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Literacy Achievement in the Primary Grades in High-Poverty Schools

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Researchers have achieved consensus on several major questions pertaining to reading: How do typically progressing children learn to read? Why do some children have difficulty? What features of instruction are most likely to help the most children become good readers? This consensus, reflected in papers, books, and policy documents (e.g., Armbruster, Lehr, & Osborn, 2001; McCardle & Chhabra, 2004; National Institute of Child Health and Human Development, 2000; Neuman & Dickinson, 2001; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001; Snow, Burns, & Griffin, 1998; Stone, Silliman, Ehren, & Apel, 2004), is derived from decades of scientific work funded by the U.S. Department of Education, the National Institutes of Health, and many other institutions and agencies. Some schools serving high-poverty children can, and do, “beat the odds” (Denton, Foorman, & Mathes, 2003; Slavin, Madden, Dolan, & Wasik, 1996; Taylor, Pearson, Clark, & Walpole, 2000). Nevertheless, we have not yet succeeded in implementing research-based instruction on a widespread, consistent basis.

This chapter summarizes a body of work generated from a 5-year longitudinal program of reading research conducted in high-poverty, urban schools in Grades K–4, positioning major findings in relation to the context of current reading research. It highlights the importance of teachers and teaching in student progress and reports some detailed findings about teacher knowledge pertaining to reading and language. Professional development and school leadership are also noted to be critical influences on teachers’ ability to raise the academic language proficiency and academic performance of students at risk.

COMPENSATORY AND SPECIAL EDUCATION PROGRAMS DO NOT ADEQUATELY SERVE THE NEEDS OF HIGH-POVERTY STUDENTS

Despite significant federal and state investments in compensatory education programs, persistent achievement gaps among students of various ethnic, socioeconomic, and linguistic backgrounds have been difficult to close. Many students who fall behind are assigned to remedial programs funded through Title I, but, on the whole, these entitlement programs have not been successful in narrowing the achievement gap. Within Title I, some programs have made a difference, such as *Success for All* (Borman et al., 2005). Successful programs often address much more than classroom or remedial reading instruction, embracing school scheduling and organization, leadership training, professional development, and small-group tutorial interventions. *Direct Instruction Reading* (Carnine, Silbert, & Kame'enui, 1997) is a proven and powerful reading intervention implemented in some high-poverty schools that has never enjoyed the widespread adoption or implementation it might deserve.

Special education services, although costly, have also not been the answer to the achievement gap. Half of the 6.2 million students served in special education programs are classified as having learning disabilities, and about 85% of those children have serious and intractable problems with reading and related language skills (President's Commission on Excellence in Special Education, 2002). Students with serious reading disabilities on average do not make any significant gains in relative standing if they are placed in special education between Grades 3 and 6 (Hanushek, Kain, & Rivkin, 1998; Torgesen et al., 2001). Special education placement usually offers too little, too late, when it comes to learning to read.

In spite of these chronic national trends, most serious reading problems appear to be preventable. Instruction, however, must begin early, aim to prevent the development of problems, keep close track of children's progress, and focus primarily on classroom instruction. The combination of strong classroom instruction with supplementary, focused interventions reduces the incidence of reading failure to about 5% of students or fewer at the first-grade level (Foorman, Brier, & Fletcher, 2003; Mathes et al., 2005; Torgesen, 2004, 2005). Supplementary instruction, however, need not involve one-to-one tutorials; results are usually as good with small-group instruction as with one-to-one instruction (Elbaum, Vaughn, Hughes, & Moody, 2000).

The major project with which we were involved for 5 years studied the conditions necessary for successful classroom reading instruction in high-poverty, urban schools serving predominantly African American students and students of mixed ethnicities. Funded by the National Institute of Child Health and Human Development (NICHD)¹ as part of its comprehensive program of research into

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reading acquisition, the project was headed by Barbara R. Foorman and codirected by Jack Fletcher, David Francis, and Louisa C. Moats. In the course of this study, we learned much about the variables that predict reading outcomes, the school and classroom factors that improve reading and writing achievement, the language learning characteristics of the children, and the needs of teachers who work in such environments.

RESEARCH CONTEXT FOR THE EARLY INTERVENTIONS PROJECT

Prior to the initiation of our study in 1997, which was the second phase of a federally funded project already in progress between 1992 and 1997, the reading research community had demonstrated much about the nature of effective preventive and remedial reading instruction. As the National Reading Panel (NICHD, 2000) later asserted, classroom reading programs should teach the alphabetic code explicitly (Ehri et al., 2001; Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997). The goal of explicit code instruction is knowledge of the correspondences between phonemes (speech sounds) and graphemes (the letters and letter groups, such as *th*, that spell the phonemes) and application of that knowledge in word reading. Effective code-emphasis instruction in kindergarten and Grade 1 is explicit, systematic, and cumulative—not random or incidental. Automatic and fast word recognition is the goal so that students will become fluent readers of connected text. Fluency at both the word and text reading levels must be achieved so that children read with sufficient speed to support comprehension. Research-based instruction also includes robust vocabulary and comprehension components, no matter where the students are in word reading development, carried out through both oral and written language activities. All these principles were established prior to the publication of the National Reading Panel report.

