TQ Research & Policy Brief

Barriers to the Preparation of Highly Qualified Teachers in Reading

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Abstract

Despite the fact that the early reading proficiency for all children has become a national mandate captured in both the No Child Left Behind (NCLB) Act and the Individuals with Disabilities Education Act (IDEA), the poor performance of America's fourth graders on national examinations of reading proficiency indicates that the nation is far from achieving that goal, especially for minority students. This is all the more disappointing given that advances in research now provide a scientific basis for reading instruction that promises to enable nearly all but the most severely handicapped students to become proficient readers by Grade 4.

Both NCLB and IDEA have invoked scientifically based reading research as the basis not only for mandating the adoption of scientifically based reading instruction but for related changes in education policy. Coupled with the emphasis in the federal legislation on putting "highly qualified" teachers who teach core content in all the nation's classrooms, scientifically based reading research has become central to the requirement that all elementary and special education teachers be adequately prepared to teach reading. Presently, not only are far too few teachers proficient in scientifically based reading instruction, but far too many of the programs that prepare the nation's teachers are failing to give them the grounding they need in order to become proficient.

The following three prominent points of impact are especially important in addressing this situation:

- Professional association standards, including program accreditation standards.
- State standards for program approval and teacher licensure.
- The teacher preparation curriculum in institutions of higher education or other teacher preparation venues.

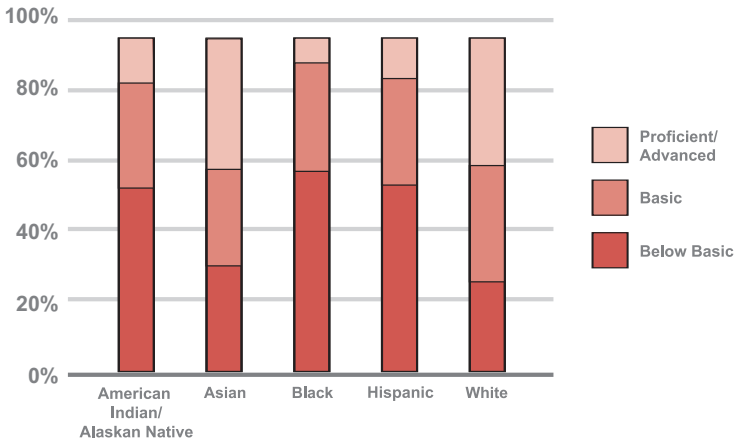
The Promise and the Challenge of Reading Instruction

The importance of the early development of strong reading skills is intuitively obvious, and it has become a critical education goal in the United States as evidenced by its prominence in both NCLB and IDEA. Research clearly demonstrates that students who read below the basic level in Grade 4 are unlikely to read at a basic or proficient level by the end of Grade 12 and are at much higher risk for poor education outcomes such as course failures, grade retention, and dropping out (Reschly & Christenson, in press; Temple, Reynolds, & Miedel, 2000).

An examination of the performance of American students on the recent National Assessment of Educational Progress (NAEP), however, indicates that too many of the nation's Grade 4 students are not reading at the most basic level and far fewer are reading with real proficiency (National Center for Education Statistics, 2005). The performance of students from specific minority groups is especially disturbing. As Figure 1 shows, approximately 24 percent of white students and 27 percent of Asian students read below the basic level in Grade 4. That compares with 58 percent for Grade 4 black students, 54 percent for Hispanic students, and 52 percent for American Indian/Alaskan Native students. The percentages of Grade 4 students who read at the proficient or advanced level are 13 percent for black students, 16 percent for Hispanic students, 18 percent for American Indian/Alaskan Native students, 41 percent for white students, and 42 percent for Asian students. Clearly, the nation is still far short of achieving its set goals for reading competency; many students, and especially minority students, are being left behind.

Fortunately, there is an extremely strong research base in early reading that led both the National Research Council in 1998 and the National Reading

Figure 1. NAEP Grade 4 Reading Results by Ethnic Group, 2005



Source: National Center for Education Statistics (2005)

Panel in 2000 to identify the same core principles of a genuinely scientifically based approach to reading instruction that, if followed, should indeed result in nearly all young children, except those with the most severe handicaps, being able to read at grade level by Grade 4 (National Reading Panel, 2000; Snow, Burns, & Griffin, 1998). The research identified by the National Reading Panel in particular is often referred to as scientifically based reading research, and it lies at the core of policy recommendations and expectations in both NCLB and IDEA.

Implicit in the possibility of scientifically based reading instruction having its expected impact, however, is a universal commitment by the nation's schools to adopt it and a teacher corps that is sufficiently skilled and knowledgeable so as to be able to implement it effectively in the classroom. Unfortunately, it is simply not the case that teachers are up to the task, in large part because the postsecondary programs in which they are being prepared to teach do not provide them with either an adequate understanding of the scientifically based research on reading or sufficient training to be able to use it successfully in the classroom.

This policy brief explores some of the barriers to the successful preservice preparation of teachers to teach reading (i.e., the education they receive prior to becoming fully licensed). The brief begins by summarizing the research on reading instruction and the policy mandates based on that research. Next, it discusses the professional association standards, standards for preparation program approval, and teacher licensing practices that have a critical impact on teacher preparation. It also discusses some recent findings about the adequacy of the reading education curricula in college- and university-based teacher preparation programs. Finally, it offers a number of recommendations that should result in improvements in the preparation of teachers in reading so that the promise of scientifically based reading instruction can be realized and thus ensure reading proficiency for nearly all the nation's children.

