Access to high-quality education is uneven, particularly for preschool children who are at risk for school failure. Professional development (PD) for teachers, including the use of coaching, is an increasingly common approach for promoting evidence-based instruction. Existing research suggests that the frequency of teacher participation in a PD intervention is related to the magnitude of PD effects, but there is little research on how to engage teachers in learning about and implementing evidence-based practices. In this article, the authors describe an iterative approach to the development of a PD intervention that employs coaching aimed at helping Head Start teachers improve their language and literacy instruction. The authors describe sequential, small-scale studies that influenced their approach to PD. Results of a pilot study of the PD intervention suggested that teachers had positive responses to the intervention content and approach. Implications for developing and implementing PD interventions designed to improve classroom instruction are included.

Keywords: professional development; intervention; classroom teachers; early childhood; iterative process

Children living in poverty enter kindergarten performing at substantially lower levels on tasks reflecting early literacy and mathematics competence and are at much greater risk for school failure than are their more advantaged peers (Bowman, Donovan, & Burns, 2001; Denton & West, 2002). Literacy skills at kindergarten entry are strongly predictive of later development in reading and writing (Cunningham & Stanovich, 1997; Duncan et al., 2007), and considerable recent attention has focused on efforts to improve young children’s early literacy and language skills. There is a growing evidence base about effective instructional approaches to promote children’s development of skills related to later, conventional literacy (Powell & Diamond, 2011). This is reflected in literacy-focused early childhood curricula (e.g., Literacy Express, Sound Foundations; What Works Clearinghouse, 2011) as well as in professional development (PD) interventions designed to improve teachers’
instruction of important early literacy skills (e.g., Landry, Anthony, Swank, & Monseque-Bailey, 2009; Neuman & Wright, in press; Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Powell, Diamond, Burchinal, & Koehler, 2010). The process developing an intervention that aims to improve Head Start teachers’ use of effective early literacy instruction is the focus of this article.

The ultimate goal of any PD intervention is to improve students’ learning by enhancing teachers’ use of evidence-based approaches to instruction. An emerging conceptualization of PD emphasizes the provision of (a) sustained opportunities for teachers to learn specific content focused on what they are expected to teach (and children are expected to learn) that (b) acknowledge the realities of their classroom and school environments and (c) facilitate active learning (e.g., Powell & Diamond, 2011; Wayne, Yoon, Zhu, Cronen, & Garet, 2008). There are a number of promising approaches to PD, including collaborations with groups of teachers and mentors in a community of practice (see Buysse, Sparkman, & Wesley, 2003; Gersten, Dimino, Jayanthi, Kim, & Santoro, 2010) and individualized supports (“coaching”) with teachers to promote implementation of a specific curriculum (see Justice, Mashburn, Hamre, & Pianta, 2008; Lieber et al., 2009) or instructional approach (see Landry et al., 2009; Powell, Diamond, Burchinal, & Koehler, 2010). Results from several randomized controlled trial studies of PD interventions that included coaching have revealed small but significant effects on children’s learning, with somewhat larger effects on teachers’ instruction (e.g., Bierman et al., 2008; Landry et al., 2009; Powell, Diamond, Burchinal, & Koehler, 2010).

In addition, technologically mediated forms of individualized PD with teachers are becoming more prevalent (cf. Amendum, Vernon-Feagans, & Ginsberg, in press; Pianta, et al., 2008; Powell, Diamond, & Koehler, 2010), in part because technology can extend the reach of PD to geographically remote communities (Powell, Diamond, & Cockburn, in press). In recent years, computer-based technology has been used to provide PD to individual teachers through web conferencing (Amendum et al., in press), feedback delivered through electronic mail (Hemmeter, Snyder, Kinder, & Artman, 2011), web cams in classrooms (Pianta et al., 2008), and software that links a coach’s feedback with videotaped segments of teachers’ instruction (linked teaching feedback; Powell, Diamond, & Koehler, 2010).

To maximize outcomes for children, PD interventions must ensure teachers’ participation and compliance with intervention components (Olds, Sadler, & Kitzman, 2007). Variability in teachers’ participation in PD interventions is common. In a recent study, Pianta and his colleagues found that 28% of teachers involved in a technologically mediated PD intervention did not submit at least one videotape of their teaching during each of three time periods across the school year (Pianta et al., 2008). Raver and her colleagues reported that 75% of teachers participated in at least one component of a PD intervention targeting the use of emotionally supportive classroom practices, but 25% of teachers who volunteered for the intervention did not participate in any component (Raver et al., 2008). Powell and his colleagues reported substantial variability in teachers’ use of resource materials provided in a literacy-focused PD intervention, with some teachers viewing most and other teachers viewing very few video clips of effective teaching practices (Powell, Diamond, & Koehler, 2010).

For PD interventions to be effective, participants need to be engaged with and be active participants in the intervention. Anecdotal evidence suggests, however, that teachers may be less engaged with PD when they regard recommended teaching practices as inappropriate
or not within reach (Dickinson, Watson, & Farran, 2008). One approach to increasing teachers’ participation and compliance with an intervention is to include teachers as collaborators as the intervention is developed. Fuchs and Fuchs (2001) described collaborations with teachers in their development of Math PALS, an instructional approach that uses peer-assisted learning to individualize instruction to meet the needs of diverse learners. The development of this program included a pilot process in which the intervention was fine-tuned in response to feedback from teachers until it was both teacher and classroom friendly and also effective. They found that although it was not necessary that all teachers personally participated in the development of an intervention, an intervention was more likely to be adopted when a representative group of teachers was involved in the development process.