Code-emphasis instruction in the early grades is advantageous because it prevents problems with the very beginning stages of literacy acquisition (Blachman, 2000; O'Connor & Jenkins, 1999; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). An important insight of modern reading research has been the recognition that phonics instruction may not “take” with young readers unless they are aware of the segments of speech represented by the graphemes used to spell words in an alphabetic writing system (Catts, Fey, Zhang, & Tomblin, 1999). Called *phoneme awareness* (PA), this foundational language skill requires conscious analysis of the internal details of speech, a linguistic achievement that is elusive for many students. Students who have difficulty acquiring PA may lack the experiences with language necessary to foster it or may not be “wired,” or biologically predisposed, to figure out the structure of speech and connect that with print (Olson, 2004). Genetic predispositions for and against good reading skill operate through this underlying competence (Gilger & Wise, 2004). One of the most positive, recurring findings of research for the 20 years leading up to the mid-1990s was that children who lacked good

phonological skills could be directly taught the identity of phonemes and how to mentally manipulate them. If this awareness was then linked with letters, then students were more likely to overcome early signs of risk for reading failure (Ehri et al., 2001; NICHD, 2000).

The report of the National Research Council (NRC; Snow et al. 1998), based on an expert panel's review of research in early reading instruction and intervention, identified the essential components of effective early literacy instruction that were later elaborated by the National Reading Panel (NICHD, 2000). These included 1) explicit instruction in the alphabetic principle, 2) teaching students to read for meaning, and 3) providing extended opportunities for practice reading connected text. In addition, oral language competency and writing skills were identified as necessary in a comprehensive lesson. The NRC was careful to point out that integration of these components of instruction was associated with the best results—that is, daily comprehensive lessons that included explicit teaching of the alphabetic code, development of reading fluency through a great deal of appropriate reading practice, and explicit teaching of comprehension skills and strategies.

Research on the timing, intensity, and composition of intensive intervention with students at risk also preceded our study (Torgesen, Wagner, Rashotte, Alexander, & Conway, 1997; Vellutino et al., 1996) and coincided with our study (Denton & Mathes, 2003). Using screening tests of phonological skills and letter knowledge, researchers identified children in kindergarten who showed significant signs of risk for reading failure. By second grade, in the study by Torgesen and colleagues, small group, daily intervention for 1/2 hour over the academic year brought 75% of the poor readers to grade-level reading. Vellutino and colleagues also identified middle-class children with very low word recognition skills at the beginning of Grade 1. After one semester of a comprehensive intervention that included decoding, fluency, and comprehension components, 70% of the poor readers were reading at grade level. After two semesters, more than 90% were at grade level. Early intervention—in Grades 1 and 2—was more effective than later intervention; intervention at Grades 3 and beyond required more hours, more expertise, and more concentrated practice than that which was carried out with the younger students. Even then, reading fluency rates were resistant to normalization when remediation was begun after second grade (Torgesen et al., 2001; Torgesen, 2005).

PURPOSE AND DESIGN OF THE EARLY INTERVENTIONS PROJECT

The Early Interventions Project was designed to begin classroom and remedial intervention in kindergarten and first grade and to follow children through the elementary grades to the end of Grade 4. The study had two overriding and complementary purposes: 1) to investigate the variables that contribute to reading success or failure in schools that are adopting research-based programs, and 2) to improve reading instruction in the participating schools. Although controlled

studies had already shown the effectiveness of specific practices and the reasons why those were likely to work better than others, we gathered evidence pertaining to larger-scale implementations of research-based reading instruction in high-poverty environments.

The project provided instructional materials to all classrooms, with publishers' support, and required participants to implement those programs of instruction. Four core, comprehensive reading programs were used across the study, three of which had already been proven effective in reducing reading failure: *Open Court's Collections for Young Scholars* (Open Court Reading, 1995); *Reading Mastery*, a direct instruction program of SRA (Carnine et al., 1997); *Success for All* (Slavin, Madden, Dolan, & Wasik, 1996); and one program that represented a literature-based approach (with a supplementary phonics kit added in the second year of the study), Houghton Mifflin's (1998) *Invitations to Literacy*. Funding was also provided to support tutorial interventions for 10% of the students.