The Science of Reading Instruction

The scientifically based principles endorsed in NCLB and IDEA are grounded in several decades of research on reading (Adams, 1994; National Reading Panel, 2000; Snow et al., 1998). These principles address both the content and instructional methodology of reading instruction. The scientifically based content has come to be encapsulated in five core components: phonemic awareness, phonics, fluency, vocabulary, and comprehension. *Phonemic awareness* is defined as the understanding that spoken words and syllables are made up of sequences of individual speech sounds. *Phonics* involves the understanding that there are single speech sounds (phonemes) represented by each letter or letter combination and also the ability to form correspondences between letters and sounds and to recognize spelling patterns. *Fluency* is defined as the ability to read orally with speed, accuracy, and proper expression. *Vocabulary* is a function of the ability to recognize and understand individual words in reading and use them correctly in speech. And *comprehension*, which is partly based on vocabulary, is the ability to understand what is read and to construct meaning through the interaction between the text and the reader. Mastery of these five elements of reading is essential for children if they are to become proficient readers.

The methodological dimension of scientifically based reading instruction involves the "how" of teaching reading as well. According to the National Reading Panel (2000), the five essential components of reading must be directly taught in an explicit and systematic manner in order to ensure that all students are successful readers by the end of Grade 3. The recommended instructional methodology is direct instruction of relevant skills in each of the five core elements using a variety of teacher-driven instructional tactics. Also important is the frequent assessment of individual student progress coupled with formative evaluation principles leading to possible changes in instructional practice or goals (Foorman, Fletcher, Francis, Schatschneider, & Mehta, 1998; Good, Simmons, & Kame'enui, 2001; Moats, 1999; Torgesen, Alexander, Wagner, Rashotte, Voeller, & Conway, 2001). Scientifically based reading instruction includes a number of instructional components that have been found to be effective with struggling at-risk readers, including, among others, (1) explicit instruction with modeling, (2) systematic instruction with scaffolding, (3) multiple opportunities for practice, (4) immediate corrective feedback, and (5) ongoing monitoring of progress (Vaughn & Linan-Thompson, 2004).

Although there is broad agreement between the National Reading Panel, the National Research Council, and other sources on the key principles and features of scientifically based reading instruction, the methodological aspect of determining the science upon which scientifically based reading instruction is based differs somewhat between the various sources. The key difference is the extent to which the research base is limited to experimental or quasi-experimental research designs, in which subjects (individuals, classrooms, or schools) are assigned to different conditions and the conditions are sufficiently controlled to provide strong assurance that any observed (or measured) differences in effects can be attributed to the differences in the conditions of interest (National Reading Panel, 2000). In the National Reading Panel (2000) report and in NCLB, experimental research is given a clear priority (see Appendix A); it becomes almost a synonym for the term scientifically based, which NCLB mentions 181 times. This reflects the fact that unlike the research in many areas of education, reading content and instructional methodology are supported by considerable research that is rigorous and systematic and meets the experimental or quasi-experimental standard. A brief discussion of the differences and advantages of different research methodologies can be found in Appendix C.

The Science of Reading and Federal Policy Mandates

Federal education statutes such as IDEA (2004) and NCLB explicitly mandate the use of scientifically based reading instruction and scientifically based reading research principles in general, remedial, and special education. The intent of Congress was to ensure that all children are taught through the most scientifically sound instructional methods established through systematic, empirical methods of research. NCLB and especially IDEA make it clear that this involves not simply the adoption of acceptable curricula and teaching practices but a greater alignment between scientifically based understanding of reading instruction and requirements in areas such as teacher qualifications, accountability mechanisms, and data collection. These considerations affect expectations for the kinds of education policies and practices states and school districts adopt as well as for the nature of the reports on educational progress states are required to submit to the U.S. Department of Education.

Thus, with regard to the definition of a child with a disability, for example, IDEA (2004) states:

> A child shall not be determined to be a child with a disability if the determinant factor for that determination is—
>
> (A) lack of appropriate instruction in reading, including in the essential components of reading instruction (as defined in section 1208(3) of the Elementary and Secondary Education Act of 1965);
>
> (B) lack of instruction in math; or
>
> (C) limited English proficiency. (pp. 2705–2706)

A strong interpretation of this requirement would prevent referrals to special education unless scientifically based reading research principles were implemented in general education and remedial education prior to the consideration of special education eligibility.

Of particular interest for the present discussion is the fact that federal statutes now also prescribe the qualifications of classroom teachers. At the most basic level, both NCLB and IDEA mandate that every public classroom (with core content being taught) must have a "highly qualified teacher"—that is, a teacher who has an undergraduate degree, demonstrates subject-matter knowledge in the discipline(s) he or she is teaching, and holds a valid teaching license. In the case of special education, there is a new context for delivering services to at-risk students under the response-to-intervention model introduced in IDEA (2004). Initially, at-risk students are to be taught by general education teachers just as in the past. For the first time, however, their reading instruction must be based upon scientific, research-based principles and their progress monitored frequently to determine appropriate instructional goals and classroom intervention options. This means there is now more concentrated focus on general education teachers being prepared to teach students with a variety of special learning needs in addition to the increased necessity for collaboration between general and special education teachers.