**Overview of Intervention Development**

In this article, we describe the processes that we used to revise a coaching-based PD intervention, originally titled Classroom Links to Early Literacy (CLEL), to improve teachers’ instruction of critical skills related to vocabulary and phonological awareness. A random assignment outcome study of CLEL found positive intervention effects on teachers’ literacy instruction and on children’s code-related skills, but no effects on teachers’ practices and children’s outcomes regarding oral language skills and small effects on children’s phonological awareness (Powell, Diamond, Burchinal, & Koehler, 2010). We wanted to develop a revised version of the intervention that provided higher levels of intensity and content fully focused on sound and word instruction. We hypothesized that a more intense and targeted focus on evidence-based approaches to teaching sound awareness skills and new vocabulary words would have positive impacts on teachers’ instruction and children’s phonological awareness and word knowledge outcomes (Powell & Diamond, 2011). Components of the PD intervention included a one-day workshop followed by 12 individualized coaching sessions plus teacher access to a case-based hypermedia resource that included approximately 100 video exemplars of literacy and language instruction.

The iterative process that we followed in revising this intervention is described in five studies presented below. We designed these studies to provide us with information from teachers about presentation of the intervention content (Study 1), the utility of two major PD components (Studies 2 and 3), and the implementation of all intervention components (Study 4). Study 5 provided preliminary pilot data on outcomes of the PD intervention in relation to teachers’ instruction. Table 1 provides an overview of the procedures used in the five studies.

**Study 1**

The first study addressed the question, what are teachers’ ideas about how (or whether) to teach children about word meanings (vocabulary), letter names, and phonological awareness skills (blending, sound awareness)? We used semistructured small group interviews to further our understanding of the way Head Start teachers approach the challenges of teaching
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Note: Head Start teachers were from the same five Head Start programs in Studies 1, 4, and 5. Teachers in Studies 2 and 3 were from different community preschool and child care programs.
these skills. Participants included 81 lead teachers and 56 assistant teachers representing 5 Head Start agencies, with 83 Head Start classrooms located across 21 different Head Start centers. The centers were located in urban, small-city, and rural communities in a Midwestern state (O’Leary, Cockburn, Powell, & Diamond, 2010). Approximately 60% of the lead teachers in this study had participated in CLEL.

Each teacher was invited to take part in one of 14 different group interviews. These 14 interview sessions lasted approximately 90 min, took place over a 1-month period at the end of the school year, included on average nine teachers, and were held in Head Start classrooms (seven in small-town and rural areas, seven in urban centers). Only consented participants and research staff were permitted in the room during the interview. Interviews were audiotaped and transcribed, with analyses guided by Hatch’s (2002) recommendations regarding the use of inductive methods for transcribed data. Interview questions focused on teachers’ ideas about the importance of teaching sounds and vocabulary skills, specific teaching practices that they use in their classrooms, and their use of small group and choice time for instruction (see O’Leary et al., 2010, for more details.)

Results

We found that teachers differed in the ways in which they approached instruction of new words (vocabulary) and phonological awareness skills. Specifically, teachers’ views of how best to teach new words varied considerably in the extent to which they regarded instruction as spontaneous or planned. Teachers were most likely to describe teaching new words in response to children’s curiosity, apparent confusion about a word meaning, or clear evidence that a new word was unfamiliar to most children. As one teacher noted, “I think the best comes when it’s not planned . . . a word [just] pops up” (O’Leary et al., 2010, p. 192); another commented that her practice in teaching new words is to “go with the flow” (p. 191). Much less common were teachers’ descriptions of planning to teach new words by selecting target words and planning a strategy for teaching each word in advance. Teachers’ comments suggested that they were not sure how to identify which words to teach, including how to help children use new words in different contexts across the school day. Teachers were uncertain about the best strategies for teaching novel words; this was especially the case when children’s limited English vocabulary skills made it more difficult to use synonyms to teach new words.

The alphabet was a central feature in teachers’ comments about how they teach phonological awareness skills. In contrast to their approach to teaching new words, most teachers offered descriptions of explicit instruction for teaching letter names, with frequent reference to a letter of the week. Teachers offered different ideas about whether to teach letter names and letter sounds at the same time, with many teachers agreeing that children needed to know letter names before learning sounds. Although most teachers also endorsed the importance of teaching children about syllables by clapping names, responses clearly suggested that teachers emphasized learning letters and sounds as the most important phonological awareness skill. Overall, teachers’ comments suggested little knowledge of the continuum of phonological awareness skills (Phillips, Clancy-Menchetti, & Lonigan, 2008).

