Science, Language, and Imagination in the Professional Development of Reading Teachers

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One of the most widely accepted facts of modern reading psychology is that reading and writing difficulties are associated with inefficient, inaccurate, or underdeveloped language processing (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). Specific language processes, such as speed of letter naming, accuracy of letter–sound associations, and fluency in decoding unknown words, account for individual differences in passage reading accuracy and fluency at the end of first grade and beyond. In addition, children living in poverty and children who come to school without English language proficiency experience a gap in vocabulary and background knowledge that undermines academic achievement. On school entry, economically and educationally disadvantaged children may know half as much vocabulary as children from middle-class circumstances . If these disadvantaged children are also slow to acquire basic reading skills, they will fall further behind the norm in both oral and written language proficiency. By the middle and upper grades, a very large group of “garden-variety” poor readers are typically overwhelmed by the language of academic texts and the demands of academic, expository writing.

Fortunately, children who begin schooling at a disadvantage in letter, sound, word, and concept knowledge can be taught to read and write well if their teachers consistently implement a linguistically informed, structured, comprehensive, and content-rich curriculum. This is much easier said than done, however, because it means that teachers must be knowledgeable and

skilled in some very specific areas, must use validated tools for assessment and instruction, and must work in supportive contexts that help them sustain intensive effort year after year.

How do we prepare and develop linguistically informed, effective teachers who can deliver research-based programs and practices? Our 4-year study of reading instruction in high-poverty schools, led by Barbara R. Foorman and funded by the NICHD, yielded multiple sources of data regarding effective professional development of classroom teachers and reading specialists. Data were obtained through direct classroom observations of teacher effectiveness, sampling of instructional time allocation, and measures of the relationship between these factors and student achievement (Foorman & Schatschneider, 2003). We also obtained anonymous, tape-recorded interviews with teachers (Foorman & Moats, in press); teacher surveys and questionnaires (see Chapter 13); surveys directed at the nature and level of teachers' knowledge of language and of reading instruction (Moats & Foorman, 2003); teachers' evaluations of courses and workshops; and anecdotal reports of the ambient conditions in our schools. Nine schools participated in Washington, D.C. and eight participated in Houston, and all were chronically low performing with high-poverty populations. In both settings, the project enabled children to achieve at or above the national average in grades K–4.

Teachers indicated in their interviews that the combination of professional development and comprehensive reading program adoption was the key to their improvement and success with students. Teachers welcomed the combination of program-specific training; information about scientific studies of reading development and reading difficulty; and information about the language structures they were teaching—phonemes, spelling, word structures, sentences, language history, discourse and genre structure, and cultural-linguistic differences among children. The application of knowledge to instructional decision making and actual practice was facilitated through coaching, mentoring, team meetings, and the creation of a supportive context

in which teacher growth and student achievement were celebrated. The context, content, and processes of professional development were all critical to building and maintaining teaching teams that could implement the practices supported by reading research. This chapter discusses in detail what we taught, how we taught it, and what we learned about teaching teachers.

THE CONTEXT OF PROFESSIONAL DEVELOPMENT

Consistent Policy

Classroom teachers work in school, district, and state contexts. Policies and practices at these levels often contradict one another and may have little continuity from year to year as administrative leadership changes. One of the most common complaints of our teachers in D.C. concerned the everchanging mandates that prevented them from refining and sustaining application of practices that were effective. During the study's first year, administrators; classroom teachers from all nine participating D.C. schools; specialists; teaching assistants; and tutors all attended the same professional development workshops and courses. The common goals, vocabulary, and understandings we established across individuals with various roles allowed administrators to guide teachers with consistency and to support them in using their instructional materials. The essentials of research-based instruction—including oral language production, phoneme awareness, explicit and systematic phonics, reading fluency, vocabulary, comprehension, and writing—were defined and demonstrated for everyone, regardless of the instructional program in use.

