutchen & Berninger, 1999). Apart from Foorman and Moats's (2004) report of their teachers' response to PD in early reading, little information is available about teachers' views of the benefits of the PD or the extent to which the PD led them to evaluate and change their own practices. Given reports of teachers' response to PD in general (or through comprehensive school reform projects), we see teachers' response to PD as a critical means of assessing the value of different models of PD in early reading. As Cohen and Ball (1999) pointed out, the goal is to improve the instructional capacity of teachers, and to reach this goal, teachers need to be engaged in learning, to be supported in their efforts to evaluate and change instructional practices, and to feel that their engagement with new professional knowledge in the classroom is paying off.

The results suggest that of the two models that provided support for teachers' learning, the better model is the three-component KEC model that included not only assistance in learning to evaluate teaching but also support from a coach for working with other teachers and making improvements in classroom reading instruction. The results confirm the finding reported by others that simply providing teachers with up-to-date knowledge about

reading and reading instruction is not likely to lead to substantive changes in practices (e.g., Desimone, 2002). Although teachers in the K condition did as well as those in the other conditions on the test of reading knowledge, there is little evidence that they used this knowledge to alter their instruction. The results also suggest that providing a system for teachers to evaluate their students' learning and their own teaching (i.e., the KE condition) led to significant gains in teachers' perceptions of their effectiveness as teachers of reading but did not lead to the kind of substantive changes observed in the instructional practices of the KEC teachers. Support from a literacy coach and regular grade-level meetings might have influenced the changes in instruction that KEC teachers made across the year. These findings are discussed in turn.

Deepening Content Knowledge

With regard to changes in knowledge about reading, we found that teachers in the three conditions did improve their performance on LRC from the beginning to the end of the year. Acquisition of content knowledge has consistently been found to characterize effective PD programs (e.g., Desimone, 2002; Garet et al., 2001). The gains were significant but not striking. Overall, teachers performed surprisingly well on LRC at the start of the PD program, suggesting that their foundational knowledge about early reading might have been stronger than has been reported in other studies (e.g., Moats, 1994).

For teachers in the K condition, the seminars provided throughout the year made up their entire PD program. Because the LETRS seminars were spread out across the year, this model of PD provided more sustained opportunities to acquire knowledge about reading and reading instruction than is typical of "traditional" in-service PD programs (e.g., 1-day or short-term workshops). However, the seminars were not intended to provide much support for the teachers in terms of learning how to implement new instructional methods in their classrooms or to engage in fruitful discussion with one another. Still, we found that the teachers in all three conditions became increasingly invested in the PD seminar sessions over time. Our observations to assess fidelity of treatment showed that, as the year went along, the seminar leaders had increasing difficulty fitting in all of the activities in the plan for the session because the teachers were more involved in discussing issues and sharing suggestions with one another about materials or techniques that were successful or problematic. It is also important to note that their ratings of the seminar sessions were very high for the most part. Although the teachers had to extend their long workday by 3 hr (minimally) in order to attend each seminar, they appeared to appreciate the quality of the learning opportunity and the time to interact with one another. In fact, we were present at one seminar session at which the teachers shared their e-mail addresses to create a discussion group to extend their conversations about effective

reading practices on their own. As much as the teachers might have felt that the seminars were helpful, this provides no assurance that they used the information in their teaching. From other studies, we have learned that teachers often find information presented in content seminars rather abstract and need guidance translating this information to practice in their classrooms (e.g., Desimone, 2002; Elmore, 2006).

Fostering Teachers' Learning through Evaluation

Given the research on factors that affect teachers' learning from PD programs, we designed the KE model to combine seminars with assistance in learning to evaluate their teaching. The question was whether this added component would provide a sufficient opportunity for teachers to engage in the process of reflection, analysis of teaching methods, and alignment of teaching practices and students' learning, as recommended by Snow et al. (2005). In particular, research findings have shown the value of having teachers learn to use data on students' achievement to evaluate the areas of their teaching that could use improvement (Hayes & Robnolt, 2007; Place, 2002). In theory, through engaging in assessment of students' progress and, thus, the effectiveness of instructional practices, teachers come to evaluate their priorities and their expectations for their students (Timperley & Phillips, 2003).