In addition to asking teachers about their approaches to teaching important early literacy skills, we asked about classroom settings in which instruction occurs. Most teachers mentioned
whole-group circle time as the most common setting for teaching letters, phonological awareness, and vocabulary knowledge, but they acknowledged that it was often difficult to ensure that all children were equally engaged in learning in a large group. Teachers reported that it was especially challenging to monitor the progress of children who were “quiet,” and they commented specifically on challenges teaching children with disabilities and children learning English as a second language. Teachers were aware that teaching children in small groups provided more opportunities to individualize instruction and to monitor children’s progress, but most found it a challenge to implement small group activities on a regular basis in their classrooms.

**Uses of Results**

These results led us to revise the training materials to include more specific content related to sound awareness, including teaching letter sounds with letter names and teaching a range of phonological awareness skills (from words to syllables, onset rime, and phonemes). We created additional video materials and accompanying text related to teaching phonological awareness skills, providing rationales related to the content of what is taught (e.g., how teaching children about compound words and syllables promotes an understanding of sounds), along with teaching strategies. In contrast, the revisions that we made in materials related to teaching new words were related primarily to providing materials that would help teachers plan which words to teach. For example, we showed teachers how to use “sticky notes” with a word definition placed, in advance, on the appropriate page of the book to be read. Because teachers reported that they often used whole-group circle as a time for explicitly teaching literacy skills and that they rarely used small groups for instruction, we decided to focus much of our PD efforts on helping teachers improve their instruction during whole group instruction and to provide planned opportunities for children to practice targeted skills at other times (e.g., reinforcing word meanings during mealtime discussions).

**Study 2**

In addition to individualized coaching, teachers in this PD intervention received a Macintosh laptop computer that contained a case-based hypermedia resource of videotapes of effective instruction. This resource library (which looks like a website, although it is loaded on the laptop’s hard drive) is designed to provide a rationale for the use of specific evidence-based language and literacy instructional practices. It includes video clips of early childhood teachers implementing these practices with children in Head Start and public preschool classrooms. The hypermedia resource contains four different types of supports: (a) broad overviews that provide a rationale for instruction (e.g., why it is important to teach about compound words, how to introduce novel words during book reading), (b) video exemplars, (c) bulleted text highlighting salient components in each video (e.g., “notice how the teacher drew children’s attention to a target vocabulary word when reading the book”), and (d) articles from publications aimed at practitioners, such as *The Reading Teacher* and *Young Children* (both published by the National Association for the Education of Young Children), each of which provides further discussion of important instructional
practices. Our focus in Study 2 was twofold: (a) to understand how teachers use the hypermedia resource and (b) to identify technical problems that interfere with teachers’ use of the computer as well as features that make the resource accessible.

In our implementation of the predecessor intervention (CLEL), we found substantial variation across teachers in their use of a similar resource. According to computer log data, 4 of 33 (12%) teachers never used the resource, whereas 1 teacher used it extensively, viewing 75% of the 104 available video clips. As well, although coaches’ suggestions guided teachers to view some video examples, only about half (51%) of the video exemplars that teachers viewed were suggested by the coach. The other video exemplars that teachers viewed were ones that they found on their own (Powell, Diamond, & Koehler, 2010). Given this wide range among teachers in hypermedia resource use, we wished to understand whether there were ways to make this resource more accessible and useful to teachers and, thereby, to increase the likelihood that the teachers would be more fully engaged with the resource.

Participants in this training study included 10 teachers employed in community preschool and child care programs. All teachers had completed some college (five with an associate’s degree or higher). Teachers’ experience with young children ranged from less than 1 year to 32 years ($M = 10.3$). Of the 10 teachers, 4 had taken an online course and 6 reported that they used email or a web browser, but most had never used a computer’s word processing, spreadsheet, or presentation tools. All of the teachers reported knowing little or nothing about using a Macintosh laptop computer.

**Procedures**

At a first visit, project staff provided teachers with individual training on the basic functions of the Macintosh laptop and demonstrated how to use the hypermedia resource. Teachers practiced using the computer for 15 to 20 min, with individual support from a project staff member. Then we asked all teachers to spend 15 min navigating through the hypermedia website while they talked out loud about what they were thinking. We audiotaped their “thinking aloud” (Barnum, 2002) and also made note of technical challenges in teachers’ use of the computer. At the end of this training session, we asked teachers to choose a “homework assignment” that they would complete over the following 2 weeks. Each assignment provided the teacher with a link to a page focusing on either vocabulary knowledge or letter knowledge. We asked teachers to spend at least 20 min exploring their chosen topic.

A research staff member met individually with each teacher 2 weeks after the initial visit. We again asked teachers to spend about 15 min navigating through the hypermedia resource using the same “think aloud” procedure as had been used previously. Teachers then responded to a brief interview that included questions related to the ease or difficulty of using the laptop and the hypermedia resource, specific challenges and how they solved them, the usefulness of the videos and accompanying text, and suggestions for improvement.

**Measures**

*Hypermedia use.* Each computer was equipped with software that allowed us to obtain information about teachers’ use of the hypermedia resource, including the number of different
pages they visited and the amount of time spent on each page. We recorded a teacher as visiting a page if she spent at least 5 s on that page. The 5-s threshold enabled us to distinguish cursory or navigational visits (brief: < 5 s) from visits conducive to some information gathering (longer: ≥ 5 s). Data were collected on visits to (a) pages providing a general overview of literacy and language topics, (b) pages that used text to describe instructional practices included in a video, (c) video exemplars (with accompanying bulleted suggestions to watch for specific instruction), and (d) reference articles.