In Houston, the context differed considerably. In Texas, as in California, the state had aligned academic achievement standards, curricular frameworks, textbooks, instructional programs, and assessments with one another; this had occurred before our study began. Teachers at the Houston site of the Early Interventions Project were thus aware of and motivated by

systemic accountability. Messages about components of instruction, instructional goals, and evaluation processes were consistent across schools and from year to year. In D.C., however, no such alignment of critical systemic components existed, and teachers often felt as if district-level mandates and project-level requirements were in conflict. For example, our emphasis on teaching phonological skills in kindergarten and first grade was unique within the D.C. school system to our nine schools, as was our use of a validated screening instrument. The project staff and consultants in D.C. delivered all professional development; no district-sponsored workshops, courses, or directives existed to support our activities. At the conclusion of the project, the program that was associated with the most positive results in D.C. was jettisoned by the school district in favor of one with less robust results, probably because the tenets and practices of the one we had used remained foreign to the dominant practices in the school district.

Time

Adequate time must be allowed for professional development that is substantive and that challenges teachers to learn and apply new teaching behaviors. Teaching children how to read and write is a complex activity that is learned with knowledge, coaching, and experience (American Federation of Teachers, 1999; Learning First Alliance, 2000). One of the most often-cited reasons why the D.C. teachers rated the project's professional development highly was its time frame. Many teachers in their recorded interviews commented that they needed 2 years for "everything to fall into place," and they welcomed the rare opportunity to study topics in depth. The three-credit courses on phonology, writing, phonics, vocabulary, and comprehension each lasted for at least a half-year and sometimes lasted longer. In addition, the teachers rated these courses highly because participants could collaborate on lessons, share insights, and demonstrate practices for and with colleagues. Teachers commented frequently that they enjoyed learning

from their peers whose practical and collective wisdom they trusted. Although the courses were perceived to be challenging in ways the teachers were unaccustomed to, course enrollments were filled and attendance at workshops was high. Thus, a state-level requirement, such as California's, for teachers to attend 40 hours of summer training and 80–100 additional hours per year in team meetings, independent study, team collaboration, and coursework would be reasonable, given the reports and behavior of our teachers.

Data-Based Decision Making

A focus on the interpretation of student assessments to inform instruction was more prevalent on the Houston side of the project because of statewide use of the Texas Primary Reading Inventory (TPRI; Texas Education Agency, 1996). Although in D.C. we trained teachers in the use of the TPRI, teachers did not use the screening data to differentiate instruction. Teachers dutifully gave the test to their students but without principal, coach, or team facilitation and a requirement to generate a data-based instructional plan, teachers did not organize instructional groups or select instructional targets on the basis of the TPRI results.

Leadership at the District and School Levels

The substantial school effects in our study were related to the leadership and commitment of district and building administrators. The principals whose schools outperformed the others visited classrooms regularly, reminded teachers of the value of specific instructional practices, promoted literacy throughout the school, read with children, supported family literacy programs and outside reading programs, created a businesslike atmosphere in the school, and expected improvement at all levels. Several greeted every child entering the school building every day.

THE CONTENT AND PROCESS OF PROFESSIONAL DEVELOPMENT IN READING AND WRITING

Early identification of reading problems, preventive intervention, and progress monitoring are now widely encouraged on the basis of research reported in this volume. For new policies to be successful, however, teachers must be well informed about reading development, reading difficulties, and research-based instruction. More specifically, they must be able to judge the meaning of students' screening test results, choose which skills to emphasize and how to teach them to specific children, interpret student written and oral responses, and allocate instructional time in proportion to student need. Intentional teaching of reading, spelling, and writing requires knowledge of oral and written language structure, developmental sequences in oral and written language learning, and the ways in which speech and print can be problematic for children (Ehri, 1995). Without such knowledge, teachers cannot take responsibility for what their students learn. As one of the D.C. teachers commented, "I could read the manual and go through the lessons, but I couldn't *teach* until I understood for myself what I was teaching." On the knowledge surveys we gave to teachers, we discovered surprising misconceptions and gaps in the awareness of many teachers about language and reading instruction. We subsequently addressed these in professional development and discuss these in the subsections that follow.