Because professional knowledge is deeply tied to teachers' views of the extent to which their instruction can make a difference for the children they teach (Ross & Bruce, 2007), we expected that teachers in the KE and KEC conditions would be more likely than teachers in the K condition to show positive changes by the end of the year in self-efficacy and interest in learning (as measured by the survey Satisfaction With My Work). Although we found no significant differences in teachers' ratings of their interest in learning more about reading and reading instruction, the results show that the percentage of KE teachers who felt that they were competent teachers of early reading significantly increased, more than was the case for K or KEC teachers. Although the KE teachers showed gains in self-efficacy, they made fewer changes in their instruction than the teachers in the KEC condition, a finding that suggests the value of the coach in guiding changes in instructional practices.

Coaching and Collaboration

The third model (KEC) included the support of a coach whose role as part of the PD program led to opportunities for teachers to collaborate with one another as well as opportunities to receive assistance in implementing new practices in the classroom. The role of the coach in leading grade-level meetings meant that the school dedicated time and resources to support the improvement of reading instruction. Still, the KEC teachers did not differ

from the teachers in the other conditions in their view of being positively supported in their professional work. Instead, the benefits of having a coach centered on the teachers' changes in instructional practices, which were distinctly different from those made by teachers in the other two conditions.

The coherence of the KEC model might be one reason for the particular success of this model. As Cohen and Ball (1999) pointed out, PD programs that focus on one specific area of instruction (in this case, reading in first grade) run the risk of not being sufficiently coordinated across teachers, grades, and areas of instruction; for example, each teacher might be left to figure out how recommended methods and content fit with the existing curriculum. In the KEC model, the coach was instrumental in providing a link between the content of the seminars, the use of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) to assess students' progress, efforts to coordinate reading instruction across classrooms and grades, and opportunities for teachers to share suggestions about methods to improve reading instruction. Because the KEC teachers were distinguished from the others most significantly by the extent of the changes in their practices, we can tentatively infer that assistance from the coach was overall beneficial.

In order to understand teachers' sense of the support they received from the coach, we examined changes in the responses to the survey item that asked about support provided by the coach. On this item, a large percentage of KEC teachers agreed in the fall that their coach supported their efforts to improve reading instruction. This result might not be surprising, as the KE and K teachers often did not have support from a staff person who served as a coach and certainly not one who assisted teachers in implementing new practices aligned with the content of the seminars. However, we also note that for the KEC teachers, the percentage of teachers who felt supported by the coach remained stable across the year. Furthermore, although the coaches in the KEC schools led weekly grade-level meetings as well as provided support for individual teachers, the net result was not an increase in the percentage of KEC teachers who agreed with the statement that they were effective teachers. Further research is needed to understand more deeply how teachers respond to assistance provided by literacy coaches within their school.

Changes in Classroom Practices

The research literature led us to expect that the teachers who received guidance and support from a coach and one another were likely to make efforts to integrate new teaching practices in their reading instruction (Foorman & Moats, 2004; McCutchen & Berninger, 1999). In contrast, without having reasons to evaluate their own instruction or the expectations they held for their students, and without support and guidance in implementing new practices (particularly in the K condition), teachers would not be likely to make

sustained efforts to change their instructional practices over the year. Results of our observations confirmed that KEC teachers made more consistent changes in time spent on critical areas of instruction and in their grouping arrangements than did KE and K teachers.

Some changes in the purposes of instruction appeared to be responsive to what students need to learn in the first-grade year. For example, there was a decrease in the amount of time spent teaching phonics for teachers in all three conditions. Of the changes that were associated with PD condition, the most noticeable was the amount of time teachers spent with the classroom organized for literacy centers. The KEC teachers spent significantly more time running centers than the KE and K teachers. The increased use of centers meant that teachers spent more time working with small groups of students and provided a variety of practice activities designed to reinforce learning for students with different needs. Thus, they seemed to be responsive to the principle of differentiating instruction promoted in the LETRS program. The post-observation survey confirmed that a greater percentage of KEC teachers taught different lessons to different students than was the case for the KE and K teachers. Although the principle of differentiation of instruction was introduced in the LETRS seminars, teachers unfamiliar with methods for grouping students according to instructional needs might not be familiar with procedures for designing and running literacy centers and for classroom management while working with a small group (Hayes & Robnolt, 2007). Here is a situation in which the assistance of the coach might be critical in helping teachers learn to use new and challenging methods of instruction.

