

An hourglass-shaped graphic with a globe in the top bulb and another globe in the bottom bulb. The hourglass is light blue and has a dark blue cap at the top. The globe in the top bulb is dark blue, and the globe in the bottom bulb is light blue. The text is centered within the hourglass.

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February 2, 2009

Congressional Research Service

Report RL32145

*Early Intervention in Reading: An Overview of Research and
Policy Issues*

Gail McCallion, Domestic Social Policy Division

Updated November 13, 2003

Abstract. This report summarizes evidence regarding the effectiveness of early intervention in general; and in specific, examines early intervention to improve reading skills.

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CRS Report for Congress

Received through the CRS Web

Early Intervention in Reading: An Overview of Research and Policy Issues

November 13, 2003

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Early Intervention in Reading: An Overview of Research and Policy Issues

Summary

A significant body of research has emerged examining the potential short-term and long-term effects of early intervention for children having difficulty in acquiring reading skills. Many researchers believe that early intervention with children who experience difficulty in learning to read is more efficacious, and ultimately more cost-effective, than attempts at later remediation. This research, in conjunction with data indicating that the majority of children with learning disabilities have a primary disability in reading, has led Congress to support efforts to intervene early to assist children with reading difficulties develop the skills they need, rather than attempt remediation with impaired readers later in their school years. Reading First and Early Reading First were drafted with the intent of incorporating the latest scientific understanding on what works in teaching reading.

Recent longitudinal data indicate that an above average home literacy environment, as well as good health, possession of certain literacy skills, and a positive approach to learning, are all positively related to reading achievement (even after controlling for race/ethnicity and poverty). Overall the research on early intervention finds positive short-term effects of high-quality early childhood programs in terms of cognitive skills, school readiness and social behavior; and positive long-term effects in terms of greater high school completion rates, higher earnings, less criminal activity and less welfare use for “model” early intervention programs. Long-term effects from more “typical” programs, such as Head Start, are not conclusive. In part this is due to the difficulty of separating the influence of early intervention from all the other factors that are significant in influencing long-term success.

Much of the reading research has focused specifically on the word-level reading difficulties that many children with reading difficulties experience. In this regard, the National Reading Panel (NRP) report has provided concrete suggestions on how to improve the teaching of reading. The NRP report has received significant positive as well as critical attention; and its research conclusions have been important in implementation of the new Reading First and Early Reading First programs.

Many reading researchers assert that a strategy of early intervention focused on identification and instruction of children with reading difficulties would significantly decrease the number of older children identified with learning disabilities, would be more efficacious than later remediation, and would reduce the need for special education placements. Practically, reading research has important policy implications in helping to craft programs that will effectively provide early intervention in reading with the ultimate goal of increasing the number of proficient readers and diminishing the need for subsequent intensive and expensive intervention. This report will not be updated.

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Early Intervention in Reading: An Overview of Research and Policy Issues

There is a significant body of research examining the potential short-term and long-term effects of early intervention for children with difficulty in acquiring reading skills. Many researchers believe that early intervention with children who experience difficulty in learning to read is more efficacious, and ultimately more cost-effective, than attempts at later remediation. This research, in conjunction with data indicating that the majority of children with learning disabilities have a primary disability in reading, has led Congress to support efforts to intervene early to assist children with reading difficulties develop the skills they need, rather than attempt remediation with impaired readers later in their school years. Reading First and Early Reading First were drafted with the intent of incorporating the latest scientific understanding on what works in teaching reading.¹ This report summarizes evidence regarding the effectiveness of early intervention in general; and in specific, examines early intervention to improve reading skills.

Background: Early Intervention

There is an extensive and growing body of research examining the effectiveness (usually measured by cognitive functioning, school readiness, and/or social adjustment in the shorter-run; and by subsequent wages, high school graduation rates, criminal activity, and welfare use in the longer-run) of early childhood programs.² In some instances, subsequent placement in special education is also considered.

¹ Reading First and Early Reading First were authorized in P.L. 107-110. For ongoing updated information on Reading First and Early Reading First see CRS Report RL31241, *Reading First and Early Reading First: Background and Funding*, by Gail McCallion.

² In Dec. 2000, a study titled *Eager to Learn* was released by the Committee on Early Childhood Pedagogy. The Committee was established by the National Research Council in 1997 to review and synthesize the theory and research on early childhood pedagogy, and to make recommendations, based on the present state of knowledge, for early childhood education programs and public policy. *Eager to Learn* included 19 specific recommendations in four major areas: (1) teacher training; (2) teaching materials; (3) public policies to support quality preschools; and (4) dissemination of information on preschool development. The Committee made recommendations in all four of these areas that it argued would significantly improve the U.S. system of preschool education and care. The Committee agreed that “the case for a substantial investment in a high-quality system of child care and preschool on the basis of what is already known is persuasive.” One of the strongest recommendations made in *Eager to Learn* was regarding teacher training. The committee recommended that all children in early care programs be provided with a teacher who has a bachelor’s degree and specialized education in early childhood.

Overall the research on early intervention finds positive short-term effects of high-quality early childhood programs in terms of cognitive skills, school readiness and social behavior; and positive long-term effects in terms of greater high school completion rates, higher earnings, less criminal activity and less welfare use for “model” early intervention programs.³ Long-term effects from more “typical” programs, such as Head Start, are not conclusive.⁴ In part this is due to the difficulty of separating the influence of early intervention from all the other factors that are significant in influencing long-term success.