Phoneme Awareness and Phonological Processing

One of the most important jobs for the teacher of beginning reading or the teacher of students with reading problems is to foster awareness of phonemes (speech sounds) in words and to help children acquire the ability to articulate, compare, segment, and blend those phonemes (Ehri et al., 2001). Knowing word meanings and differentiating confusable words depend on accurate perception of the phonological structure of the words. Children must be aware of subtle contrasts

in similar-sounding spoken words, such as “shark” and “shock”; “fill,” “fell,” and “fail”; “fresh” and “flesh”; and “irrelevant” and “irreverent,” in order to learn their meanings. Thus, teachers must recognize when and how to direct children’s attention to contrasts in speech-sound sequences. More importantly, word recognition and spelling depend on rapid and accurate association of phonemes with graphemes (written letters and letter groups that represent phonemes) in the service of reading and writing whole words. These associations should be taught explicitly, cumulatively, and systematically for best results (National Reading Panel, 2000), but the foundation for instruction is phoneme identity and differentiation.

Phoneme awareness instruction involves more than delivery of a set of playful activities in kindergarten. Students scoring below benchmark levels in reading and/or spelling may acquire phoneme awareness over a number of years and may need continuing clarification during instruction, even as reading skill progresses. Phoneme awareness can be taught with a variety of tasks that precede or complement letter manipulation, including phoneme counting (e.g., “How many sounds are in *sheep*?”), phoneme identification (e.g., “What is the last sound in *cab*?”), phoneme segmentation (e.g., “Let’s say the sounds in *shoe:* /sh/ /u/”), and phoneme deletion (e.g., “Say *steak* without the /t/”)

The teacher who knows phonemes and their distinction from letters and letter names can demonstrate this knowledge in the context of daily classroom interactions. The effective teacher will refer to the /f/ sound, not the “ef” sound; she contrasts it with the voiced consonant /v/, which is articulated similarly. She asks for the last *sound* in the words *half* and *have*, not the last letter, when those words are exchanged in a student’s spelling. She says, “How do we spell /v/ at the ends of words? That’s right, with *-ve*!” This level of expertise was uncommon in our classrooms until we worked with teachers on the underlying concepts that enable such behavior.

Our surveys and experiences (Moats, 1994; Moats & Foorman, 2003), as well as the research of others (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Mather, Bos, & Babur, 2001; McCutchen, Abbott, et al., 2002; McCutchen, Harry, et al., 2002), have indicated that specific concepts of word structure and speech-sound differentiation are problematic for teachers. We targeted these topics in our professional development. For example, teachers often believed that the consonant clusters in complex syllables were "one sound." Thus, about half of the teachers undercounted the number of phonemes in the word *shrimp.* With word items involving digraph and vowel team spellings, such as *sing*, *sawed*, and *boy,* more than a third of the teachers overcounted the number of phonemes, revealing a tendency to count letters rather than speech sounds. Phoneme matching was a problem when the letter or letters used to represent a sound were different than the letter or letters that most often represent that sound. For example, about half of the teachers surveyed believed that the last sound in *nose* was /s/, not /z/, and half could not identify that /t/ ends the spoken word "walked." The concept that single phonemes, including /ng/ and /ch/, are represented in orthography with letter teams was either unknown or only partially known by a very large group of experienced teachers. These confusions influenced instruction, for it was not uncommon for teachers to be seen teaching children that each letter represented a separate sound in words such as *house* or *them* even if the teacher's manual contained directions for sound production and sound blending.

Many of our teachers in D.C. cited their learning of speech sounds as a pivotal experience in professional development. We began with a tour of the consonant and vowel inventories (i.e., the speech-sound system) and careful differentiation of the 44 phonemes of English from the 26 letters in the alphabet. We practiced production, segmentation, blending, and manipulation of consonant and vowel sounds apart from and in relation to the letters that represent them. During this exploration, we discussed dialectal and regional differences in

pronunciation and the nature of phoneme awareness and its role in reading acquisition. Learning the phoneme inventory and practicing phoneme manipulation helped the teachers appreciate the challenges of phoneme awareness for children. Moreover, the experience itself impressed on teachers the nature and role of the alphabetic principle in learning to read. No teacher challenged the importance of this insight once it was apparent, and many teachers expressed dismay that they had been directed away from explicit sound-based instruction by district policy of the previous decade.