The professional development provided to teachers was more extensive in the District of Columbia site than the Houston site, as described in a later section of this chapter. In Houston, only 3 days were available for teacher workshops; whereas in the District of Columbia, we provided not only an introductory summer workshop of 3–5 days, but 3 additional professional development days throughout the school year and ongoing courses that met weekly for teachers who voluntarily enrolled in them. A supplementary congressional grant was awarded to the project to support professional development stipends and consulting fees at the District of Columbia site.

SOCIAL, POLITICAL, AND EDUCATIONAL CONTEXT OF THE EARLY INTERVENTIONS PROJECT

According to our initial screening tests, between 70% and 80% of all students in the entering kindergarten classes were at risk for reading failure in the District of Columbia and in the Houston Independent School District. The schools themselves had resisted many reform efforts in the past. Teacher turnover was high, and the pool of certified, capable teachers was not sufficient to meet the demand. Expectations for staff and students were low, capable leadership was inconsistent or absent, and student transience was common. Aversive working environments in which resources were scarce and demands overwhelming often challenged the patience, skill, and persistence of staff and students. For example, school libraries sometimes had no books and classrooms were devoid of instructional materials and resources beyond what our project provided. Basic equipment such as copy machines, overhead projectors, or working tape recorders were frequently missing from the schools and classrooms. Schools opened late the first year because about one third of the buildings' roofs were not up to safety codes.

The context for change differed dramatically at each site, in spite of the positive and similar growth observed across the study schools in general. Houston

Independent School District enjoyed stable leadership for many years, a nationally acclaimed district reading initiative, and a long-term accountability system at the state level. Under such conditions, we expected that most schools would sustain positive growth in achievement; however, the subdistrict where this study was located had two area superintendents in 4 years. Likewise, the District of Columbia Public School system had three superintendents in the first 4 years of the study. The District of Columbia site had instituted accountability (in the form of the Stanford-9 Achievement Test) during the second year of our project, but prior to that adoption, no data were available on students' progress before third grade. There was no districtwide reading initiative during the 4 years we worked in the District of Columbia site, so our schools had only each other for support.

ACHIEVEMENT OF READING IMPROVEMENT IN THE PRIMARY GRADES

Our study involved 1,400 children in 17 low-performing schools (8 in Houston and 9 in the District of Columbia). We followed the reading growth of children through fourth grade in two cohorts, one selected in kindergarten and the other in first grade. Children were assessed at the end of each year with an extensive, individually administered test battery and four other times during the year with brief measures of critical skills underlying reading acquisition, similar to those now included in the Dynamic Indicators of Basic Early Literacy Skills (Good & Kaminski, 2005) and the Texas Primary Reading Inventory (TPRI; Texas Education Agency, 2004–2006). At the end of Year 4 of the project, children who were finishing third and fourth grades were solidly at national average in both Houston and the District of Columbia. Students had achieved average standard scores on the Woodcock-Johnson Psychoeducational Battery–Revised (Woodcock & Johnson, 1989) Passage Comprehension subtest (97 and 98 in District of Columbia and Houston, respectively) and Basic Reading Cluster (103 and 101 in District of Columbia and Houston, respectively). There was considerable variability across individual teachers and schools, however (Foorman & Moats, 2004; Foorman et al., 2006; Mehta, Foorman, Branum-Martin, & Taylor, 2005).

FACTORS RELATED TO LITERACY GROWTH AND OUTCOMES

The first phase of the study, conducted in Houston from 1992 to 1997, supported the advantage of explicit over implicit classroom instructional approaches in first and second grades (Foorman et al., 1997; Foorman et al., 1998). The continuation of the study, conducted between 1997 and 2002, showed the positive impact of phonological awareness instruction in kindergarten on Grade 1 reading outcomes (Foorman, Chen, et al., 2003); the importance of teacher content

knowledge, teacher allocation of instructional time, and overall teacher quality on literacy development through Grade 4 (Foorman & Moats, 2004); and the complex interaction of instructional factors in Grades 1 and 2 in determining Grade 2 classroom results (Foorman et al., 2006).

Complex data analyses allowed researchers to understand the relationships among teacher, student, and classroom variables. Mehta and colleagues (2005) examined 1) the extent to which literacy is a unitary construct at the student and classrooms levels, 2) the differences between language competence and literacy levels, and 3) the relative roles of teachers and students in predicting literacy outcomes. Utilizing data from 1,342 students in 127 classrooms in Grades 1–4, Mehta and colleagues found that language and literacy were separable at the student level but unified at the classroom level and that the roles of phonological awareness and writing in accounting for literacy development change as students progress. PA is a significant factor early in reading development but declines in importance as students progress. In contrast, the contribution of writing to the literacy construct becomes stronger after second grade.