Effective implementation of these new policies and legal requirements depends upon the availability of teachers who can deliver high-quality, scientifically based reading instruction. Thus, the requirements for compliance with scientifically based reading research and scientifically based reading instruction provisions in NCLB and IDEA impose obligations on states, teachers, faculty in institutions of higher education (IHEs), and others. For example, states need to implement policies governing teacher licensure and the approval of teacher preparation programs in order to ensure that teachers are adequately prepared to teach scientifically based

reading instruction. Teacher preparation programs in IHEs need to ensure that their curricula reflect the knowledge of scientifically based reading research and the principles of scientifically based reading instruction so that their graduates can be effective teachers of reading. No one who is aware of current education policy can disregard scientifically based instructional approaches or the broad body of work focusing on early identification and intervention reflected in the studies of some of the leading reading scientists (Denton, Foorman, & Mathes, 2003; Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997; Foorman et al., 1998; Foorman, Schatschneider, Eakin, Fletcher, Moats, & Francis, 2006; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2002; Torgesen et al., 2001; Vellutino, Scanlon, Small, & Fanuele, 2006). Policies, guidelines, and standards derived from NCLB and IDEA must be designed to guarantee that scientifically based reading instruction is implemented by highly qualified teachers and, furthermore, that the right to learn how to read is assured to every student in every general, remedial, and special education classroom in the United States.

Ensuring Teachers Are Qualified to Teach Scientifically Based Reading Instruction

Unfortunately, instructional practice in U.S. schools generally does not reflect the scientifically based research about reading instruction. This is clear not only from the poor student showing on assessments of their reading ability but also from the widespread adoption of questionable approaches to reading instruction. Teachers often are encouraged, for example, to develop a "personal" theory of reading instruction rather than to study and learn to apply scientifically based reading research and scientifically based reading instruction in their teaching (Walsh, Glaser, & Wilcox, 2006).

There are several potential points of impact that can improve this situation and provide teachers with grounding in scientifically based reading research and scientifically based reading instruction. For the current teacher force, good professional development opportunities need to be more available. The focus of this discussion, however, is the preparation of beginning teachers, and here there are important mechanisms that can be employed to increase the likelihood that beginning teachers will be able to practice scientifically based reading instruction successfully in the classroom. Appropriate professional development for IHE faculty is an important consideration; those who teach teachers must themselves be well grounded in scientifically based reading research and scientifically based reading instruction. There are three other points of impact, as follows:

- Alignment of professional association standards, including program accreditation standards, with scientifically based reading research and scientifically based reading instruction.

- Alignment of state standards for program approval and teacher licensure with scientifically based reading research and scientifically based reading instruction.
- Implementation of scientifically based reading instruction and scientifically based reading research in the teacher preparation curriculum of IHEs or other teacher preparation venues.

Alignment of Professional Association Standards

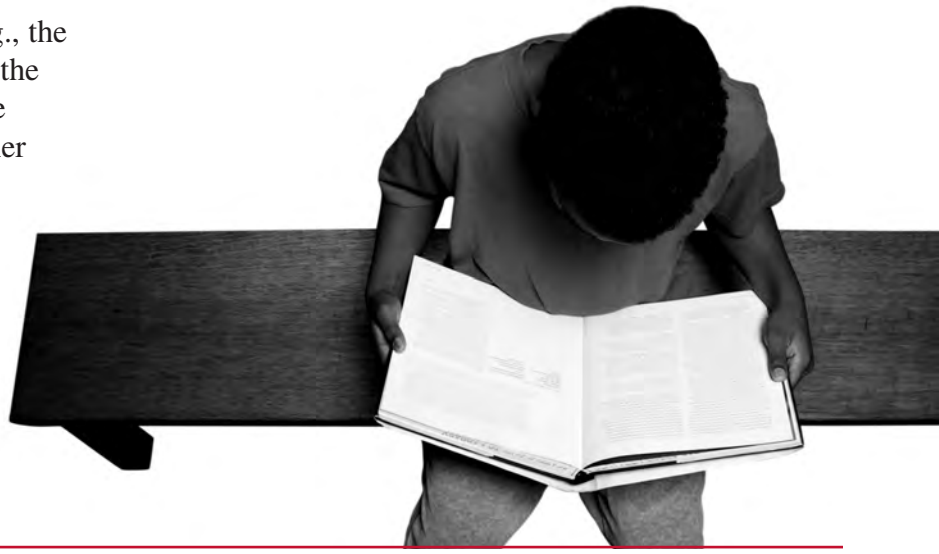
Professional associations are important sources of standards for undergraduate and graduate preparation of personnel in the different educational professions. Several professional associations publish standards that include content on teaching reading. The key professional associations and their most recent standards are the National Council for the Accreditation of Teacher Education (NCATE, 2006), the American Association of Colleges for Teacher Education (AACTE, 2002), and the International Reading Association (IRA, 2004). Also important in the field of special education is the Council for Exceptional Children (CEC, 2003).

NCATE is the principal accreditation agency in the United States for teacher education. It accredits schools, colleges, and departments of education and, in the process, reviews and evaluates specific education programs such as elementary education, mathematics education, and special education. Specific professional subject organizations (e.g., the National Council of Teachers of Mathematics, the National Science Teachers Association, and the National Council of Teachers of English) partner with NCATE in developing detailed content standards that define what teachers of those subjects should know. Currently, two such organizations play a critical role in defining the NCATE content standards for reading in the early grades: IRA and the Association for Childhood Education International.