There is also an extensive body of literature that specifically examines the impact of early intervention on reading outcomes. Many reading researchers assert that a strategy of early intervention focused on identification and instruction of children with reading disabilities would significantly decrease the number of older children identified with learning disabilities, would be more efficacious than later remediation, and would reduce the need for special education placements.⁵ Reid Lyon, et al. state:

We estimate that the number of children who are typically identified as poor readers and served through either special education or compensatory education programs (as well as children with significant reading difficulties who are not formally identified) could be reduced by up to 70% through early identification and prevention programs.⁶

Many reading researchers contend that early intervention is more efficacious in improving reading than later intervention. If a child is experiencing difficulty early in the process of learning to read, they say, the child will fall behind in building vocabulary, may fall behind in developing reading comprehension strategies, and may develop a negative attitude towards reading. A child with reading difficulties will read less than good readers and without early intervention, will fall further behind normally progressing readers over time as these readers are rapidly increasing

³ For more information see CRS Report RL31123, *Early Childhood Education: Federal Policy Issues*, by Gail McCallion.

⁴ GAO indicates that research to date is not definitive on the effectiveness of Head Start. GAO-03-840T, *Head Start Key Among Array of Early Childhood Programs, but National Research on Effectiveness Not Completed*. For more on the issue of the long term effects of Head Start see CRS Report RL30952, *Head Start Issues in the 108th Congress*, by Melinda Gish and Alice Butler. W. Steven Barnett, Director of the National Institute for Early Education Research has recently issued a report arguing that properly designed studies show that educational effects from Head Start are long lasting (*The Battle Over Head Start: What the Research Shows*). Available at [<http://www.nieer.org>].

⁵ Reid Lyon, et al, state that 80% of children with learning disabilities have reading as their primary difficulty. Reading disability may consist of learning disability in basic reading skills or learning disability in reading comprehension. Reid Lyon, Jack Fletcher, Sally Shaywitz, Bennett Shaywitz, Joseph Torgeson, Frank Wood, Ann Schulte, and Richard Olson, “Rethinking Learning Disabilities,” in Chester Finn, Andrew Rotherham, Charles Hokanson, eds., *Rethinking Special Education for A New Century* (Thomas Fordham Foundation, May 2001), pp. 259-287. (Hereafter cited as Lyon, et al., *Rethinking Learning Disabilities*.)

⁶ *Ibid.*, p 260.

their repertoire of sight words throughout elementary school, according to these researchers. In addition, they say, following years of failure, older poor readers may be less motivated to learn to read. Joseph K. Torgesen argues that:

... to the extent that we allow children to fall seriously behind at any point during early elementary school, we are moving to a 'remedial' rather than a 'preventive' model of intervention. Once children fall behind in the growth of critical word reading skills, it may require very intensive interventions to bring them back up to adequate levels of reading accuracy, and reading fluency may be even more difficult to restore because of the large amounts of reading practice that is lost by children each month and year that they remain poor readers.⁷

Reading Research

Factors influencing Reading Success

The Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K). Recent longitudinal data from the U.S. Department of Education have provided more information on factors related to reading achievement. These data indicate that there are a host of child and family characteristics that are correlated with reading achievement in kindergarten and first grade.⁸

The ECLS-K is a longitudinal study that, beginning with the 1998-1999 school year, tracks a nationally representative sample of children, and measures, among other things, their reading achievement from kindergarten through 5th grade. This study will provide an ongoing source of data on factors that are related to later success in reading (up through 5th grade). Data on these children for their first 2 years of school (kindergarten and 1st grade) are now available. Upon kindergarten entry, children with multiple risk factors for school failure (a mother with less than a high school education, single parent family, welfare receipt, primary language not English) scored lower on measures of reading skill than children with zero or one risk factor(s). During kindergarten these at-risk children made gains toward closing the gap with other children in simple reading skills (such as letter recognition), but the gap widened between the two groups in more complicated reading skills (such as recognizing sight words). In addition, home literacy environment (children who have more books, records, etc, than average and are read to and sung to frequently) was related to children's reading skills at the beginning of kindergarten, as well as to their reading skills at the end of kindergarten and 1st grade. This relationship between children's reading achievement and their home literacy environment was found both in children in families with incomes above and below the poverty threshold.

The ECLS-K data also showed that children who could recognize letters, numbers, and shapes, and the relative size of objects at the beginning of kindergarten,

⁷ Joseph K. Torgesen, "Catch Them Before They Fall," *American Educator*, spring/summer 1998, p. 32. (Hereafter cited as Torgesen, *Catch Them Before They Fall*.)

⁸ U.S. Department of Education, National Center for Education Statistics, *The Condition of Education*, 2003, p. 6.

did better in reading at the end of kindergarten and 1st grade when compared with children who did not have those skills upon entering kindergarten. In addition, childrens' reading performance was positively related to whether or not they had a positive approach to learning and were in good health at the beginning of kindergarten.