We note, nonetheless, that our results show changes in time devoted to different aspects of first-grade instruction; we did not ask observers to rate the quality of instruction. This would be a valuable topic for a follow-up study—as would information gathered from teachers about why they made changes in the amount of time spent on such areas of reading as phonics. We did consider the possibility that changes in time spent on phonics and centers were influenced by the use of the DIBELS to evaluate student progress and the effectiveness of instruction, but as the DIBELS was used by both KEC and KE teachers, it seems more likely that teachers' opportunities to discuss instruction in grade-level meetings and to receive support from the literacy coach led to increased differentiation of instruction through the centers grouping format.

Participation in the Different Models Distinguished Teachers' Response to PD

Given our three measures of teachers' response to the three PD models, we were interested in determining the extent to which these measures significantly distinguished the teachers by condition across the year. To answer this question, we ran discriminant function analyses at each time point. In

the fall, the measures did not significantly distinguish teachers in the three conditions. It is comforting to know that at the outset the teachers in the three conditions could not be identified by their attitudes toward teaching reading, their knowledge about reading, or their practices. In the winter and even more so in the spring, our measures of teachers' response to PD did significantly distinguish the teachers by condition. Specifically, it was the TIP variables that distinguished the groups: In the winter, time spent on centers, phonics, writing, and fluency contributed to the significant outcome. In the spring, the variables that most distinguished the groups were time spent on centers, fluency, and writing.

By the spring, the classification results were quite accurate for two of three conditions: 72% of the KEC teachers and 73% of the KE teachers were correctly classified by their performance on our measures. It is noteworthy that our measures of teachers' response to PD did not do a good job of classifying the teachers in the K condition (only 30% were correctly identified as teachers in the K condition). About equal numbers were misclassified as KEC and as KE teachers, suggesting significant variation in the extent to which the K teachers made changes on their own without additional support. The K condition was predicted to be the least effective model (Garet et al., 2001)—and our findings suggest that this was the case particularly when it came to using updated knowledge about reading instruction to transform teaching (Borko, 2004).

These findings are aligned with those of other researchers who have found that collaborative work (sharing ideas about how to run literacy centers) and support from the coach (e.g., advice about how to keep all students engaged in active learning) help teachers make connections between the content of seminars and their classroom practices (Bean, 2004; Taylor et al., 2002). Because previous studies have shown that teachers are resistant to changing their instructional practices (e.g., Cohen & Ball, 1999), it is noteworthy that the KEC and KE teachers responded positively to principled changes in instructional practices.

Limitations and Future Studies

Although the results of the present study suggest that teachers in the three conditions responded differently to their PD program, limitations to the design of the study indicate the importance of carrying out additional studies of the benefits of the components of PD included in this study. First, the study was carried out in the context of the RF initiative in Michigan, and the teachers in the most intensive PD model (KEC) were all volunteers from RF schools. Other aspects of the RF program might have affected the teachers' responses to the PD program that they received. Second, several measures involved self-report from the teachers. The observation data provide an objective measure of the extent to which teachers' practices changed.

However, in future studies, it would be informative to supplement these observations with additional surveys or interviews with teachers so that we can understand why changes were made in their practices and (for the KEC teachers) the extent to which the coach was instrumental in facilitating these changes. The present study, at least, serves as a first effort to identify components of PD programs in early reading that might lead to improved teacher quality. Further studies of early reading PD models need to embrace the complexities of the process through which teachers acquire new knowledge and use this knowledge to improve their professional practices.

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APPENDIX

Multivariate Test of Teachers' Instructional Practices by Time, Professional Development Condition, and Purpose of Instruction

Effect	Wilks's Λ	*F*	Hypothesis *df*	Error *df*	Significance
FaWiSp	.871	6.097	2.000	82.000	.003
FaWiSp × Condition	.950	1.068	4.000	164.000	.374
Purpose	.778	5.704	4.000	80.000	.000
Purpose × Condition	.705	3.825	8.000	160.000	.000
FaWiSp × Purpose	.730	3.510	8.000	76.000	.002
FaWiSp × Purpose × Condition	.869	0.690	16.000	152.000	.801

Note. Within-subjects design: FaWiSp + Practice + FaWiSp × Practice. FaWiSp = fall, winter, spring.