AACTE is a voluntary association of 800 higher education institutions and a number of other organizations across the United States that is dedicated to ensuring high-quality PK–12 teacher preparation and professional development. AACTE is closely linked with NCATE as one of the latter's constituent organizations; it also has a representative on the NCATE board. In the fall of 2002, the AACTE Focus Council on Literacy published a white paper titled *Research-Based Literacy Instruction: Implications for Higher Education*. A list of "standards" can be extrapolated from the AACTE paper, reflecting the organization's view of what teachers need to know in order to teach reading and writing effectively in Grades K–4.

IRA is the world's largest organization of reading professionals, with a current U.S. membership of 80,000. The association is dedicated to improving the quality of reading education, disseminating research and information about reading, and encouraging the public to read. IRA has published several documents designed to assist colleges and universities as they develop or modify teacher preparation programs in reading. These documents include *Standards for Reading Professionals—Revised 2003* (IRA, 2004).

CEC is the largest organization devoted to promoting standards and educational opportunities for students with disabilities. CEC also establishes



standards to define critical teacher preparation elements in special education. CEC is an umbrella organization that includes many divisions based on disability categories (e.g., learning disabilities, developmental disabilities) or professional roles (e.g., special education administrators). The CEC standards are used in NCATE accreditation of special education teacher preparation programs.

In a comprehensive analysis, Smartt and Reschly (2007) reported that the key professional organizations do not establish specific standards that treat scientifically based reading instruction principles in depth. The organizations generally endorse evidence-based instruction and usually mention the five essential components of reading (phonemic awareness, phonics, fluency, vocabulary, and comprehension). They do not, however, require in-depth preparation in scientifically based reading instructional practices (e.g., integration of the component areas, systematic and explicit instruction, universal screening, and progress monitoring).

A critical issue is whether professional organization endorsement of evidence-based practices and mentioning the five essential components of reading is sufficient to ensure teacher preparation in scientifically based reading instruction. Results from studies of NCATE and state accredited, and CEC approved, teacher preparation programs do not support confidence in these assumptions. Fully accredited or approved teacher education programs for general education (Walsh et al., 2006) and special education (Reschly, Holdheide, Smartt, & Oliver, 2007) typically do *not* incorporate scientifically based reading instruction principles. Perhaps more explicit and detailed scientifically based reading instruction standards would improve this situation.

In sum, although the NCATE, AACTE, IRA, and CEC professional standards have improved, especially since the publication of the National Reading Panel (2000) report, current reading standards do not address several elements of scientifically based reading instruction. In addition to the five essential components of reading, teachers need competencies to, (1) determine the level of proficiency of their students in each of the five components of reading, (2) assess the progress of their students and determine effectiveness of instruction, (3) apply explicit and systematic instruction, and (4) modify instruction based on student progress toward benchmark standards.

Alignment of State Standards for Program Approval and Teacher Licensure

Through collaborative agreements with NCATE, the majority of states use NCATE standards for approving teacher preparation programs. In these states, passing an NCATE accreditation assessment automatically leads to teacher education program approval by the state. As noted earlier, the NCATE standards regarding scientifically based reading instruction and scientifically based reading research are not sufficient to ensure that teachers are prepared to deliver scientifically based reading instruction.

A similar situation exists with regard to state teacher licensure standards, which are often integrated closely with standards for teacher preparation program approval. Indeed, there are important reciprocal relationships between licensing test content, professional and state standards, and teacher preparation program content. In fact, ETS—one of the two principal publishers of teacher licensure examinations—uses job analysis surveys, surveys of and interviews with teachers and teacher educators, and national disciplinary standards in developing content for its Praxis series of tests (www.ets.org). For reading in particular, ETS uses IRA and the National Council of Teachers of English (www.ncte.org) as advisors for developing test items.

Some 35 states use the ETS Praxis series of tests. These include the Praxis I tests of basic knowledge, which are frequently required for entry into teacher preparation programs; the Praxis II tests, which assess more sophisticated knowledge of subject matter and pedagogy; and in a few states, the Praxis III tests, given to teachers as a prerequisite for a more advanced stage of licensure after a year or more of experience in the classroom. However, several of the more populous states—such as California, Illinois, Michigan, New York, and Texas—have chosen the National Evaluation Systems (NES) company (www.nesinc.com) to develop licensure tests designed to meet their unique state regulations and requirements.

A comparison of the NES and Praxis II examinations (Stotsky, 2006) indicates that the NES examinations place greater emphasis on knowledge of how to teach reading according to the basic components of scientifically based reading instruction. Stotsky (2006) and Rigden (2006) independently analyzed the content in current specific Praxis tests required for licensure as an elementary teacher, reading teacher, reading specialist, early childhood teacher, and special education teacher. They both concluded that most of these tests do not adequately assess scientifically based reading instruction and scientifically based reading research. The one version of the Praxis test that includes more scientifically based reading research and scientifically based reading instruction content is used in only one state (Stotsky, 2006).

The situation for special education teachers mirrors that of general education teachers. Each state sets its own requirements for special education teacher licensure. Typically, the special education licensing exam measures only areas related to understanding exceptionality, legal requirements, and service delivery options. In general, there is little emphasis on scientifically based reading research and scientifically based reading instruction in either the Praxis II or NES tests for special education teachers, with the notable exceptions of California, Massachusetts and Virginia. Each of these three states requires all prospective special education teachers and elementary teachers to take the state-specific early childhood and elementary teacher's reading test (Stotsky, 2006).