Data on effects of half-day versus full-day kindergarten were also examined. The ECLS-K data suggest that public school students attending full-day kindergarten made more gains in reading during kindergarten than those attending half-day kindergarten.⁹

The ECLS-K data also indicated some differences in the frequency that certain skills were taught in full-day versus half-day kindergarten:

Full day classrooms were more likely than half-day classrooms to spend time everyday on the following skills: letter recognition, letter-sound match, conventions of print, vocabulary, making predictions based on text, using context clues for comprehension, rhyming words, reading aloud, reading multi-syllable words, and alphabetizing.¹⁰

Impacts of Early Intervention on Reading. Steven Barnett has surveyed model and more typical preschool education programs in order to assess their impact on subsequent reading achievement as well as on measures such as IQ, employment, and special education placements. In order to consider studies that would best measure program effects on these specific outcomes and exclude the effect of other differences among the children, he considered 12 model programs that used random assignment (participants were randomly assigned to either the experimental group (i.e. with the intervention), or else they were assigned to the control group).¹¹ Most of the studies either had small initial sample sizes and/or had significant attrition (children leaving before the end of the study period). Two studies without these limitations were the Abcedarian and Perry Preschool studies.¹² These two studies

⁹ Ibid.

¹⁰ Ibid., p. 10.

¹¹ Research studies that employ random assignment of comparable subjects to both a control and a treatment group are considered the most reliable. However, because educational research is conducted with children, it is difficult to justify the random assignment of children to control and treatment groups if it means some will be deprived of instruction that they would have otherwise received. Partly for this reason, many studies rely on a similar group of non-participating children, but this can result in biased results because of family and child characteristics that influence participation in the program. Even those studies that do use random assignment often have a very small initial sample size, and/or experience a great deal of attrition (children not continuing in the study) over the course of the study, or there are limitations on the sample of children (e.g., only children with low IQ) which may affect the results.

¹² Steven Barnett, "Preschool Education for Economically Disadvantaged Children: Effects on Reading Achievement and Related Outcomes," in Susan Neuman and David Dickinson, eds., *Handbook of Early Literacy*, (New York: Guildford Press, 2001), pp. 421-443. (Hereafter cited as Barnett, *Preschool Education*.)

found positive effects on reading and literacy test scores that persisted into early adulthood. Barnett argues that the fade-out effect in reading found in many studies may be due to:

... problems with research design and procedures that bias estimated effects toward zero and attrition in achievement test data that decreases statistical power
¹³

Barnett notes that participation in other preschool education (not the “treatment” being investigated) by children in the control group may lead to underestimating a treatment’s effect. In addition, Barnett argues that the fade-out effect in the long-term found in many reading studies may be due to the reduction in statistical reliability of study results because of attrition (the loss of participants over time); and to limitations in the research design and implementation that bias the effects downward.¹⁴ For example, he notes that many large studies rely on grade level school administered tests. Barnett raises several concerns about the use of these tests. They are administered to an entire class by a teacher (in contrast to individually administered by a specialist). Additionally, over time, fewer and fewer poorly performing students will be tested with their age cohort (due to grade retention), and the sample of poorly performing students will decrease due to special education placements and other factors.¹⁵

¹³ Ibid., p. 436.

¹⁴ Ibid., p. 436. There are other data issues that concern researchers investigating the efficacy of reading interventions and other early interventions. These data limitations can influence researchers’ ability to conclusively determine the effectiveness of an intervention and to determine which children will benefit the most from the intervention. One of these data issues is so-called prediction error — i.e., false positives (e.g., children who are incorrectly identified as at risk of reading difficulties) as well as false negatives (e.g., children who are incorrectly found to not be at risk of reading difficulties). For example, measures of phonological awareness during kindergarten are correlated with later success or difficulty in reading. However, the choice of a cutoff score for children to be found at risk or not at risk can result in children being incorrectly identified. If a lower cut-off score is chosen to try and minimize the number of false positives, then the group of students identified as at risk of reading difficulty will be smaller and as a consequence the number of children incorrectly identified as not at risk of reading difficulty will rise. If a higher cut-off score is chosen to try and minimize the number of false negatives, then the group of students identified as at risk of reading difficulty will be larger and as a consequence the number of students incorrectly identified as at risk will rise. If intervention is delayed until 1st grade when test scores become more reliable, then kindergartners who are at risk of reading difficulties will be deprived of needed intervention. Torgesen, *Catch Them Before They Fall*, p. 35.

¹⁵ Barnett, *Preschool Education*, p. 436 states: “At best, studies relying on school-administered tests have reading test data with lower reliability and sample sizes that decline over time, both of which would reduce their ability to detect long-term program effects. At worst, such studies systematically lose the more poorly performing students from year to year as the cumulative percentage of children retained in grade, placed in special education, or otherwise omitted from testing grows. The result is that any differences between program and comparison groups are gradually hidden as grade level rises because the children for whom achievement tests are available become more similar across the two groups.”

Barnett concludes that well-designed studies do indicate that early intervention can produce positive long-term effects on reading outcomes for children in poverty. There are also long-term improvements in math and language achievement and in school success (measured by grade retention and special education placements), but not in IQ. The long term gains have been found to occur even without subsequent interventions:

... It is also consistent with the view that the first few years of schooling have an important influence on future school success, for example, by affecting reading group placements and other ability tracking, teacher expectations, parental expectations, and the child's sense of self-efficacy, motivation and classroom behavior. None of this suggests that society should abandon efforts to improve the elementary education of disadvantaged children whether by such structural changes as decreased class size or through improved pedagogy.¹⁶

Word-Level Reading Difficulties. The discussion thus far has focused on the relationship to subsequent reading success or failure of intensive early childhood interventions such as enriched child care; and of SES status, and other child and family characteristics. However, much of the research on reading intervention has focused specifically on word-level reading difficulties. Many reading researchers agree that poor readers experience difficulties in the early process of learning to read because they have difficulty learning accurate and fluent recognition of words. This section briefly explains word-level reading difficulties. The efficacy of interventions with children who have such difficulties is addressed below.