Knowledge of Orthography

Users of English orthography spell by both sound and meaning. To read the alphabetic orthography proficiently, learners must first appreciate that letters and letter groups, such as *oa, eau, igh,* and *eigh,* are the relational units that represent phonemes (Venezky, 2001). Next, to read multisyllabic words fluently, learners must recognize the syllable spelling conventions and junctures of printed syllables that permit visual "chunking" of long letter sequences and assignment of a vowel sound to specific letter patterns. To spell accurately, children must learn specific orthographic patterns, principles, and rules and typically do so in a more or less predictable sequence (Bear & Templeton, 1998).

Many teachers we surveyed had partial or unelaborated knowledge of phonic correspondences and syllabication, and many had not had exposure to even a traditional approach to teaching phonics or spelling. When information about orthography is found in modern reading textbooks, it is often presented in unappealing, unsystematic, and unteachable lists of rules about letter sequence constraints. Consequently, lacking awareness of either the orthographic system or its specifics, teachers may try to teach phonics with incomplete information, disconnected lists of formidable rules, and superficial strategies that mislead, such

as “Find the little word in the big word” or “When two vowels go walking, the first one does the talking.”

Our surveys of teachers again suggested knowledge gaps that should be addressed directly in professional development. A large percentage did not know the concept that letter groups such as *-dge* in *edge* were correspondence units, used conventionally for sounds in specific contexts (*-dge* spells the sound /j/ after accented short vowels). About one of three teachers did not identify which of the following high-frequency words had a regular spelling: *when, does, were,* or *said*. (*When* is perfectly predictable by sound–spelling correspondences.) Teachers were weakest in knowledge of syllable spelling conventions. Fifty-five percent could recognize a closed syllable such as *up* from four choices. Fifty-one percent knew that the double *d* in *puddle* resulted from the joining of a closed syllable (*pud*) with a consonant-*le* syllable (*dle*). The links between inflections *-ed* and *-s* and their various pronunciations were not well known; about half could match the sounds of the inflections on *dogs* and *coached* to the same last sound on another word. In the case of *dogs,* teachers tended to choose a matching word that ended with the letter *s* even though the *s* in that word represented the voiceless /s/ instead of the voiced /z/ at the end of *dogs.* In the case of *coached,* whose final sound is /t/, teachers matched it incorrectly with *screamed* (/d/) and *filled* (/d/).

Teachers appreciated acquiring insights that helped them explain words to their students. Activities such as marking graphemes in familiar words and building words with grapheme tiles instead of tiles for single letters (e.g., building *shouting* with *sh ou t i ng*) were productive because they fostered awareness of the relational units in the sound–symbol correspondence system. Syllable sorting and classification were revelations, especially to the second- and third-grade teachers. For example, the word *happy* has four phonemes; the double *p* results from the combination of a closed syllable with the vowel *y,* needed to mark the first vowel as short. With

the knowledge of this principle, teachers understood that the two *p* letters do not represent two separate speech sounds but rather an orthographic convention of syllable juncture.

Morphology and Etymology

English orthography represents both sound structures (phonemes and syllables) and meaning structures (inflections and Anglo-Saxon base words in compounds; Latin-based derivational suffixes, prefixes, and roots in lower frequency nouns, verbs, adjectives and adverbs; and Greek-based combining forms in scientific and mathematical vocabulary). Spelling is often related to the word's language of origin (e.g., *antique, rouge, mosquito, piano*). Beyond basic phonics, the study of meaningful parts of words and where they came from assists vocabulary development, word recognition, and spelling. An expert teacher of orthography is one who can explain the spelling of almost any word with reference to its phonemes, syllables, morphemes, orthographic patterns, language of origin, usage, and meaning (King, 2000; Moats, 2000, 2003a). For example, silent letter patterns such as *kn-, wr-, -ough, -ould,* and *-igh* are remnants of Anglo-Saxon, in which those "silent" letters were sounded. The word *tube* is Anglo-Saxon, but the word *television* has three Latin-based morphemes that recur in other words and that have stable pronunciations, meanings, and spellings: *tele, vis,* and *ion.* The richness of expression in English is a consequence of its linguistic history: From our Anglo-Saxon heritage, we *walk*; from Latin, we *ambulate*. From Anglo-Saxon, we *live*; from Latin, we are *animate.* Anglo-Saxon gave us *mothers* and *fathers;* Latin gave us *maternal* and *paternal figures.* (See Henry, 2003, for more about the origins of the English language and how that information can be applied to explicit instruction in decoding, spelling, and morphology.)