Teacher Preparation Curriculum

Teacher preparation in scientifically based reading research is crucial to improving reading outcomes (McCutchen, Abbott, et al., 2002). Students' progress in reading development has been linked to teachers' knowledge of reading content (e.g., language structure, word structure, phoneme-grapheme correspondences) (Kroese, Mather, & Sammons, 2006; Spear-Swerling & Brucker, 2004). As noted earlier, professional association standards influence IHE teacher preparation programs, and the standards, in turn, are influenced by IHEs. Higher education faculty in particular plays a key leadership role in the professional associations and in their efforts to set standards. It is problematic, therefore, that professional association standards, though improving, continue to have significant shortcomings in their incorporation of and consistency with key elements of scientifically based reading research and scientifically based reading instruction. This translates into a frequent lack in IHE teacher preparation programs of explicit, direct guidance to teacher candidates in dealing adequately with students at risk for reading failure, particularly in supporting struggling readers early, assessing their progress adequately, and knowing what type of focused intervention is needed.

A recent report by the National Council on Teacher Quality (NCTQ), *What Education Schools Aren't Teaching About Reading and What Elementary Teachers Aren't Learning* (Walsh et al., 2006), drew several troubling conclusions about the current state of teacher preparation in reading. It found that the vast majority of IHEs preparing elementary teachers do not teach scientifically based reading research principles in basic courses on reading instruction. Only 11 of 72 institutions surveyed were credited with teaching all five components of scientifically based reading instruction, and 31 of the 72 did not appear to teach any of them. Similar findings were reported by Reschly et al. (2007) in a study of special education teacher preparation in a large state with more than 30 higher education preparation programs.

In the Walsh study, a balanced approach to reading, essentially a whole-language orientation with little explicit teaching of skills in the five key reading areas, dominated the curricula of the institutions studied rather than scientifically based reading instruction principles (Moats 2007). Furthermore, Moats added that most of the textbooks examined did not include critical scientifically based reading research and scientifically based reading instruction content, and students were urged to develop their personal philosophies of literacy instruction rather than to learn and apply principles of scientifically based reading research.

The NCTQ report was based upon a study of course syllabi, textbooks, and other artifacts from randomly selected institutions of greatly varying size, student diversity, prestige, and institutional mission. However it should be noted that the methodology of the report had some limitations. Though syllabi provide a helpful window into what a course intends to teach and what is expected of its students, instructors do not always follow the syllabus faithfully and do not always include in the syllabus all important course details. In addition, the NCTQ report lacked an in-depth examination of all course materials and assignments. Nevertheless, the report's findings are consistent with those of an earlier study that also examined syllabi (Steiner & Rozen, 2004), in which they also reflect the inadequacies noted earlier in state licensure requirements and professional association standards.

Recommendations for Improving the Teaching of Reading

The recommendations for improving the ability of teachers to teach reading follow from the inadequacies identified earlier in the professional association standards, state standards for approval of preparation programs and teacher licensure, and the reading education instruction that is delivered in the nation's colleges and universities.

Improving Professional Association Standards

The standards of the professional associations that influence teacher preparation in reading and the practice of reading instruction can be strengthened significantly by addressing their lack of alignment with scientifically based reading instruction and scientifically based reading research. Specific recommendations for improving the standards along these lines would include the following:

- Establish specific standards for teaching the five essential components of reading.
- Establish requirements regarding teacher knowledge of the structure of the English language.
- Establish standards that require clear mastery of scientifically based reading research and scientifically based reading instruction, including methods to teach students with special needs and at-risk characteristics, and knowledge of explicit and systematic strategies.
- Establish expectations for the development of a well-designed sequence of reading education courses in teacher preparation, including acquisition of early reading skills and language development, integration of reading components, and supervised practice with feedback on teaching performance.
- Establish standards for the assessment of PK–12 student performance, including standards for student screening and monitoring student progress.

The National Reading Panel (2000) report is an important resource for improving professional association standards, along with three additional sources:

- "Knowledge and Skills for Teaching Reading: A Core Curriculum for Teacher Candidates," in Moats (1999), *Teaching Reading Is Rocket Science*. This curriculum has been used with success to train teachers in both preservice and inservice settings throughout the country.
- *A Blueprint for Professional Development for Teachers of Reading and Writing: Knowledge, Skills and Learning Activities* (Moats, 2001) explains the essential components of scientifically based reading instruction. This document currently is being used by some state departments of education (e.g., Colorado, Maryland) in the development of program standards and teacher licensure requirements.
- *First Grade Teachers' Knowledge of Phonological Awareness and Code Concepts* (Brady et al., in press). Brady and her colleagues provide guidelines of basic knowledge required by first-grade teachers and emphasize the importance of teachers having a strong understanding of the structures of language and orthography, reading development, and the critical factors that influence reading acquisition (McCutchen, Abbott, et al., 2002; McCutchen, Harry, Cunningham, Cox, Sidman, & Covill, 2002; Moats, 2002; Pressley, Roehrig, Bogner, Raphael, & Dolezal, 2002; Spear-Swerling & Brucker, 2004).

Improving State Standards for Program Approval and Teacher Licensure

The creation and adoption of better teacher licensing examinations that focus on a research-based approach to the teaching of reading, along with parallel revisions in program approval standards, are critical steps for states to take in their efforts to ensure the availability of effective reading teachers for all students. Several states have made significant changes in their standards for preparation program approval and teacher licensure, and their efforts hold considerable promise as models for other states.

Maryland and Colorado, for example, have developed standards that require scientifically based reading instruction and scientifically based reading research in teacher preparation coursework. In Maryland, after an initial orientation to scientifically based reading research, IHEs received technical assistance in revising courses to comply with scientifically based reading instruction and scientifically based reading research guidelines. The state allocated funding to enable IHEs to develop model course outlines that are now used by several Maryland institutions (www.marylandpublicschools.org).