Many empirical studies focusing on word-level reading weaknesses have found these weaknesses to be largely attributable to phonological processing difficulties¹⁷ and to a lessened ability to quickly and accurately read words (also referred to as rapid word naming):

Research, grounded in a common theoretical framework, now provides evidence that instruction that heightens phonological awareness and that emphasizes the connections to the alphabetic code promotes greater skill in word recognition — a skill essential to becoming a proficient reader.¹⁸

Research has also indicated that word-level reading difficulties are not linked to intelligence, and that intervention can significantly reduce the number of children in early elementary school experiencing these difficulties. Some reading researchers

¹⁶ Barnett, *Preschool Education*, p. 438.

¹⁷ Phonological processing requires the ability to hear, identify, and manipulate phonemes, as well as broader skills of word manipulation (e.g., the ability to identify rhymes, words, syllables, onsets and rimes). These difficulties are also linked, to a lesser extent, with phonological memory.

¹⁸ Benita Blachman, "Phonological Awareness," in *Handbook of Reading Research, Vol. III* (Mahwah, NJ: Lawrence Erlbaum Pub.), p. 495. Joseph Torgesen, Ann Alexander, Richard Wagner, Carol Rashotte, Kytja Voeller, and Tim Conway, "Intensive Remedial Instruction for Children with Severe Reading Disabilities: Immediate and Long-term Outcomes From Two Instructional Approaches," *Journal of Learning Disabilities*, vol. 34, no.1 (Jan./Feb. 2000), p. 33.

argue that identifying children for early intervention in reading based on weaknesses in phonological processing, rapid automatic word-recognition, and phonological memory will be more effective in identifying children who need early intervention in reading, than identifying children for early intervention by looking for a discrepancy between general verbal ability and reading achievement. However, children with higher general verbal ability than their word-level reading skills, may ultimately achieve higher reading comprehension levels because they have greater cognitive skills in other areas critical to reading comprehension.¹⁹

Research on Efficacy of Reading Interventions

Two influential research reports on reading are frequently cited by policy makers working on reading issues. They are: *Preventing Reading Difficulties in Young Children* and *Teaching Children to Read*.

National Research Council (NRC). In 1998, the NRC published a report titled: *Preventing Reading Difficulties in Young Children*. The NRC report examined skill and environmental factors that facilitate acquisition of reading skills; it did not explicitly investigate how those skills could be transferred to classroom settings. The NRC report concluded that: (1) early exposure (in the home and in school) to language and books is critical; (2) effective reading instruction requires well trained preschool and elementary school teachers; and (3) elementary school teachers should include all of the following components in reading instruction: alphabets, reading sight words, techniques in sounding out letters and words, and achieving fluency and comprehension.

The National Reading Panel (NRP). In 2000, the NRP issued a report titled: *Teaching Children to Read*. The NRP was convened by the National Institute of Child Health and Human Development (NICHD) with the consultation of the U.S. Department of Education (ED) in response to a congressional charge to review the literature on reading and use it to assess the effectiveness of different techniques for teaching reading, and whether these techniques were ready to be applied to classroom settings. The NRP research was intended to build on the earlier research conducted by the NRC.

The NRP conducted a literature review of studies which met “rigorous scientific standards in reaching conclusions” — it focused only on experimental and quasi-experimental studies. The following instructional topics were examined by the NRP: phonemic awareness and phonics, fluency, comprehension, teacher education and reading instruction, and computer technology and reading instruction. The selected topics were chosen based on the NRP’s assessment of issues central to reading instruction and achievement; and based on input received from public forums.²⁰

¹⁹ Joseph Torgesen and Stephen Burgess, “Consistency of Reading-Related Phonological Processes Throughout Early Childhood: Evidence From Longitudinal-Correlational and Instructional Studies,” in Jamie Metsala and Linnea Ehri, eds., *Word Recognition in Beginning Literacy* (NJ: Lawrence Erlbaum Associates, Inc., 1998), pp. 161-188.

²⁰ Kathleen Kennedy Manzo, “National Panel Ready Guidance to Build Foundations for (continued...)”

In summarizing the implications of its work for the teaching of reading, the NRP noted that not all the areas it investigated contained sufficient data to reach conclusions; however, it did find that the data supported the following conclusions:

- Systematic phonics instruction (the teaching of a planned sequence of phonics elements) is effective for children in grades K-1, and for children in grades 2-6 in word decoding and pseudoword reading, and for children who are having difficulty learning to read. Systematic phonics instruction was found to be so successful, that the NRP recommended it as appropriate for routine classroom instruction.
- Phonemic awareness is a crucial building block for phonics.²¹
- As early as kindergarten, children benefit significantly from phonics instruction.
- Children with learning disabilities, low-achieving children, and those from low socioeconomic levels benefit from systematic phonics instruction in conjunction with synthetic phonics instruction (teaching students to convert letters into phonemes and then blend the phonemes to form words).
- Reading fluency, word recognition, and comprehension are enhanced by repeated, guided oral reading. The NRP found the research data insufficient to conclude whether or not encouraging children to read on their own is effective in improving reading fluency, word recognition, and comprehension, although there is correlational evidence of its effectiveness.