Technical features. Think-alouds at pre- and posttest were transcribed and coded to identify (a) specific challenges teachers confronted when navigating the hypermedia resource and (b) features that made navigation easier. Technical challenges and positive features identified by teachers in the posttest interview were also recorded. At the posttest, we also asked teachers what they “liked best.”

Results

Question 1. How did teachers use the hypermedia resource? On average, teachers spent about 41 min using the computer over a 2-week period, with six of eight teachers using the computer at least 20 min. Teachers viewed almost twice as many text pages ($M = 18.9$) as video exemplars ($M = 9.4$) or pages providing a general overview ($M = 8.1$). As well, teachers with an associate’s degree or more education explored more text pages, $t(8) = 2.45$, $p < .05$, and general overviews, $t(8) = 5.26$, $p < .05$, but not more video pages, $t(8) = 2.09$, $p = .10$, than did teachers with less education. However, once a teacher began to watch a video exemplar, she was likely to watch it for its total length ($M = 151$ s), spending substantially more time on each video page than on pages containing a general overview ($M = 34.5$ s, $p < .001$) of teaching practices or text only ($M = 48.6$ s, $p < .001$); some teachers reported, however, that they referred to the text as the video was playing. There were no differences associated with teachers’ education in the length of time spent on a web page. Overall, teachers visited only a few reference pages that provided published articles ($M = 3$).

Question 2. What technical problems interfered with teachers’ use of the computer, and what features made the resource more accessible? We used data from the pre- and posttest “think-alouds” and from the posttest interview to identify technical challenges and positive features of the hypermedia resource. At the time of the pretest, although most teachers expressed initial concerns that using a Macintosh laptop (iBook) computer would be difficult, they found that they had little difficulty with technical aspects of using the computer (e.g., turning it on and off, finding the hypermedia resource on the hard drive). As one teacher commented, “I expected it to be hard, but it wasn’t; it was easy.”

The most important challenge apparent on most pretest “think-alouds” was that of getting lost and being unable to figure out how to go back to a previous page. This is exemplified by one teacher’s comment: “Now where was I? I can’t find where I was.” Another teacher said that she felt “lost in cyberspace.” In the pretest “think-alouds,” these 10 teachers offered 19 different comments related to feeling lost as they navigated the hypermedia (researchers provided assistance if the teacher asked for help, but this occurred rarely). Analysis of the posttest “think-alouds” revealed six different comments about feeling lost,
and all teachers were eventually able to find the page they wanted without assistance. Of 10 teachers, 9 found the video clips to be the best part of the hypermedia resource; one teacher commented, “[M]y only frustration was that I did not have enough time to see everything.”

**Uses of Results**

Teachers’ suggestions, along with data collected during the “think-alouds” and teachers’ use of the laptop during a 2-week trial, led to several revisions in the hypermedia materials. The fact that teachers visited more *text* than *video* pages, combined with evidence that most teachers watched complete video clips, suggests that they used the descriptions on the *text* pages to determine whether or not the video would be of interest. As well, the finding of substantial variations in teachers’ attention to text suggests the importance of using multiple strategies (text, video) for presenting information about instructional practices to teachers. To make it easier for teachers to identify videos of interest, we modified *text* pages so that they included only brief text and bulleted points to describe instructional practices on the video exemplars. Also, we adopted a number of the teachers’ suggestions for modifying the hypermedia resource to make navigation easier (e.g., using strikingly different colors of text to identify links; including headings with the name of the case).

**Study 3**

This study was a formative evaluation of our approach to coaching at a distance. In this coaching approach, each teacher provides a videotape of her instruction of specific skills (about 20 min in length) and the coach provides feedback on a CD in which the coach’s comments are aligned with portions of the teacher’s videotape. The coach also embeds in the feedback links to specific video exemplars or other resources in the hypermedia resource. Teachers and coaches agree, in advance, on the focus of two consecutive videotapes (e.g., teaching novel words during book reading, blending simple words to make compound words). Because there is a lag time of about 10 days between a teacher’s taping and receipt of coach feedback, this asynchronous coaching model is somewhat different from a model in which immediate feedback is provided (as occurs in much classroom-based coaching; Powell & Diamond, 2011). In our predecessor intervention (CLEL; Powell, Diamond, Burchinal, & Koehler, 2010), we found that although on average teachers participated in the planned number of seven coaching contacts (i.e., submitting videotapes and receiving feedback), there was some variability ($M = 7.0, SD = 1.5$, range $= 2–9$), with 12% of teachers submitting fewer than six videotapes. Because the PD intervention we were developing focused on sustained, intense attention to teachers’ instruction of vocabulary and phonological awareness skills, it was important to determine whether teachers would participate in frequent, targeted coaching that entailed successive attention to the same instructional practice. Our goal in this small-scale study was to identify potential barriers to teachers’ compliance with the videotaping required by the intervention protocol. Of particular interest were two questions: (a) How would teachers respond to an intervention in which they were asked to repeat an instructional practice? and (b) Are there ways to organize feedback to make it more accessible to teachers?
**Participants and Procedures**