Following a similar strategy, the Colorado Department of Education amended the Rules for Administration of the Colorado Basic Literacy Act and the Educator Licensing Act to reflect the findings of scientifically based reading research and ensure that scientifically based reading instruction is implemented in Colorado classrooms and teacher preparation programs. They developed the Colorado Teacher Preparation Program Approval Rubric and Review Checklist for Literacy, which are used by the Department's Reading Directorate to ensure that the state's teacher preparation programs include the most current scientific research on literacy standards, assessment, and instruction in their courses. These will be used as part of the normal five-year review of all teacher preparation programs that is to be completed by 2011 (www.cde.state.co.us/edprepprogram/epp_index.htm).

In addition to revising standards for preparation program approval, several states are implementing examinations that do a much better job of assessing teacher licensure candidates' qualifications in scientifically based reading instruction. Rigden (2006) cited three states in which examinations developed by NES are directly aligned to elementary teaching standards: the Massachusetts Foundations of Reading (PK–6) test 90; the California Reading Instruction Competence Assessment; and the Virginia Reading Assessment for Elementary and Special Education Teachers. Rigden (2006) also identified the ETS Praxis II test 0201, "Reading Across the Curriculum: Elementary," as better aligned with scientifically based reading research than other ETS Praxis tests for elementary and special education teachers.

Improving the Teacher Preparation Curriculum

While a number of IHEs do a good job of preparing teachers to teach reading consistent with scientifically based reading research and have aligned their syllabi and provided solid professional development to their faculty, far too many preparation programs remain inadequate (Walsh et al., 2006). Implementing change in IHE teacher preparation programs, however, is a complex undertaking. Faculty tenure and control over the hiring and promotion of colleagues, coupled with faculty control over the curriculum and program graduation requirements, make universities resistant to change. Increasing pressure, regulation, and scrutiny by state and federal governments, however, is likely to force IHE teacher preparation programs to be responsive or face serious consequences.

One of the significant developments during the last 10 years in teacher preparation is the increasing proliferation of a range of alternative options to meet the nation's need for preparing teachers. Thus, IHEs no longer have a monopoly on teacher preparation. In some states, one third or more of newly licensed teachers have completed requirements through

alternative pathways or graduated from freestanding, nontraditional preparation programs. Alternative providers of teacher preparation may expand more rapidly in the future if traditional programs are unresponsive to federal and state policy mandates. One interesting consequence of this increasing diversity of teacher preparation options incidentally is that it seemingly increases the need for greater attention to state and national program approval and accreditation standards.

One very promising approach to the alignment of teacher preparation course curricula with scientifically based reading research bears mention—the Higher Education Collaborative that was first funded in 2002 by the Texas Education Agency (www.texasreading.org/utcrla/pd/hec.asp). The collaborative, a purely voluntary association of more than 300 members from 86 teacher education and educational administration programs, has become an important facet of Texas Reading First. The collaborative's objectives include (1) ensuring that teacher educators and administrators are knowledgeable about components of scientifically based reading research and scientifically based reading instruction and incorporate these critical components into teacher and administrator preparation courses, (2) providing materials based on scientifically based reading research and scientifically based reading instruction to teacher educators for use in preparing teachers, and (3) establishing a community of members who collaborate in the ongoing process of adjusting their instruction and developing materials to improve the preparation of teachers and school administrators. The group's leadership provides seminars with nationally recognized reading researchers, and members receive instructional materials designed to assist in teaching scientifically based reading research courses. Collaboration is further enhanced through online communication between faculty and project staff. In addition, project staff provides technical assistance in IHE classroom visits that include observations and syllabi review in order to document the degree to which faculty integrate scientifically based reading research and practices into their courses.

Innovation Configurations to Improve Implementation of Scientifically Based Reading Instruction

An innovation configuration is another promising tool to communicate essential features of scientifically based reading instruction to several audiences including local administrators and classroom teachers, college professors in teacher preparation programs, state education authorities, and professional association leaders (Hall & Hord, 1987; Roy & Hord, 2004). Innovation configurations have been used for at least 30 years to assess the development and implementation of educational innovations, fidelity of instructional practices, and content of teacher education programs and continuing professional development. Innovation configurations specify key competencies or desired outcomes such as knowledge of the major components of reading instruction and specify different levels of implementation or, in the case of teacher preparation and professional development, different levels of understanding and use.

In their 2004 paper, Roy and Hord discuss using innovation configurations to assess implementation of standards in continuing professional development and other teacher preparation programs. Innovation configurations typically have two dimensions: essential components and degree of implementation (Hall & Hord, 1987; Roy & Hord, 2004).

Appendix B illustrates these two dimensions in the context of the scientifically based reading instruction innovation configuration. First, essential components (or desired outcomes) of the innovation or program are listed in the rows of the far left column of the table, sometimes with descriptors and examples to guide application of the criteria to coursework and classroom practices. The essential components of the innovation configuration should be based on research or policy (preferably both).