In particular, looking at the effects of phonics instruction (an area that has received much public attention), the NRP found statistically significant results from phonics instruction across multiple domains.²² The effect sizes of phonics instruction were found to be greatest for students in kindergarten and 1st grade. Researchers surmise this occurs because phonics is more effective if taught before students are reading on their own. The largest effects of phonics training overall for

²⁰ (...continued)

Reading,” *Education Week*, Jan. 30, 2002, p. 5. Three new federal panels have been formed following the issuance of the NRP report. One is examining more quantitative research on reading, one is examining qualitative research on reading, and the third is examining reading issues for English as second language learners. In addition, the National Institute for Literacy and the National Center for Family Literacy have formed a panel to examine early-childhood studies to identify predictive factors for later reading proficiency, as well as effective practices for building pre-reading skills for children from birth to age 5. Its report is expected in Dec. 2003. Kathleen Kennedy Manzo, “National Panel Ready to Build Foundations for Reading,” *Education Week*, July 9, 2003, p. 13.

²¹ Phonemes are the smallest units of spoken language (the word *go*, for example, consists of two phonemes).

²² Jacob Cohen, *Statistical Power Analysis for the Behavior Sciences*, (Hillsdale, NJ: Erlbaum, 1988). An effect size of .2 is considered small, .5 is considered moderate, and .8 or above is considered large.

kindergartners and first graders were in decoding regularly spelled words ($d=0.98$),²³ decoding pseudo words, and in spelling words ($d=0.67$). The effects of phonics on comprehension measures were mixed across sub-populations. Youngest students benefitted the most in comprehension measures ($d=0.51$ for kindergarten and 1st graders), in part because the youngest readers' comprehension of text is strongly influenced by the ability to read the words in the text; probably more so than for children in later grades.²⁴ The effects of phonics instruction on comprehension for students beyond first grade were relatively small for disabled older students ($d=0.32$), and were even smaller for older students overall ($d=0.12$).²⁵

Thus, research indicates that early intervention in phonics instruction benefits children in learning to read words; however its impact on comprehension is more limited. As indicated by the research of the NRP, this intervention does have a moderately significant effect with young children and a small effect with disabled older students on comprehension. The correlation between phonics instruction and comprehension for older students in general, is not significant. This may be attributable to the many additional factors, beyond being able to read words, that influence comprehension. Reading comprehension requires, in addition to word-reading skills, vocabulary, subject area knowledge, thinking and reasoning skills, effective reading strategies, and motivation, among other things.²⁶

Critical Perspectives on the National Reading Panel Report. The NRP report has prompted significant critical response: (1) because of the perceived narrowness of the topics examined; (2) because of methodological concerns; and (3) because of its substantive and policy conclusions.

Joanne Yatvin, a member of the NRP, wrote a minority view criticizing the perceived narrowness of the topics selected for review. In her minority view attached to the NRP report, Yatvin states that the NRP effectively excluded: “any inquiry into the field of language and literature”; and that the research reviewed by the NRP would be “of limited usefulness to teachers, administrators, and policymakers because they [the reviews] fail to address the key issues that have made elementary

²³ *Report of the National Reading Panel, Reports of the Subgroups*, pp. 1-10. (Hereafter cited as *Reports of the Subgroups*.) Effect size= d . Effect sizes equaled how much the mean of the phonics group exceeded that of a control group in standard deviation units. “When appropriate and feasible, effect sizes were calculated for each intervention or condition in experimental and quasi-experimental studies. The subgroups used the standardized mean difference formula as the measure of treatment effect.”

²⁴ *Reports of the Subgroups*, pp. 2-107. The effect of phonics instruction on oral reading for kindergartners and 1st graders, although significant, was only $d=0.23$.

²⁵ *Reports of the Subgroups*, pp. 2-108. The effect of phonics instruction on oral reading for older students was statistically greater than zero at $d=0.27$.

²⁶ Joseph K. Torgesen, “Individual Differences in Response to Early Interventions in Reading: The Lingering Problem of Treatment Resisters,” *Learning Disabilities Research and Practice*, vol. 15, no. 1, 2000, pp. 55-64.

schools both a battleground for advocates of opposing philosophies and a prey for purveyors of ‘quick fixes’.”²⁷

Elaine Garan, an associate professor of education at California State University, has authored a book written in a question and answer format that is directed at questions that teachers may have as they investigate how to implement scientifically based reading research in their classrooms. Garan argues that the conclusions of the NRP are based on limited research and are focused on a few limited topics and thus fail to provide useful information on reading instruction as a whole entity — which, she argues, is how teachers must confront it:

Because the NRP focused its research on isolated skills they ignored the complexities of the reading process, as well as the incredible complexities of real children in real classrooms. In fact, only about 16% of the studies in the phonics report even looked at the impact of its scientific methods on children’s reading comprehension of authentic, connected text.²⁸

And Garan expresses concerns about the potential impacts of applying the NRP’s findings on teachers and classrooms: “The federal government has decided it knows better than we do — *what* we should teach, *how* we should teach, and even *when* we should teach it.”²⁹

One recent study attempted to replicate the NRP’s results on the influence of phonics on beginning readers by conducting its own meta-analysis of the studies examined by the NRP.³⁰ Gregory Camilli (Professor at Rutgers’ Graduate School of Education), Sadako Vargas (Assistant Professor at Kean University), and Michele Yurecko (Ph.D. student at Rutgers’ Graduate School of Education) began with the 38 studies examined by the NRP and deleted one because it lacked a control group and added three others that they felt should not have been rejected for inclusion by the NRP. After conducting their meta-analysis, the authors concluded that “the methodology and procedures in *Teaching Children to Read* were not adequate for synthesizing the research literature on phonics instruction.”³¹ Camilli, Vargas, and

²⁷ *Report of the National Reading Panel: Reports of the Subgroups*, Minority View of Joanne Yatvin, 2000.