Foorman and Schatschneider (2003) observed that teachers spent very little time on either writing instruction or meaningful spelling instruction and that spelling achievement lagged significantly behind reading at all levels. Even though reading scores were in the average range, spelling scores on the Kaufman Test of Educational Achievement (Kaufman & Kaufman, 1985) were significantly lower (89 and 87 in the District of Columbia and Houston, respectively; approximately the 24th and 20th percentiles). Learning to read was not enough to support learning to spell.

The No Child Left Behind Act of 2001 (PL 107-110) includes the Reading First program, which has awarded grants to states for schools willing to adopt research-based core, comprehensive reading programs. How important is the school's program in accounting for the progress made by classrooms? What accounts for successful implementation of a core program?

HOW MUCH DIFFERENCE DOES THE READING PROGRAM MAKE?

A consistent finding in our research was that reading achievement outcomes were determined more by school, teacher, and child factors than by the effect of a particular program of instruction. None of the four participating reading programs showed clear superiority in accounting for student reading achievement. In other words, the effect of any of the research-based, comprehensive programs was limited by 1) school effects and 2) lack of variability at the classroom level. A well-designed program in the hands of a low-performing teacher was of little effect, but a strong teacher could get results even with a program of weaker design.

Those schools whose overall achievement was higher than others were characterized by the same qualities that characterized the Flagship Schools identified

in a Texas survey (Denton, Foorman et al., 2003; Foorman & Moats, 2004). Mutual respect, pride in academic achievement, and collegiality was evident in interactions among administrators, teachers, and students. Discipline was seldom an issue, and children were generally on task. Time spent on reading instruction was a priority in every classroom, in small-group intervention, in specialized tutorials, and in extended-day activities. Teachers bought into the instructional approach they had been given (Foorman & Moats, 2004), and they could explain the rationale for the approach and how it was used to prevent reading problems as well as to intervene with at-risk students.

The instructional programs, with the exception of the Houghton Mifflin program, focused on explicit, systematic instruction in phonological skills and phonics. Houghton Mifflin teachers used supplementary materials and activities to bolster that program's weaknesses, as modeled in their professional development workshops and courses. These elements were combined with vocabulary, oral language, and comprehension instruction and lots of reading practice. Teachers in higher performing schools communicated with parents about children's progress and provided ways for parents to extend reading opportunities.

SCREENING AND PREDICTION OF READING PROBLEMS

Evidence from other longitudinal studies, in addition to ours, converge on a restricted set of valid predictors for the identification of children at risk for reading difficulties: phonological awareness and identification of letter sounds; rapid naming of letters; vocabulary knowledge; and word reading, especially word reading fluency (Fletcher, Denton, Fuchs, & Vaughn, 2005; Good, Simmons, & Kame'enui, 2001; O'Connor & Jenkins, 1999; Vellutino, Scanlon, & Lyon, 2000; Wood, Hill, & Meyer, 2001). Taken together, these studies indicate that predictive validity of phonological awareness tasks depends on how and when these skills are assessed.

Schatschneider and colleagues (2004) found that phonological awareness and word reading tasks measure the same underlying constructs over time but that tasks vary in their predictive value at different points in development. For example, in kindergarten, initial sound comparisons and blending of onsets and rimes are predictive of first-grade reading, whereas in first grade it is blending and segmenting of multiple phonemes that predict end-of-year reading success. Moreover, assessments at the beginning of kindergarten are less reliable than those at the middle or the end, as children need time to acclimate to the school environment. Finally, letter-sound identification is more predictive than letter naming in the second half of kindergarten and the beginning of first grade. Identifying the sounds represented by letters is directly related to phonic decoding of words.

By third grade, oral reading fluency, indicated by words correct per minute on 1-minute timed passage readings, accounts for the most variance in sustained,

silent reading comprehension (Torgesen, 2005). Vocabulary knowledge and verbal reasoning account for more and more of the variance in reading comprehension as children get older and have mastered basic decoding skills.

Such findings have collectively influenced the design and use of early screening instruments such as Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2005) and the Texas Primary Reading Inventory (TPRI). The Early Interventions Project was a source of validation data for the construction of such screening instruments, but at the classroom level, teachers did not habitually use the screening data to inform their instruction. Without structured team meetings and opportunities to interpret student data, teachers did not use it purposefully. Current policies promoting “multi-tiered” instructional delivery systems (Fletcher et al., 2005) will require considerably more coaching for teachers in the use of screening data than we were able to provide.

WRITING: WHERE LANGUAGE PROBLEMS ARE EXPOSED

Each year during the Early Interventions Project, a structured writing sample was obtained from students in May. We undertook an intensive analysis of the writing skills of 40 fourth graders, randomly selected from classrooms where we had observed high- and low-quality writing instruction (Moats, Foorman, & Taylor, 2006). Although we were able to show the positive effects of stronger writing instruction on students’ compositions, striking and unresolved problems of language formulation, transcription, and usage were ubiquitous across the writing samples. Although our students were scoring within the average range on standardized reading tests, spelling and writing were not developing at average levels. Spelling was highly correlated with reading, but spelling was developing at a comparatively slower rate, as previously noted.