Where does language instruction for the teachers begin and of what use is such knowledge? The goal of professional development is to enable teachers to explain language

concepts accurately and completely. Teachers who are knowledgeable can exploit a teachable moment, for example, to link words such as *native*, *national*, *nativity*, and *nation.* If a teacher has never studied Latin or the history of the English language, however, morphology is foreign territory and the topic should be approached through its foundations. The distinction between free and bound morphemes (e.g., *fur* versus *-fer*) and the distinction between inflections (*-ing, -ed, -s*) and derivational suffixes (*-al, -ment, -ful, -ity*) are important basic concepts. The insight that the spelling system of English preserves or represents morphology, often in the presence of sound pattern alternations such as *sign, signature; inspire, inspiration; legal, legislate; preside, president;* and *medicine, medical* (Moats & Smith 1992), helps teachers call students' attention to word structure beyond phonics.

Derivational suffixes mark the part of speech of the root or word to which they are added, and simply marking whether a suffix creates a noun, verb, adjective, or adverb is instructive for teachers. Exploration of suffixes that cause changes of pronunciation in the base words to which they are added, such as *divide, division; repeat, repetitive; peculiar, peculiarity;* and *medicine, medical,* helps teachers appreciate why word families should be taught together, why words must be pronounced when they are being learned, and why the meaningful parts are useful to discuss. Rather than memorizing lists of prefixes, suffixes, and roots, teachers enjoy selecting one productive Latin root and locating many examples of words derived from that root. They can then organize a map of those morphological relationships (see Henry, 2003, and Moats, 2000, 2003b). Realizing that multisyllabic words can be divided by either syllable division rules or by morphology is helpful for teachers who want to know the "right" way to divide a word. The answer, of course, depends on which kind of language organization is of interest: One can divide the word *instruction* morphologically (*in-struct-ion*), or syllabically (*in-struc-tion*).

Morphology and language history provide a narrative context for the study of words. Because teachers cannot teach children every word they need to know, the instructional goal must also include cultivation of linguistic awareness, or word consciousness. Teacher preparation itself should excite teachers about linguistic discoveries so that the same enthusiasm and interest is communicated to the children. This assertion leads to the next topic: What is the role of imagination and creativity in scientifically-based reading instruction?

Vocabulary and Comprehension

No less important for teachers is the ability to teach word and text meaning. Novice teachers need to know that much more is involved in teaching vocabulary than matching dictionary definitions to words or giving students definitions to memorize. Likewise, there is more to teaching comprehension than asking students questions about what they read. Effective teaching pursues meaning making at both literal and inferential levels, using a variety of techniques and strategies that fit the text, the situation, and the children.

Vocabulary and comprehension are domains of instruction that defy formulaic approaches. Formulaic approaches can keep children busy but often divert them from making sense of what they read. Formulaic approaches include such activities as posting new vocabulary on the board and matching definitions to the words; ordering children to make “mind maps” regardless of whether the graphic organizer fits the structure of the content; or always taking a compulsory “picture walk” through a text to predict its outcomes, instead of sometimes using other kinds of introductions. Although such practices have their place, the key to reading comprehension instruction is intentional, creative use of questions and strategies to get the children to identify and articulate the meanings that the author intended (Beck, McKeown, Hamilton, & Kucan, 1997). Before instituting professional development based on Beck and

colleagues' approach, we found that many teachers had lost sight of the purpose of their instruction. For example, they were teaching vocabulary without ever using the vocabulary in context, teaching strategies instead of focusing on the use of the strategies to garner meaning from the text, or rereading stories over and over without deepening the purpose of the rereading. We witnessed many cases of teachers embarking on text instruction without having read the text themselves. In an extreme and memorable case, one teacher remarked in a workshop, "You mean we're supposed to understand what we teach before we teach it?"