²⁸ Elaine Garan, *Resisting Reading Mandates* (N.H.: Heinemann, 2002), p. 5.

²⁹ *Ibid.*

³⁰ G. Camilli, S. Vargas, and M. Yurecko, “Teaching Children to Read: The Fragile Link Between Science and Federal Education Policy,” *Education Policy Analysis Archives*, 11(15), May 8, 2003, p. 3. Retrieved from [http://www.epaa.asu.edu/epaa/v11n15/]. (Hereafter cited as Camilli, et al., *Teaching Children to Read*.) A “meta-analysis” is a statistical procedure for summarizing the results of multiple studies in a systematic way. The authors note: “Though some of the methodological steps taken by the NRP analysts were retraced, our goal was to verify whether an independent team of researchers would arrive at conclusions consistent with those in the NRP report. We did not examine how the original 38 studies were chosen.”

³¹ Camilli, et al., *Teaching Children to Read*, p. 12. Among other things, the authors believe that there were differences among control groups that might have biased the results, and (continued...)

Yurecko did find a statistically significant effect of systematic phonics instruction compared to nonsystematic or no phonics instruction on learning to read, but of much lower magnitude than the effect found by the NRP ($d=0.24$ and $d=0.41$, respectively). However, the authors also found that the effect of individual tutoring ($d=0.40$) was greater than the effect of phonics instruction ($d=0.24$); and they found that the effect of systematic language activities was comparable ($d=0.29$) to the effects of phonics instruction. The authors believe that these effects are likely additive, and that when all three instructional techniques are combined the effect size may be triple that of phonics alone:

As federal policies are formulated around early literacy curricula and instruction, these findings indicate that phonics, as one aspect of the complex reading process, should not be over-emphasized.³²

Michael Pressley, a professor in the psychology department at the University of Notre Dame, argues that the NRP report was too methodologically and conceptually narrow. He contends that the NRP should have examined influences in early childhood that can affect reading outcomes; rather than relying solely on school age interventions:

Effective reading instruction occurs over years and changes with the developmental level of the child, with these dynamics not captured at all by the Panel's emphases on discrete skills appropriate at only particular developmental levels (i.e., mostly when children are mastering letter-sound associations and beginning word recognition). Effective literacy instruction is a balance and blending of skills teaching and holistic literature and writing experiences.³³

Additionally, Pressley argues that there are scientifically validated findings on the effects of the following factors that should have been included by the NRP: home storybook reading, television (e.g., *Between the Lions*), community resources such as tutoring, language of instruction, and school reform movements. Pressley also argues that the NRP should have included information on the positive effects of whole language instruction (which Pressley states is "the most pervasive approach to reading instruction in schools in the 1990s."). Further, he argues that the NRP: "Could have done a great deal of good for educators by attempting to separate out the instructional wheat from the instructional chaff in whole language, for there is both

³¹ (...continued)

that more moderator variables should have been employed: "By *moderator* variable, we mean a component of treatment delivery that leads to a stronger or weaker effect. Four new moderator variables were constructed for specifying the treatment conditions: degree of phonics systematicity; degree of coordinated language activities; whether treatments were regular in-class or pullout programs; and whether basal readers were used. These variables, which were coded from the research studies by means of rubrics, provided the explanatory power missing from the simple comparative design used in the NRP analyses. That is, the NRP design did not fully account for variation in the mixtures and degrees of treatment delivered to both experimental and control groups."

³² Camilli, et al., *Teaching Children to Read*, p. 12.

³³ Michael Pressley, *Effective Beginning Reading Instruction: A Paper Commissioned by the National Reading Conference*, 2001, p. 3

wheat and chaff in what is conventional instruction for many children in American classrooms.”³⁴

Policy and Implementation Issues

Reading First and Early Reading First were created to broaden and expand existing reading programs in order to address concerns about student reading achievement and to try and reach younger children. These programs draw upon recent reading research, and, in particular, upon the recommendations of the NRP, by requiring that Reading First and Early Reading First programs implement scientifically based reading and pre-reading curricula. These significant new reading initiatives were part of the January 8, 2002, reauthorization of the Elementary and Secondary Education Act (P.L. 107-110).³⁵ These new programs are part of a broader initiative by the Administration to, among other things, increase the quality and quantity of academic and pre-academic skills low-income children are receiving, with the goal of ensuring children participating in these programs are able to read by third grade. One of the purposes of the Early Reading First program is to integrate scientifically based reading research into existing Head Start, childcare and preschool programs. These preschool programs, are intended to be integrated with the Reading First program, which may serve some of these same children in early elementary school (grades K-3).