Similar to students with language learning disabilities (LLD), our high-poverty students also appeared “overwhelmed by the multiple demands of . . . writing and appear[ed] to have difficulty allocating sufficient cognitive resources to meet various writing demands” (Singer & Bashir, 2004, p. 559). The 40 students in our study, however, were not designated as having LLD; they were average students in classrooms of struggling urban schools serving high-poverty, minority populations, many of whom were speakers of African American Vernacular English. The classroom language and writing instruction had not enabled these students to acquire the academic language proficiency necessary to support the planning, organization, text generation, and online revision skills of writing.

To deploy attention and working memory in the service of explicit planning, organization, text construction, and self-regulation strategies during the writing process, students must automatize many component skills of written language production (Berninger, 2000; Berninger, Cartwright, Yates, Swanson, & Abbott, 1994; Graham, 1997). These include handwriting fluency and legibility, knowledge of spelling, mastery of the words and language used in written

English, punctuation, and other conventions of written expression. Our students' use of language such as verb forms, subordinate clauses, grammatical word endings, punctuation, and spelling rules was very problematic.

The students' limited vocabularies, documented in the parent study as being significantly below average (seventh percentile in the study population when the study began), undoubtedly contributed to their dependence on repetitive uses of the same words and to under-elaboration of thoughts and ideas. The topic was provocative (i.e., "When I Was Frightened"), and compositions contained multiple references to violence, vulnerability, monsters, and various environmental threats. In this case, topic knowledge and engagement in the task may have been higher than would have been the case with a more banal assignment. The students had something to say but nevertheless struggled to write.

Part of our analysis probed in detail the specific difficulties the children experienced with the representation of words at the phonological, orthographic, and morphosyntactic levels. At the most basic level, students' fluency of output depends on their mastery of graphomotor skills of letter formation, alphabet production, word knowledge, grammar, and spelling. About one third of the fourth-grade students demonstrated very poor handwriting, which is known to interfere with compositional quality and fluency (Berninger et al., 1994). Handwriting problems were most likely attributable to lack of instruction, as so little direct teaching of writing skills was observed in earlier grades. The percent of time spent on writing instruction during reading/language arts instruction ranged from 3% to 11% in Houston from first to fourth grades and from 6% to 8% in the District of Columbia across those same grades (Foorman et al., 2006; Moats et al., 2006).

The ability to read Standard Academic English for comprehension does not appear to be sufficient to enable students with dialect differences or linguistic disparities to represent standard English forms in writing by the fourth-grade level. The awareness of and representation of speech sounds with graphemes, awareness and representation of morphosyntactic structures in spelling, and awareness and use of standard word and sentence forms each depend on the development of specific linguistic knowledge (Bryant, Nunes, & Bindman, 2000) as well as, perhaps, a nonspecific level of metalinguistic awareness that supports such skills as intrinsic and automatic comparison of dialects (Charity, Scarborough, & Griffin, 2004).

It is not possible to know, given our data, whether the children who struggled with the written representation of speech sounds, inflectional morphemes, and grammatical forms would have exhibited tacit awareness of these structures, for example on a recognition task, but were limited in their explicit and conscious expression in writing simply from lack of direct teaching and practice. Likewise, it is not possible to know how many children were lacking even tacit awareness of the Standard Academic English structures they were to use in written expression.

TEACHING—WHAT INFLUENCE DID PROFESSIONAL DEVELOPMENT HAVE?

Professional Development Program

In the District of Columbia site, professional development comprised an introductory summer workshop of 2–4 days that addressed both content knowledge of reading and language and instructional program implementation. These institutes were followed by two or three 3-credit courses each year, focused on foundation concepts in teaching reading with any comprehensive instructional program. The topics of those courses included Phonology and Reading Research (1 term, repeated yearly); Teaching Decoding (2 terms); Teaching Vocabulary and Comprehension (2 terms); and Teaching Writing.

Observers visited each classroom an average of five to six times during the year. Publishers' program consultants carried out monthly in-class visits and delivered demonstration lessons for the teachers. Principals and school-based change facilitators were included in all professional development. We thus maintained a continuous presence in the classes of all teachers, although only about half of the eligible teachers enrolled in formal courses that met after school or on weekends. During the fourth year of the project, reading coaches also worked intensively with individual teachers in their classrooms as the need arose.