Such habits could be changed. We found that change of approach occurred after teachers explored the nature of elementary students' miscomprehensions and the difference between queries (questions designed to deepen understanding) and closed questions that usually elicited brief, unelaborated, thoughtless responses from children. For example a query might ask, "Why do you think the author is giving us this information about this character?" whereas a closed question might ask, "Who was she talking to?" An enjoyable exercise for teachers involved planning the instruction of a text together. They read the text aloud in a small group, summarized the critical meanings that they wanted students to understand, and then identified places in the text at which they intended to pose queries. Each group discussed and formulated those queries. Then, teachers shared their plans with the other groups of teachers. Lively discussions, such as those that we wanted to see in the classrooms, ensued among teachers as they sought agreement about the intentional use of a given text. Even though the teachers' manuals directed them to use specific questions and strategies, teachers did not implement these effectively until they were engaged with the material and took responsibility for what the children were learning.

Specific teaching behaviors were also practiced in the teacher classes. For example, teachers practiced using new words in spoken sentences as a text was previewed and using graphic organizers to demonstrate logical relationships in expository text. Consequently,

teachers who understood the principle of teaching word meanings through multiple examples dramatically changed their verbal behavior. One reported that she learned that she should talk before writing things down for students. Another spent about 20 minutes explicating the meaning of one word through contextual examples. Another reported that for the first time, her students retained and used words from one lesson to the next.

In the text discussions, we drew teachers' attention to the metaphorical, idiomatic, and colloquial expressions that could interfere with reading comprehension. Language is by nature metaphorical, and metaphorical language is even more common in literary text than it is in everyday speech. We do not *keep time* in a physical sense, nor do we *run out of luck*. Awareness of the ubiquitous nature of metaphorical and idiomatic language was cultivated as we shared examples of children's misinterpretations and learned to anticipate them. We identified the need of English language learners for contextualizing idiomatic phrases. We discussed and modeled other comprehension skills and strategies, but no exercises had more power to focus and motivate teachers than the ones in which careful reading and questioning was modeled and practiced.

Written Expression

Progress in writing for students in D.C. and Houston was far more limited than progress in reading. A very small percentage of instructional time was spent teaching writing across classrooms, and the quality of instruction was observed to be poor. Teachers, in turn, often struggled with written expression on class assignments and expressed insecurity about their own command of written language. On the knowledge survey, 44% of the teachers chose to define a kernel or "bare-bones" sentence as a clause or a group of words with a capitalized first word and a period, rather than a subject and a predicate. Systematic teaching of children, nonetheless,

requires teachers to explicate sentence, paragraph, and genre structure, as well as standard English grammar and usage—areas in which the teachers themselves were weak. To compound the issue, teachers' instructional materials for writing and grammar were far less structured, comprehensive, and integrated than their reading programs.

In our course on writing instruction, teachers were least prepared in the structured teaching of sentence and paragraph composition and were seldom organized to lead children through the stages of the writing process. Course time was devoted to setting up and organizing writing centers, practicing sentence-level skill development, using rubrics to evaluate writing, and learning to coach children through the stages of the writing process. The importance of skill development to composition quality and fluency (Berninger & Richards, 2002) was a theme reiterated throughout the course. Unfortunately we were not able to gather evidence that these interventions with teachers resulted in better classroom implementation of writing instruction.

SUMMARY OF FINDINGS ON TEACHER NEEDS

In the context of a longitudinal, 4-year study of reading instruction in low-performing urban schools (Foorman & Moats, in press; Moats & Foorman, 2003), we found modest but statistically significant relationships among teacher knowledge, teacher effectiveness, and student achievement variables. Preliminary data, obtained under difficult public school conditions, supported the common-sense assertion that teachers' knowledge and their ability to apply it affects student learning. Teachers reported in tape-recorded interviews that professional development; the presence of classroom coaches and observers; and the adoption of core, comprehensive reading programs were keys to their success. The professional development process was more comprehensive, substantive, and intensive than past district offerings. Courses and workshops, followed by classroom coaching, promoted understanding of research findings

about reading acquisition, the structure of the English language, and instructional methods supported by research. Professional development sessions also aimed to engage the imagination, affect, and commitment of teachers who often seemed deflated by the aversive conditions in their schools.