In addition to Reading First and Early Reading First, there are several other federally funded programs that provide early education and care to low-income children. The largest federal program with early childhood development as its primary mission is Head Start. The program’s reauthorization is currently being considered by Congress — the House has passed a Head Start reauthorization bill (H.R. 2210) and reauthorization legislation has been approved by the Senate Health, Education, Labor and Pensions Committee (The Head Start Improvement and School Readiness Act).³⁶ Head Start provides educational services to low-income children to prepare them to enter kindergarten, as well as health, nutrition and other services. The last reauthorization of the Head Start program in 1998 increased the share of appropriations targeted for quality improvement activities; and also required the administering agency, the Department of Health and Human Services, to develop specific education performance standards for the program. In its FY2004 budget, the Administration proposed transferring Head Start to ED to better ensure coordination with other preschool programs with the goal of ensuring all children participating are prepared to enter kindergarten. In addition to Head Start, other large federal programs funding early education and care are the Child Care and Development Block Grant (CCDBG), the Social Services Block Grant (SSBG), the Elementary and

³⁴ Ibid., p. 13.

³⁵ For ongoing updated information on Reading First and Early Reading First see CRS Report RL31241, *Reading First and Early Reading First: Background and Funding*, by Gail McCallion.

³⁶ CRS Report RL30952, *Head Start Issues in the 108th Congress*, by Melinda Gish and Alice Butler.

Secondary Education Act (ESEA), Title I-A, and the Individuals with Disabilities Education Act (IDEA).³⁷

This section focuses on the Reading First and Early Reading First programs, and in particular, on the application of reading research to the implementation of Reading First; and on the potential impact of early intervention in reading on the numbers of children needing remedial education.

The Reading First program, with funding of \$900 million in its first year, FY2002, is principally a program of formula grants to states, distributed based on a poverty formula.³⁸ Beginning in FY2004 a portion of Reading First funds will be allocated (\$90 million or 10% of funds in excess of the FY2003 appropriation, whichever is less) as targeted assistance grants for states that have increased the percentage of 3rd graders who are proficient readers and have improved the reading skills of 1st and 2nd graders. The purposes of the Reading First program are:

- To provide assistance to state educational agencies (SEAs) and local educational agencies (LEAs) in establishing scientifically based reading programs for children in kindergarten through grade 3;³⁹
- To provide assistance to SEAs and LEAs in providing reading related professional training for teachers, including special education teachers;
- To provide assistance to SEAs and LEAs in selecting or administering screening, diagnostic, and classroom-based instructional reading assessments;
- To provide assistance to SEAs and LEAs in selecting or developing effective instructional materials, programs, learning systems, and strategies; and
- To strengthen coordination among schools, early literacy programs, and family literacy programs, in order to improve reading achievement for all children.⁴⁰

The Reading First program is intended to focus on the general education classroom in grades K-3. ED has indicated that:

³⁷ See CRS Report RL31817, *Child Care Issues in the 108th Congress*, by Melinda Gish.

³⁸ States are allocated funds in proportion to the number of children aged 5-17 from families with incomes below the poverty line who reside within the state.

³⁹ Section 1208 (6) of P.L. 107-110 defines scientifically based reading research as follows: “The term ‘scientifically based reading research’ means research that (A) applies rigorous, systematic, and objective procedures to obtain valid knowledge relevant to reading development, reading instruction, and reading difficulties; 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 valid data across evaluators and observers and across multiple measurements and observations; and (iv) has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review.”

⁴⁰ Section 1201, P.L. 107-110.

Reading First will provide support to all K-3 students and their teachers in the schools that are served, and it is the Department's view that the classroom provides the most important teaching venue for reaching these early readers. It is the classroom where the program will build and support the scientifically based reading foundation. Reading First seeks to embed the essential components of reading instruction into all elements of the primary, mainstream K-3 teaching structures of each State.⁴¹

LEAs receiving Reading First funds are required to use these funds to select and administer "screening, diagnostic, and classroom-based instructional reading assessments."⁴² LEAs are also required to implement a scientifically based reading program that includes the essential components of reading instruction. Additional required uses include: procuring and implementing scientifically-based instructional materials; providing professional development to teachers (grade K-3, and K-12 for special education teachers) that will prepare them in all of the essential components of reading instruction; collecting, summarizing and reporting data; and promoting reading and library programs that expose students to "engaging reading material."⁴³

Reading First defines the essential components of reading instruction as:

- (A) phonemic awareness;
- (B) phonics;
- (C) vocabulary development;
- (D) reading fluency, including oral reading skills; and
- (E) reading comprehension strategies.⁴⁴

The Early Reading First program, with funding of \$75 million in its first year, FY2002, is a competitive grant program. LEAs eligible for Reading First grants, as well as other public or private organizations serving preschool age children, or combinations of one or more of the above, may apply for these grants. There are five stated purposes underlying the Early Reading First program:

- To support local efforts to enhance the early language, literacy, and prereading development of preschool age children, particularly those from low-income families;
- To provide preschool age children with cognitive learning opportunities in high-quality and language-rich environments;
- To demonstrate language and literacy activities based on scientifically based reading research that supports age-appropriate development of pre-reading skills;
- To use screening assessments to effectively identify preschool children who may be at risk for reading failure; and
- To integrate such scientifically-based instructional materials and literacy activities with existing programs of preschools, child care

⁴¹ U.S. Department of Education, *Guidance for the Reading First Program*, Apr. 2002.