After-school courses emphasized the conceptual underpinnings and research basis for effective classroom practice as well as the links between those concepts and the practices teachers used in their instructional programs. Teachers were asked to read, discuss, and summarize points from professional journal readings. Each topic was addressed in depth. In each class, we anchored practical teaching strategies to a larger theoretical framework, such as a model of reading processes, a model of reading instruction components, and a model of reading and spelling development. Throughout the courses, we emphasized the structure of English phonology and orthography. The interplay between theory and practice was continual, redundant, and consistent, just as Birman, Desimone, Porter, and Garet (2000) reported in their analysis of effective professional development projects that were part of the Eisenhower Professional Development Program.

Teachers' Views of Their Professional Development Experiences

We interviewed 50 K–4 teachers who had been with the project for 2 years or more to elicit teachers' impressions of the professional development program. Interviews were conducted, taped, and transcribed to preserve teacher anonymity. Forty-nine of the fifty teachers characterized their experience in the project as "positive" to "extremely positive." No teacher identified the payment of stipends

as a primary motivator for their interest in taking courses. Rather, teachers linked their enthusiasm to improved student outcomes; the achievement of greater insight into the teaching of reading; the availability of material support; and enjoyment of a supportive, collaborative professional context in which learning was rewarding, reciprocal, useful, and exciting.

Teachers recognized immediate and long-term student gains on both classroom assessments and the district's Stanford-9 testing, attributing those gains to their own professional growth. Many stated specifically that they succeeded with at-risk, reluctant, and poor readers whom they had not been able to reach in previous years. Many stated that "all children can learn to read" if the programs are properly taught.

Teachers' Views of Conditions that Support Improvement

Many teachers commented that their own gains in phonological and phonic knowledge had a major positive impact on children's reading achievement. The information about language was new, even to those who had taught for many years. Knowledge of "sounds," when coupled with opportunities to learn and practice specific instructional techniques and strategies, was empowering.

Teachers expressed gratitude that, for the first time, they were working with comprehensive reading programs with all necessary support materials. Prior to the project's intervention, many had been working with few instructional materials, few books, and no working mechanical equipment such as tape recorders or overhead projectors. Teachers welcomed feedback, guidance, and encouragement given with the expectation of gradual, incremental improvement toward clearly defined teaching standards. They enjoyed watching model lessons, visiting peers' classrooms, role-playing during workshops, receiving tips from staff members, and team planning. Many valued the reciprocity embedded in the professional development learning experience. No teacher expressed a preference for being left alone or teaching without a core, comprehensive set of instructional materials. The importance of collegial networks for sustaining research-based practice has been noted as well by other researchers (e.g., Darling-Hammond & Post, 2000; Gersten, Chard, & Baker, 2000).

Teachers welcomed the structure imposed by project staff in the form of pacing guides, lesson scripts, and lesson plans. No teacher complained that structure and well-defined expectations for time management, pacing, or instructional priorities were either stifling or limiting. Rather, many protested that they had been overwhelmed by too many choices of activities in publishers' teaching manuals and too little assistance choosing essential lesson components. Several teachers mentioned that creativity was possible within the structure provided; only one requested less repetition in a program's format, although she acknowledged that repetition was effective for the children.

In summary, the model of professional development was enthusiastically endorsed by participating teachers. Sound, rigorous, consistent content; a constant

interplay between knowledge, understanding, and improvement of classroom practices; permission to make gradual improvement over time; and the creation of a positive, rewarding professional and social context in which to learn and work were the factors most often praised by teachers.

RELATIONSHIP BETWEEN TEACHER KNOWLEDGE, TEACHER COMPETENCE, AND CLASSROOM OUTCOMES

Relationships among measures of teacher knowledge, teacher effectiveness, and student outcomes were studied at both sites (Moats & Foorman, 2003). Teacher knowledge was measured by an experimental 19-question multiple choice Teacher Knowledge Survey; teachers' general effectiveness in essential teaching routines and classroom management was measured with a structured observation instrument (Texas Teacher Appraisal System [TTAS]; Texas Education Agency, 1984). The Teacher Knowledge Survey included questions about orthographic, phonological, and morphological aspects of word structure; the components of reading instruction; and the significance of specific spelling, writing, and oral reading errors in student work samples. Eighty third- and fourth-grade teachers, during the fourth year of the study, took the Teacher Knowledge Survey at the beginning of the year and the end of the year. They were also rated during that year by observers who had achieved high interrater reliability with the TTAS ($>.80$; see Foorman & Schatschneider [2003] for further description of these instruments).

Teachers rated as more effective in their classroom teaching techniques had students with higher reading outcomes. The very modest relationships we were able to demonstrate between teacher knowledge, teaching effectiveness, and student outcomes support findings of other studies (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Cunningham, Perry, Stanovich, Stanovich, 2004; McCutchen, Abbott et al., 2002; McCutchen & Berninger, 1999) that also document connections among these variables.