We documented, through multiple-choice surveys, what teachers typically did and did not know about language structure and reading development. Responses indicated that the following understandings were elusive and needed to be addressed in class: 1 differentiation of speech sounds from letters; 2) detection of the identity of phonemes in words, especially when the spelling of those sounds was not transparent; 3) knowledge of the letter combinations (graphemes) that represent many phonemes; 4) conceptualization of functional spelling units such as digraphs, blends, and silent-letter spellings; 5) knowledge of syllable division and syllable spelling; 6) identification of the syntactic constituents of a sentence; 7) identification of students' problems with phonological, orthographic, and syntactic learning; and 8) comprehension of the ways in which the components of reading instruction are causally related to one another.

Our approach to professional development emphasized both content depth and teachers' active engagement in learning. Teachers' tolerance for lecture presentations was very limited. Classes were successful when teachers prepared demonstrations for one another, read aloud with one another, worked as groups to answer questions, toured each other's classrooms, viewed videotapes of peers at work, or put themselves in the shoes of the children. Heated discussions were encouraged, even though they were sometimes tangential. Appeals to affect and imagination energized the teachers as much as insights into subject matter and the children's learning processes.

RECOMMENDATIONS FOR PROFESSIONAL DEVELOPMENT PROGRAMS

Researchers in reading development and reading disabilities have made considerable progress in early identification and treatment of dyslexia and other reading problems. The fruits of these scientific labors cannot be realized, however, unless teachers understand and are prepared to implement them. Fundamental to differentiated instruction in basic reading skill are the teacher's insight into what causes variation in students' reading acquisition and the ability to explain concepts explicitly, to choose examples wisely, and to give targeted feedback when errors occur. Knowledge of language structure, language and reading development, and the dependence of literacy on oral language proficiency are prerequisite to (but not sufficient for) informed instruction of reading.

According to our teacher surveys and interviews, teachers often need more than an instructional program and classroom experience to understand how children learn to read and how to teach language structure. Teachers who implement comprehensive, research-based reading programs usually achieve better results with their students than teachers who do not (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998), as the programs provide essential tools. A teacher, however, delivers the program and unless he or she understands the content and principles of instruction in the teachers' manual, intentional teaching is not possible. Although general verbal ability may well be a mediating factor in how readily knowledge of language and reading instruction is acquired and how skillfully it is applied, teachers, too, deserve to be taught systematically the content they are responsible for teaching to children.

Knowledge of language and access to science-based programs of instruction are still not all that brings the best effort from teachers. Our experience and teacher interview data indicated that teachers appreciate an approach that engages their affect and imagination, is respectful of

their concerns, and that shows them the connection between what is being learned and the job they have to do. Any professional would prefer such conditions to prevail in the workplace. These goals may best be accomplished with a combination of activities: directed assessment of children; discussion of those results; direct instruction about phonemes, graphemes, morphemes, syntax and grammar, semantic organization, etymology, discourse structure, and pragmatics; lesson study groups; small-group readings to summarize and respond to texts; and rehearsal of the writing skills expected of the children.

Research on teacher education in reading is a young science. Better-controlled studies should address further the many questions raised by studies such as ours. What combination and sequence of learning experiences is most effective and appropriate for new teachers? How much content knowledge should be required before teachers are even admitted to a licensing program? What level of content knowledge can be taught within a licensing program? What is typically learned after licensing? What is the difference between knowledge and skill needed by specialists and knowledge and skill needed by regular classroom teachers? What kinds of measures are valid predictors of how well a teacher is likely do in reading instruction?

And finally, policy makers must accept the financial responsibility of supporting teachers if quality counts. Sustained, embedded, substantive professional development for teachers is a necessary investment if research gains are to be realized on a wide scale.

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