Participants were five female teachers employed by a publicly funded community child care program serving low-income, at-risk children. This program, and these teachers, had not participated in previous iterations of this literacy intervention. Teachers’ backgrounds ranged from some college courses to a bachelor’s degree, a range similar to that of teachers in Head Start programs. Teachers participated in a 2-hr workshop that provided a rationale for an intensive focus on teaching vocabulary and phonological awareness skills along with training in the use of the computer and video equipment. We asked teachers to submit eight videotapes (four targeting vocabulary and four targeting phonological awareness instruction) over a 10- to 12-week period. A literacy coach provided detailed feedback on each videotape, and each teacher was to provide a follow-up tape showing her implementing specific recommendations from the coach. For example, Tape 1 focused on teaching new words during book reading; Tape 3 focused on the same instructional goal, with the teacher implementing suggestions she had received in feedback from the coach. Similarly, if Tape 2 focused on teaching children to identify initial sounds, Tape 4 focused on the same goal. Three teachers submitted the expected number of eight videotapes; two teachers were unable to participate in the full trial because of an unanticipated move out of state (one teacher) and reassignment to a different classroom (one teacher). Each of these two teachers submitted one half (four) of the expected number of videotapes over a 6- to 8-week period.

Four of the five participating teachers submitted initial and follow-up videotapes as expected (i.e., three teachers submitted four follow-up tapes and one teacher submitted two follow-up tapes); one teacher (who left after 2 months) submitted one of two expected follow-up videotapes. Four teachers submitted follow-up videotapes that demonstrated careful attention to the coach’s feedback; the coach deemed the quality of teaching in each of the follow-up videotapes to be an improvement over the prior submission. These data suggested that teachers were able and generally willing to comply with a biweekly tape submission schedule that involved repeats of a teaching practice. Of most interest were teachers’ comments about ways to improve the coaching experience. Each of the five teachers was interviewed, individually, after the submission of four videotapes by a research assistant who was unfamiliar to the teachers. Three teachers were interviewed again at the end of eight tape submissions. These structured interviews included questions about (a) the coaching feedback, (b) teachers’ preferred approach to receiving feedback (e.g., use of a bulleted list versus narrative description; balance between positive comments and suggestions for improvement), (c) the number and length of video segments the coach chose for comment, (d) the organization of the feedback, including the use of embedded links to related video exemplars on the hypermedia tool, and (e) challenges with logistics and managing equipment. Each interview was audiotaped and transcribed. Teachers’ anonymous suggestions for improvement, along with comments about what was helpful, were analyzed within the categories described above.

**Results**

Overall, teachers had positive reactions to the experience and endorsed it as a valuable approach to PD (“getting feedback really helped me to grow as a teacher”), with one teacher noting the value of individualized coaching for more experienced teachers (“sometimes we get
too comfortable; we need to be challenged to improve”). Finding the time to review the coach’s lengthy feedback was a challenge, and teachers were unanimous in recommending that feedback be provided in short paragraphs or with bullet points. Several teachers noted that limiting the amount of text provided in the feedback was more critical than the number of video segments on which the coach provided a comment. Teachers also recommended limiting to two the number of embedded links to video exemplars provided in each coaching feedback. Teachers liked learning from the coach about what they were doing well before the coach offered suggestions for improvement (“[M]y coach was kind and positive and then made suggestions . . . this made it easier to absorb”). It was clear from teachers’ comments that a challenge for coaches would be limiting the length of feedback and the number of links to video exemplars while including both positive comments and suggestions for improvement.

Although we anticipated that teachers might not enjoy addressing the same instructional practice in more than one videotape, this did not present a problem. We were surprised to find that several teachers commented that they liked returning to the same practice, with one noting, “[I]t’s a great idea because it gives me a chance to improve.”

**Uses of Results**

It was clear from many comments that although teachers felt they learned from the coaching feedback, they had limited amounts of time to read the detailed feedback, and they preferred concise comments that “got to the point.” We learned, as well, that several teachers found videotaping challenging, not because it was difficult to use the equipment but rather because “I always needed to plan ahead.” Another teacher noted that she learned the importance of “keeping it much simpler” after taping a lesson in which “I was trying to do too much.” Both of these lessons highlight the challenges facing teachers who are adding a commitment to PD to an already busy schedule. As a result of this experience, we revised some materials to provide teachers with an explicit and prescriptive framework for targeting specific skills to be taught in a lesson that the coach would observe (e.g., selecting at least three words to teach using child-friendly definitions that extend to children’s experiences and encourage children’s discussion about the word). This framework is introduced, and the related instructional strategy is practiced, at the initial workshop. In addition, we modified the videotaping training to include attention on how to videotape oneself using a tripod, so that videotaping is not necessarily interrupted if an assistant is unavailable. Finally, we have worked closely with coaches to streamline their feedback without compromising details necessary to communicating both strengths and areas for instructional improvement.