The top row of the table in Appendix B shows the levels of implementation, ranging from nonuse to ideal implementation. As an example, when assessing teacher preparation course syllabi, *no evidence* of the essential component is the lowest level of implementation and is assigned a score of zero. Increasing levels of implementation are assigned progressively higher scores. In this example, these levels are as follows:

- ***No evidence*** the component is not mentioned in the syllabus (score=0).
- ***Mentioned*** the component is mentioned in the syllabus (score=1).
- ***Mentioned, plus readings and tests or quizzes*** specified in the syllabus (score=2).
- ***Mentioned, plus readings and tests or quizzes, and assignments such as papers or projects*** required in the syllabus (score=3).
- ***All prior levels, plus supervised practice (field work) with feedback about degree of success*** required in the syllabus (score=4).

When the purpose for using the innovation configuration is to obtain scores or quantify implementation, the scores created to represent different levels of implementation are on an ordinal scale. That is, a higher number indicates more of something, in this case more thorough implementation of an innovation configuration component. These scale points cannot, however, be interpreted as if the intervals between the scores are equal. That is, the difference between 1 and 2 cannot be assumed to be the same amount as the difference as between 3 and 4. Furthermore, a score of 4 indicates more thorough implementation than a score of 2, but it cannot be interpreted as twice as much of some quality as a score of 2. We urge readers and potential users to consider these limitations in the score scale when using it.

Inservice Technical Assistance in Scientifically Based Reading Instruction

Finally, in addition to preservice teacher preparation, it is critical to address the need for technical assistance in scientifically based reading instruction and scientifically based reading research with current teachers. Most currently licensed and practicing teachers were not educated in the knowledge base defined by scientifically based reading research, and it is imperative to provide them with the appropriate knowledge and skill if the goal is to assist all children to become proficient readers. Continuing education for current teachers in scientifically based reading instruction is being developed at NCCTQ and other agencies.

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Appendix A. NCLB Criteria for Scientifically Based Research

Section 9101(37) of NCLB (2002) defines the term scientifically based research as follows:

> (A) means research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs; and
>
> (B) includes research that
>
> (i) employs systematic, empirical methods that draw on observation or experiment;
>
> (ii) involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn;
>
> (iii) relies on measurements or observational methods that provide reliable and valid data across evaluators and observers, across multiple measurements and observations, and across studies by the same or different investigators;
>
> (iv) is evaluated using experimental or quasi-experimental designs in which individuals, entities, programs, or activities are assigned to different conditions and with appropriate controls to evaluate the effects of the condition of interest, with a preference for random-assigned experiments, or other designs to the extent that those designs contain within-condition or across-condition controls;
>
> (v) ensures that experimental studies are presented in sufficient detail and clarity to allow for replication or, at a minimum, offer the opportunity to build systematically on their findings; and
>
> (vi) has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review. (pp. 1964–1965)

Appendix B. Scientifically Based Reading Instruction Innovation Configuration

Instructor Teaches Components	Level 0	Level 1	Level 2	Level 3	Level 4
SBRR/NCLB/IDEA • *Preventing Reading Difficulties in Young Children* (1998) • National Reading Panel Report (2002) • Reading success for **all** students • Scientifically based research—randomized studies, peer reviewed, replicated, minimize bias • NCLB law—mandates SBRR • Research-based strategies • Five essential elements of reading: (phonemic awareness, phonics, fluency, comprehension, vocabulary)	**No evidence** that teaching ***SBRR/NCLB /IDEA*** as part of reading instruction is included in the class syllabus	SBRR/NCLB/IDEA **mentioned in class syllabus**	SBRR/NCLB/IDEA mentioned in class and required **readings and tests or quizzes**	SBRR/NCLB/IDEA mentioned in class, with readings, tests, and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	SBRR/NCLB/IDEA mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Phonemic Awareness (This is ideally subsumed under the broader topic Phonological Awareness) • Individual speech sounds, phonemes • Precursor to phonics • Detect, segment, blend, manipulate phonemes (sounds) ex. /b/ /a/ /t/ =bat • Rhyming, alliteration in preschool, K • Ability to manipulate sounds at the phoneme (sound) level • Elkonin boxes—common activity • Early indicator of risk	**No evidence** that teaching ***Phonemic Awareness*** as part of reading instruction is included in the class syllabus	Phonemic Awareness **mentioned in class syllabus**	Phonemic Awareness mentioned in class and required **readings and tests or quizzes**	Phonemic Awareness mentioned in class, with readings, tests, and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Phonemic Awareness mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring

Instructor Teaches Components	Level 0	Level 1	Level 2	Level 3	Level 4
Phonics • Correspondence of sounds and letters • Phoneme-grapheme correspondences • Blending, decoding, encoding • Syllable types • Nonsense words (assessment) • Alphabetic principle • Word analysis • Words are composed of letters (graphemes) that map to phonemes • Letters and sounds work systematically	**No evidence** that teaching ***Phonics*** as part of reading instruction is included in the class syllabus	Phonics **mentioned in class syllabus**	Phonics mentioned in class and required **readings and tests or quizzes**	Phonics mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Phonics mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Fluency • Rate, accuracy, and prosody • Repeated readings • Fluency training • Partner reading • Measurable goals • Chart progress	**No evidence** that teaching ***Fluency*** as part of reading instruction is included in the class syllabus	Fluency **mentioned in class syllabus**	Fluency mentioned in class and required **readings and tests or quizzes**	Fluency mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Fluency mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring

Instructor Teaches Components	Level 0	Level 1	Level 2	Level 3	Level 4
Vocabulary • Taught directly and indirectly • Preteach • Oral language • Multiple contexts, meanings • Choosing and leveling words for explicit instruction • Word consciousness • Context • Morphemes	**No evidence** that teaching ***Vocabulary*** as part of reading instruction is included in the class syllabus	Vocabulary **mentioned in class syllabus**	Vocabulary mentioned in class and required **readings and tests or quizzes**	Vocabulary mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Vocabulary mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Comprehension • Questioning strategies (i.e. before, during, and after reading) • Summarize, predict, retell • Metacognitive strategies • Teach both narrative and expository text structure • Collaborative Strategic Reading	**No evidence** that teaching ***Comprehension*** as part of reading instruction is included in the class syllabus	Comprehension **mentioned in class syllabus**	Comprehension mentioned in class and required **readings and tests or quizzes**	Comprehension mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Comprehension mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Integration • Planned connections of instruction for five essential elements of reading • Weaving of five essential elements of reading (or any combination of elements), first taught in isolation, always placed back in meaningful context	**No evidence** that teaching ***Integration*** as part of reading instruction is included in the class syllabus	Integration **mentioned in class syllabus**	Integration mentioned in class and required **readings and tests or quizzes**	Integration mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Integration mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring

Instructor Teaches Components	Level 0	Level 1	Level 2	Level 3	Level 4
Systematic Instruction • Planned, purposeful, sequential • Step-by-step • Teach from easy to difficult, e.g., certain letters (b, m, a) before others (y, x, tch). • Directions for determining if reading programs use skills sequence and provide adequate practice	**No evidence** that teaching ***Systematic Instruction*** as part of reading instruction is included in the class syllabus	Systematic Instruction **mentioned in class syllabus**	Systematic Instruction mentioned in class and required **readings and tests or quizzes**	Systematic Instruction mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Systematic Instruction mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Explicit Instruction • Direct, straightforward • No room for guessing • Example: This is the letter B, it represents the /b/ sound. • I do it, we do it, you do it	**No evidence** that teaching ***Explicit Instruction*** as part of reading instruction is included in the class syllabus	Explicit Instruction **mentioned in class syllabus**	Explicit Instruction mentioned in class and required **readings and tests or quizzes**	Explicit Instruction mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Explicit Instruction mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring
Screening Assessment • Early identification and prevention • Brief measures • **All** students • Identifying students that require additional support • Valid and reliable instruments	**No evidence** that teaching ***Screening Assessment*** as part of reading instruction is included in the class syllabus	Screening Assessment **mentioned in class syllabus**	Screening Assessment mentioned in class and required **readings and tests or quizzes**	Screening Assessment mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Screening Assessment mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring

Instructor Teaches Components	Level 0	Level 1	Level 2	Level 3	Level 4
Progress Monitoring Assessment • On-going and frequent assessment for those requiring additional support • Provide additional support, monitor every 1-2 weeks, and so on • Instructional modifications made accordingly • Reflects appropriateness of the teacher's intervention	**No evidence** that teaching ***Progress Monitoring*** as part of reading instruction is included in the class syllabus	Progress Monitoring **mentioned in class syllabus**	Progress Monitoring mentioned in class and required **readings and tests or quizzes**	Progress Monitoring mentioned in class, with readings, tests and **assignments or projects for application** • Observations • Lesson Plans • Classroom Modeling	Progress Monitoring mentioned in class, required reading, tests, quizzes, assignments, projects, **and teaching with application and feedback** • Field Work (practicum) • Tutoring

Appendix C. Research Methodologies

A clear hierarchy exists regarding research methodologies and the kind of inferences or assertions that legitimately can be made from studies with differing methodologies. Strong cause-and-effect statements are restricted to randomized controlled trials (i.e., random assignment of participants to contrasting treatments under precise experimental control of conditions). This research model in comparison to others can provide strong indication that one program or treatment is clearly superior to alternatives. Much weaker inferences about causation are possible from some complex, correlational multivariate designs (i.e., research that uses sophisticated statistical techniques such as hierarchical linear modeling). Traditional correlational designs do not permit cause-effect assertions, only evidence that two or more variables are positively or negatively associated with each other. Descriptive methods are sometimes useful for portraying current patterns, but of course no cause-effect statements can be made. Finally, qualitative methods may be useful to describe specific situations and as a basis for hypotheses that may be studied further through other methodologies. Inferences from qualitative studies are limited in generalizability and cannot be construed as cause-effect assertions. All good empirical research, however, should be capable of replication of its results by other scholars and publication in peer-reviewed journals.

The randomized controlled trial model, however, limits the research evidence that can be considered in decisions about what programs or treatments work best for children and youth. Current discussions at the Federal level and in professional associations (Odom, Brantlinger, Gersten, Horner, Thompson, & Harris, 2005) suggest modifying "scientifically based" to "evidence based." First, "evidence based" incorporates a broader range of research methodologies, including single-subject designs, correlational research, and qualitative inquiry. Second, broadening the acceptable research methodology expands the literature on effective practices since there are relatively few educational areas with ample scientifically based research to guide practice. The problem with broadening this scope, of course, is that the expanded repertoire of research has significant limitations in the inferences it supports.

About NCCTQ

The National Comprehensive Center for Teacher Quality (NCCTQ) was launched on October 2, 2005, after Learning Point Associates and its partners—Education Commission of the States, ETS, and Vanderbilt University—entered into a five-year cooperative agreement with the U.S. Department of Education to operate the teacher quality content center.

NCCTQ is a part of the U.S. Department of Education's Comprehensive Centers program, which includes 16 regional comprehensive assistance centers that provide technical assistance to states within a specified boundary and five content centers that provide expert assistance to benefit states and districts nationwide on key issues related to the goals of the No Child Left Behind Act.

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