RESULTS OF TEACHER KNOWLEDGE SURVEYS

Knowledge surveys given to teachers of various levels of experience and education have consistently found major gaps in teachers' understandings about language structure, reading instruction, and the meaning of student assessments and work samples (Bos et al., 2001; Cunningham, Perry, Stanovich, & Stanovich, 2004; McCutcheon, Abbott et al., 2002; McCutcheon, Harry, et al., 2002; Moats, 1995; Moats & Foorman, 2003; Spear-Swerling & Brucker, 2003, 2004). Knowledge surveys from our own and others' research consistently reveal that the most elusive concepts for teachers are

1. Differentiation of speech sounds from letters
2. Ability to detect the identity of phonemes in words, especially when the spelling of those sounds does not directly represent the sounds

3. Knowledge of the letter combinations (graphemes) that represent phonemes in familiar words and recognition of a word's regularity or irregularity
4. Identification of functional spelling units such as digraphs, blends, silent-letter spellings, and meaningful word parts (morphemes)
5. Conventions of syllable division and syllable spelling
6. Linguistic constituents of a sentence and the recognition of basic parts of speech
7. Recognition of children's difficulties with phonological, orthographic, morphologic, and syntactic learning from work samples and assessments
8. Understanding of the ways in which the components of reading instruction are causally related to one another

Findings from teacher knowledge studies converge in suggesting that teachers' knowledge of phonology and orthography is often underdeveloped for the purpose of explicit teaching of reading or writing. In addition, teacher content knowledge of language can be measured directly but is not closely associated with philosophical beliefs, teachers' self-assessments, or knowledge of children's literature. Finally, teachers' knowledge of and ability to apply concepts of phonology and orthography does correspond to primary grade children's reading and spelling achievement.

CORE ISSUE: WHO TEACHES THE CHILDREN?

Reading programs, state standards, and literacy curricula are only as good as those who are implementing them. A growing body of work suggests that most teachers are ill-prepared to implement core, classroom instruction and small-group intervention in accordance with research-based principles (Walsh, Glaser, & Dunne-Wilcox, 2006). If administrators and teachers are taught (as these authors once were) that students' reading depends more than anything else on gender, intelligence quotient score, family's education, socioeconomic status, handedness, or "learning style," they will have little reason to implement systematic, explicit instruction of essential language skills. If teachers believe, as many still do, that literature comprehension must be the primary focus of beginning reading instruction and that language learning and word recognition will fall into place naturally, through exposure to books and motivational experiences, then they are likely to perpetuate the cycle of failure.

Children's reading and writing success, especially in high-poverty schools, depends on teachers who will use every available minute to build language and academic skills. Ideally, teachers will be using the best-designed programs available to organize their instruction. In addition, they must be able to explain concepts, select examples, give corrective feedback, adjust the teaching cycle, and differentiate groups of children. Teachers who can model Standard American English usage, compare informal language with academic English, and explain

the reasons why words are spelled the way they are can help students overcome initial language disadvantages. But how many teachers are able to do these things? Our teacher surveys, as well as those of other researchers, show repeatedly that practicing, licensed teachers in general know much too little about reading and language, including the identity of phonemes in words, the spelling rules and patterns of English, the conventions of academic English usage, and the organization of exposition. Such knowledge is necessary to implement a good program skillfully (Snow, Griffin, & Burns, 2005). Furthermore, teachers are not very good at estimating their own knowledge levels in any of these domains.

Some critics of these ideas argue that detailed and specific knowledge of language is unnecessary for teachers if they are given scripted programs to follow. Others emphasize that knowledge of *big ideas* or *essential components of instruction* (e.g., Coyne, Zipoli, & Ruby, 2006) is most important. In practice, however, detailed knowledge lies behind productive interactions between teachers and students. *High quality instruction*—defined as that which most efficiently enables children to achieve high levels of literacy—depends on the coherence of the content conveyed as well as the manner in which it is taught.

To illustrate, enumeration of concepts that underlie coherent instruction in just one domain of learning, word recognition, may be helpful. Coherent instruction, again, provides information about the language systems involved in the use of print and gives complete and accurate information to children, which they then internalize and generalize. The information provided enables children to integrate all aspects of word knowledge—sound, meaning, word origin, and usage conventions.

Phonological awareness instruction, to support phoneme blending and segmentation in beginning word recognition and spelling, necessitates differentiation of syllables (e.g., *ac-com-plash*) from onsets and rimes (e.g., *pl-ate*) and depends on a teacher's ability to count, pronounce, blend, segment, and manipulate the individual speech sounds in words (e.g., /p/-/l/-/ā/-/t/). If we want young children to distinguish the meanings of *cloud* and *clown*, for example, we should teach them first to recognize and pronounce ending consonants by highlighting the feature differences of those speech sounds. In this case, /n/ and /d/ are articulated similarly, with the tongue behind the teeth, and the critical distinguishing feature of the two phonemes is the nasality of /n/. Children who have been asked to attend to language at that level can more readily distinguish words that are similar in form but different in meaning.