**Study 4**

This pilot study of implementation of the complete intervention was designed to provide information about (a) appropriate scheduling of on-site and distance meetings or contacts with coaches, (b) the most effective schedule for providing coaching in relation to vocabulary and phonological awareness skills, and (c) logistics of on-site and distance (videotaped) coaching. Participants were 11 Head Start teachers from five different programs in urban, small-city, and rural communities. Six teachers participated in the fall semester 2008 and five teachers in the spring semester 2009.
Procedures

In each semester, teachers’ participation in the PD intervention included a 1-day workshop to introduce important information about evidence-based practices in vocabulary and phonological awareness instruction, including rationales for devoting instructional time to these skills. Training in the use of the iBook, hypermedia resources, and video equipment also was provided. Following the workshop, teachers received individualized coaching focused on strategies for teaching the meanings of novel words (six coaching contacts—four on-site and two via videotape feedback) and phonological awareness skills (six coaching contacts) over the course of a 16-week semester. (We use the phrase coaching contact to refer to either an on-site visit in which the coach observes a teacher’s instruction and then meets with the teacher to provide feedback or to submission of a videotape with subsequent coaching feedback.) Coaching occurred in four on-site visits to the teacher’s classroom (two focused on vocabulary and two focused on phonological awareness instruction) and eight at-a-distance contacts through the use of feedback on teachers’ videotape submissions. Teachers responded (anonymously) to a questionnaire at the end of the semester that asked them about their overall reaction to the intervention and suggestions for improvement.

Over the course of the semester, teachers were to provide a total of eight 20- to 25-min videotapes of their teaching, with each videotape focused on a prearranged goal (e.g., teaching new word meanings, teaching about sounds and letters). The teacher’s coach viewed the complete videotape and then selected two to three segments for feedback. Typically, coaches selected segments of the teacher’s submitted videotape that provided the opportunity to reinforce effective instruction and to offer guidance on enhanced or alternative approaches to teaching a specific skill. In addition, teachers had access to the complete hypermedia resource on the iBook. Although coaches linked their feedback to specific video exemplars (on average two to three) in the hypermedia resource, as described in Study 2, teachers also were able to use the hypermedia resource on their own.

Results

In both semesters, our focus was on the logistics of managing a PD intervention that gave equal attention to vocabulary and phonological awareness instruction and included 12 coaching contacts (8 of which involved asynchronous videotaped instruction and coaching feedback) in a 16-week semester. Our initial plan, implemented in the fall semester, was that we would give concurrent attention to vocabulary and phonological awareness instruction by alternating the focus of instruction across coaching contacts (e.g., vocabulary instruction during coaching Contacts 1, 3, 5, etc. and phonological awareness instruction during Contacts 2, 4, 6, etc.). The advantage to this design was that, if tapes arrived on time and coaching visits occurred as planned, teachers would have received feedback from their coach before repeating an instructional skill (i.e., there was an opportunity for follow-up practice after receiving feedback). This design also allowed for semester-long attention to both vocabulary and phonological awareness instruction. We learned in Semester 1, from both coaches and teachers, that this approach was not practical for several reasons: (a) classroom events such as picture day meant that many teachers did not follow the schedule of
taping every 8 days and (b) some teachers found it difficult to move between a focus on vocabulary and phonological awareness instruction topics in videotape submissions. We learned, as well, that teachers were reluctant to tape on days when children’s challenging behaviors disrupted the classroom routine; in some classrooms, this reportedly was a frequent occurrence.

In response to fall semester 2008 teachers’ and coaches’ suggestions for simplifying the coaching schedule, the spring semester 2009 implementation trial included attention to vocabulary instruction in the first 6 coaching contacts (4 videotaped) with phonological awareness instruction occurring in coach Visits 7 through 12, replacing the original plan in which teachers alternated between vocabulary and phonological awareness instruction, receiving feedback on a taped instructional practice before implementing a follow-up. To increase the likelihood that this new approach would be successful, there was greater prescription and repetition in the content of planned coaching contacts (e.g., the first three coaching contacts included one classroom visit and two videotapes focused on teaching the same skill or concept). In addition, we developed checklists of key instructional strategies (e.g., “select a single, developmentally appropriate sound skill for instruction; plan the words you will teach, including child-friendly definitions”) that provided a clearer framework for planning and implementing instruction. Finally, we provided teachers with supplemental materials for skills teachers consistently found challenging to teach (e.g., we provided each teacher with a set of compound word cards that provided examples of, and a way to teach, how to combine simple words to make a compound word).

Uses of Results

We implemented the revised approach to coaching with five teachers in the spring semester. Both the teachers and the coach found it easier to plan for instruction and coaching contacts when there was a sustained focus on only one instructional approach. The coach reported that the strategies checklists were helpful in guiding feedback and reducing the length of comments. Feedback from both teachers and coach suggested that these revisions made the intervention seem more “doable” and a better fit with teachers’ classrooms.

Study 5

Because teachers responded favorably to the revised format of the PD program in spring semester 2009, we implemented a pilot outcome study of the intervention in the fall semester of 2009. Participants included 34 Head Start teachers randomly assigned to either intervention (n = 18) or control (n = 16) groups. Teachers were from the same five Head Start programs as had participated in Study 4. This pilot study had two primary aims: (a) to determine the level of teacher compliance with each of the PD components (coaching visits, tape submissions, and hypermedia use over the course of a semester-long implementation) and (b) to examine preliminary evidence on whether the intervention (identical to that used with the spring cohort of teachers in Study 4) improved teachers’ instruction.
Measures

Teachers’ participation. We recorded the number of on-site coaching visits and number of videotape submissions, the interval between coaching sessions, and whether or not teachers viewed the coach’s feedback (provided on a CD). Web log data provided information about teachers’ independent use of the hypermedia resource.

Coaching. We recorded the length of coaches’ on-site coaching visits (observation + teacher consultation) along with the number of video segments on which they provided comments. As well, we recorded the length of time to provide feedback following receipt of teachers’ videotapes along with coaches’ use of embedded links to the hypermedia resource. We also gathered suggestions from coaches, informally and with a formal interview at the end of the semester, about ways to improve delivery of the intervention.

Teachers’ instruction. We observed instruction during teachers’ complete large group circle time at the beginning and end of the fall semester in both intervention and control classrooms. This included observing routine activities such as calendar time and classroom helpers as well as book reading. We recorded the frequency with which teachers used specific teaching practices related to vocabulary (e.g., providing definitions of new words, extending definitions to other familiar contexts) and phonological awareness instruction (e.g., phonological awareness skills such as blending and eliding compound words). We achieved 85% interobserver agreement on frequency counts of specific instructional practices prior to collecting data for this study. In addition, we audiotaped teachers as they read a book to the children in their class and later transcribed these tapes using Systematic Analysis of Language Transcripts (Heilmann, Miller, & Nockerts, 2010). Book text read by the teacher was recorded but not coded.

Results

All but one of the 18 teachers participated in each of the 12 coaching sessions; there was an average of 8.6 calendar days between coaching contacts. When we examined the interval between coaching sessions more closely, we found a significantly shorter time lag from a teacher’s submission of a videotape prior to a planned on-site consultation ($M = 4.6$ days, $SD = 2.29$) than from the on-site consultation to a tape submission ($M = 10.97$ days, $SD = 3.32$), $\kappa(16) = 5.37$, $p < .001$, $d = 1.22$, suggesting perhaps that a scheduled visit to the classroom from the coach prompted teachers to submit a scheduled videotape. Although the teacher and coach scheduled visits and tape submissions when they met at the beginning of the semester (at the workshop), teachers did not always follow the schedule, and there was substantial variability in time (3 to 28 days) between coaching contacts (either tape submission or classroom coaching). The range in days between coaching contacts, although perhaps not ideal, likely reflected busy classroom schedules. Teachers told us, for example, that it was difficult to videotape when children were excited about a classroom visitor or when the Head Start center was planning for an accreditation visit. These results and teachers’ feedback at the end of the intervention reminded us of feedback from teachers in Study 3 about how important it was for them to plan ahead for videotaping. Although
the teachers in the present study complied with the expectation that they would participate in 12 coaching contacts, the time between videotape contacts varied substantially as a function of variability in teachers’ tape submissions. The consequences of such variability for improving teachers’ instruction are unknown.

Each of the 18 teachers independently used the case-based hypermedia resource and 16 teachers (89%) visited one or more content pages. There was substantial variability across all teachers in the number of text and video exemplar pages that they visited ($M = 38$, range = 0–162). Although this level of variability is consistent with teachers’ use of a hypermedia resource in our earlier PD intervention (Powell, Diamond, Burchinal, & Koehler, 2010) and with web use more generally (e.g., Jansen & Pooch, 2001), we did not meet the original goal of increasing all teachers’ use of these materials.

Teachers and coaches complied with the expectations for coaching contacts. Coaches made four 2-hr coaching visits to each teacher, with an average of 31 min of that time devoted to consultation. Teachers submitted the expected number of eight tapes; coaches selected and provided feedback on an average of 2.78 segments ($SD = 0.76$) of the teacher-submitted videotapes. There were no significant differences between two coaches in the average number of segments included in feedback to teachers. Coach feedback on teacher-submitted videotapes was sent to teachers within an average of 5 calendar days ($SD = 3.2$) from the date of the coach’s receipt of the videotape. Most teachers (72%) reported reviewing coach feedback on all or nearly all (seven to eight) submitted videotapes. Implementation of the current intervention included the intended use by coaches of embedded links to video exemplars in their feedback to teachers.

In our analyses of the effects of the intervention on teachers’ instruction, we found that intervention teachers provided more vocabulary instruction, including defining and reviewing more novel words ($M = 7.12$ words defined) than control teachers ($M = 3.7$ words, $d = 0.69$) at the end of the semester (Powell, Diamond, & Burchinal, 2011). There were more child utterances ($M = 163$ intervention vs. 119 control), teacher utterances ($M = 185$ vs. 137), and teacher questions ($M = 66$ vs. 54) during large group sessions in intervention classrooms compared to control classrooms at the end of the semester ($ds = 0.55$ to 0.73).