As children progress, differentiation of syllables from morphemes is helpful because meaningful parts of words are reflected in the spelling system and provide a direct link to meaning. For example, *global* has two meaningful parts or morphemes: the base word *globe* and the adjective suffix *-al*. The silent *e* in the base word was dropped because the suffix begins with a vowel. A phrase such as *global warming* resonates more deeply with students who have thought about the structure of the words.

Informed word recognition instruction includes much more than letter-sound correspondence, but teachers are seldom trained in sufficient depth—or provided the instructional materials—to demystify language with such clarity. Some of the poorest results in our Teacher Knowledge Surveys occur on items having to do with knowledge of morphology and word structure. On one survey, given to 120 primary grade teachers in two states, an item asked teachers to identify which word has an adjective suffix: *natural*, *apartment*, *city*, *encircle*, or *emptiness*. Only 7 % of respondents correctly identified *natural*. If these results indicate what is typical, then it should not be surprising that the language learning needs of most children are not being met.

So far, we have no evidence that teachers are any better prepared to teach language form and use at the level of sentences, paragraphs, or lengthier discourse. Nevertheless, until we find ways to convey better command of language to students, they are unlikely to progress beyond current levels of literacy.

CONCLUSION

Multiple consensus reports link expectations for teacher knowledge and teaching skill to the scientific consensus on reading instruction. The fruits of scientific reading research, however, cannot be realized unless teachers understand and are prepared to implement those findings. Mandates for the practice of *scientifically based reading research*, such as those in the No Child Left Behind legislation, may have been premature before a concerted educational effort was undertaken to ensure that teachers and administrators understood what was intended.

Fundamental to differentiated instruction in language and literacy is the teacher's insight into the reasons why some children have difficulty and knowledge of research-based practices. Knowledge of language structure, language and reading development, and the dependence of literacy on oral language proficiency are prerequisite understandings for informed instruction of reading, along with extensive procedural knowledge of explicit teaching routines. We cannot blame teachers or hold them accountable for poor results if, as a profession, we have not defined the prerequisite levels of verbal proficiency necessary to teach literacy, are unwilling to invoke standards for entry into the profession, and have not offered teachers the kind of professional training that engages their interest, is respectful of their needs, and empowers them to be successful with children. Well-constructed and validated instructional materials are necessary and important tools for high-quality instruction, but merely disseminating these materials is unlikely to strongly affect teachers' behavior without attention to their attitudes, goals, and knowledge base.

A first course of action in addressing our need for a stronger teaching corps is to obtain more evidence that bears on these critical questions: What combination and sequence of experiences are most effective and rewarding for teachers who are learning to teach children how to read and use language? How much

content knowledge and verbal skill should be expected before teachers are even admitted to a licensing program or admitted to a practicum in teaching? Within the confines of licensing programs, what concepts are priorities? What incentives will work best to attract and keep talented teachers? What is the difference between knowledge needed by specialists and knowledge needed by regular classroom teachers, and what is the difference in training time?

A second condition for successful and sustainable reduction of reading failure is to encourage school boards and administrators to adopt longer range implementation plans. These should include ample professional development time around a set of specific knowledge and practice standards (Moats, 1999). Several years are necessary to build a school culture that will support optimal achievement (Denton, Vaughn, & Fletcher, 2003; Fletcher et al., 2005; Gersten et al., 2000). Projects with a history of success include phases such as 1) planning and commitment to all aspects of change; 2) orientation, including baseline data collection, training of school personnel, and the establishment of teams; 3) initial implementation, in which the program is put into place according to plan and coaching is provided; 4) independent operation, characterized by increased self-sufficiency and evaluation of outcomes; and 5) institutionalization, in which all key aspects of a program—including use of regular classroom instructional materials, procedures for teaching intervention groups, a professional development curriculum, and use of student assessments—are integrated into the routine operation of the school. Sometimes up to 5 years are necessary before the maximum affect of a reading initiative is realized (King & Torgesen, 2006). This should seem realistic in light of the extensive knowledge required for skillful teaching of the essential components of instruction and the use of assessments that inform grouping. “Spray and pray” workshops will not be enough.

Third, teachers need multiple opportunities to view good models and to practice new procedures with helpful feedback that will lead to refinement of teaching skill. They cannot become experts at everything at once. Teaching high-poverty students is highly demanding. Teachers thrive on supportive interactions within collegial networks, as long as the shared learning activities pertain to a reasonable, specific, explicit set of professional learning objectives.

In summary, teaching and teachers hold the key to the literacy of high-poverty students. Educating the teachers, and building professional contexts in which they can do their valuable work, is as serious a business as educating the young students.

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