**General Discussion**

Developing effective interventions that improve outcomes for young at-risk children is both critical and difficult. The studies reported in this article represent an iterative process in developing and refining a PD intervention designed to promote early childhood teachers’ use of effective evidence-based instruction of vocabulary and phonological awareness skills in classrooms for young children who are at risk for poor school outcomes. Our approach reflects emerging understandings in the field about the importance of using a successive set of small-scale studies to develop and refine a promising intervention (Flay et al., 2005; Gallimore & Santagata, 2006; Olds et al., 2007). The approach that we adopted, in which teachers participated in the development and refinement of intervention components, reflects our understanding that, to be effective, an intervention implemented by teachers (either a new curriculum or new teaching approaches) must be perceived as doable (Dickinson et al., 2008; Fuchs & Fuchs, 2001).
Our collaborative work with teachers in the development of this PD intervention has highlighted the challenges inherent in the process of implementing PD work with teachers. As Chien and her colleagues noted recently, “as pressures from federal and state mandates increase, and school districts increase demands for school-ready children, [prekindergarten] teachers are asked to do increasingly more” (Chien et al., 2010, p. 1547). The teachers who participated in these pilot studies often reminded us that we were asking them to do “one more thing” (i.e., they did not receive release time from their program or agency to participate). Adhering to the multiple components of a PD intervention was, not unsurprisingly, challenging for these teachers. This was reflected in the variability with which teachers provided videotapes of their own teaching (Studies 4 and 5) and in teachers’ requests to reduce the amount of coach feedback (Study 3). PD requires balancing teachers’ time commitment to improving their teaching skills while continuing with their other classroom responsibilities. Our teacher collaborators helped us to appreciate these challenges.

A major decision we made in the process of developing this intervention was to clearly focus the intervention content on a few critical instructional practices that support children’s early literacy development yet occur infrequently in early childhood classrooms. Our original plan was one in which teachers taught a lesson targeting early literacy skills (e.g., teaching novel words during book reading), received feedback and suggestions for improving their instruction, and then practiced and received feedback on this same instructional approach at least one more time. The teachers who collaborated with us in refining this intervention helped us understand that this sequential approach was not very doable, at least in part because they could not commit to a firm schedule of coaching contacts every 8 days. When a coach received a teacher’s videotape only 4 days before a coaching visit to the classroom, it was unrealistic to expect the teacher to have received, understood, and implemented the coach’s recommendations in time for the next classroom meeting. Teachers helped us to understand that one way to address this issue was to provide specific guidelines for their instruction (e.g., to identify three novel words that they would teach as they read *The Kissing Hand* [Penn, Harper, & Leak, 2006], along with child-friendly definitions and extensions to children’s experiences). This is the strategy we adopted.

Technology is becoming increasingly important in PD. Interventions have used technology to model effective teaching through the use of video exemplars (Pianta et al., 2008; Powell, Diamond, & Koehler, 2010), to provide feedback to teachers through web conferencing (Amendum et al., in press), electronic mail (Hemmeter et al., 2011), web cams in classrooms (Pianta et al., 2008), and software that links a coach’s feedback with videotaped segments of teachers’ instruction (Powell, Diamond, & Koehler, 2010), and to assist teachers with progress monitoring by providing immediate feedback through the use of a PDA (Landry et al., 2009). Two of the pilot studies that we describe in this article were designed to help us facilitate teachers’ use of a laptop for viewing video exemplars (Study 2) and feedback from coaches (Study 3). Although technologically mediated approaches appear particularly appropriate for many of the rural communities in which our sample’s teachers and programs are located, the technological components replace more traditional ways to provide teachers with models of good practice and feedback on their own teaching. The components that we think of as critical to the effectiveness of this intervention (a focus on only a few evidence-based teaching practices with regular feedback from coaches, including models of effective instruction) can be provided by using technology as well as
through more traditional face-to-face coaching. In an earlier study, we found that both approaches were effective in promoting teachers’ use of more effective instruction (Powell, Diamond, Burchinal, & Koehler, 2010).

About two thirds of the teachers with whom we worked in these pilot studies had a 4-year college degree or held a state teacher license, and this proportion is higher than the national average for Head Start (National Institute for Early Education Research, 2003). We suggest, however, that the iterative approach we have described is a useful one that can be generalized to the development of many different educational interventions (see Flay et al., 2005). We note, as well, that Landry and her colleagues found no consistent effects of teachers’ education levels on participation in a literacy-focused PD intervention (Landry et al., 2009). The recent and growing research literature on effective strategies for promoting early literacy and language skills may be of keen interest to a range of teachers of at-risk children, regardless of teachers’ educational backgrounds. Teacher engagement of supportive PD interventions may be driven in part by the considerable policy interest in improving at-risk children’s school readiness, as noted earlier, and the promise of recent research on instructional practices for bolstering children’s literacy and language skills.

Our experiences in conducting a series of small-scale studies in which we “tried out” different elements of a PD intervention reinforce the argument that time invested in the iterative process of testing, systematically securing feedback, and then revising educational interventions is time well spent, especially when it leads to revisions in the intervention that make it more likely to be implemented with fidelity (Gallimore & Santagata, 2006; Olds et al., 2007). Our experiences also support the perspective that collaborating with teachers in intervention development is a critical step for ensuring that an intervention is both teacher and classroom friendly (Fuchs & Fuchs, 2001). Clearly, the sequential set of related studies we carried out represents a first step in a larger process of testing the effectiveness of an intervention designed to improve teachers’ instruction and children’s learning. An iterative approach to developing and refining an educational program, however, is a valuable way to learn about what intervention strategies are likely to work in the real world and which parts of the intervention, almost certainly, will not.

References