⁴² Section 1202 (c)(7)(A)(i), P.L. 107-110.

⁴³ Section 1202 (c)(7)(A), P.L. 107-110.

⁴⁴ Section 1208 (3), P.L. 107-110.

agencies and programs, Head Start Centers, and family literacy services.⁴⁵

The passage of Reading First in particular, because of its size and scope, has focused considerable attention on it, and on the requirements states must meet in order to receive Reading First money.

In response to congressional and public concerns, ED has stated that there is no approved list of reading programs and assessments that will be required for states to receive Reading First funds. Nevertheless, ongoing concern has been expressed regarding what some perceive as overly prescriptive requirements of Reading First; and about whether states will be able to use locally developed reading initiatives and other supplemental programs such as Reading Recovery.⁴⁶

Reading First is still very new, and as a consequence, performance data from states in implementing these grants are not yet available. However, the International Reading Association (IRA) has published a study examining the successful application experience of 13 states under Reading First.⁴⁷ The review included interviews with the application coordinators of the 13 states (via telephone and email), as well as examination of the actual applications (available on the Web).

The IRA wanted the following areas of concern about the application process explored: whether states would be limited to specific curriculum materials or to specific assessment measures; and how the eligibility of providers of professional development would be determined. In the review of these 13 applications, the IRA noted that some states privately expressed ongoing concerns about the extensive revisions to their applications that were required before final approval. The IRA also expressed concerns about a document distributed at Reading First Leadership Academies and relied upon by many states in completing their applications.⁴⁸ The document titled: *A Consumer's Guide to Evaluating a Core Reading Program Grades K-3: A Critical Analysis*, was authored by Deborah Simmons and Edward Kame'enui. The IRA noted that the publication recommended the use of decodable

⁴⁵ Section 1221 (a), P.L. 107-110.

⁴⁶ "Reading Recovery is a highly effective short-term intervention of one-on-one tutoring for low-achieving first graders. The intervention is most effective when it is available to all students who need it and is used a supplement to good classroom teaching. In Reading Recovery, individual students receive a half-hour lesson each school day for 12 to 20 weeks with a specially trained Reading Recovery teachers. As soon as students can read within the average range of their class and demonstrate that they can continue to achieve, their lessons are discontinued, and new students begin individual instruction." At [<http://www.readingrecovery.org>].

⁴⁷ Margie Bell, "The International Reading Association's Review of Reading First Grant Recipients," *The Reading Teacher*, vol. 56, no. 7, Apr. 2003, pp. 670-674. (Hereafter cited as Bell, *The International Reading Association's Review*.) In addition, the Education Commission on the States has constructed an online database to examine states' literacy policies. See [<http://www.ecs.org>].

⁴⁸ Reading First Leadership Academies were conducted by the ED to assist states in understanding the requirements of the new law.

text in reading programs, even though the NRP had found the research insufficient to reach a conclusion on the effectiveness of decodable text.⁴⁹ Nevertheless, if states are not required to use materials that include decodable text, this concern will be satisfied, according to Cathy Roller director of research and policy for the IRA:

... it is not clear exactly how each of the approved states will use the Consumer's Guide, it is not clear how serious this problem may be. It is unlikely that any series would meet all of the criteria listed in the Consumer's Guide. If it is possible to use materials that do not include decodable text, then there is little cause for concern. However, if the states are required to use materials that include decodable text, then that would be a cause for concern.

The IRA study conclusions were generally positive. The study found that "the U.S. Department of Education so far has not restricted states to the use of specific curriculum materials or specific tests and that there is a broad range of plans for determining eligible providers of professional development."⁵⁰ The IRA survey noted that the 13 states surveyed were not limited to specific commercial programs and that state officials were satisfied overall with the application process.

Remedial Education

Part of the rationale for early intervention in reading is that it is more educationally effective, and ultimately more cost effective, than subsequent remediation with already impaired readers:

... although the reading instruction provided by special education is more effective than general education classroom instruction for children with reading disabilities, current instruction in many special education placements is not sufficient to accelerate reading growth so that there is reasonable hope for these children to achieve average-level skills in a reasonable time.⁵¹

Part of the promise of early intervention for students who need it in general education classrooms is that it will result in fewer children needing more extensive (and expensive) remediation such as that provided under Title I of the Elementary and Secondary Education Act (ESEA) for children attending relatively high poverty schools, and the specialized services provided under the Individuals with Disabilities Education Act (IDEA).⁵²

⁴⁹ Decodable text refers to books containing the letter-sound relationships that children have been taught.

⁵⁰ Bell, *The International Reading Association's Review*.

⁵¹ Joseph K. Torgesen, Ann W. Alexander, Richard K. Wagner, Carol A. Rashotte, Kyta S. Voeller, and Tim Conway, "Intensive Remedial Instruction for Children with Severe Reading Disabilities," *Journal of Learning Disabilities*, vol. 34, no. 1 (Jan./Feb. 2001), p. 34.

⁵² Torgesen, *Catch Them Before They Fall*, p. 32. "It is a tragedy of the first order that while we know clearly the costs of waiting too long, few school districts have in place a mechanism to identify and help children before failure takes hold. Indeed, in the majority (continued...)"

To what extent might early reading intervention reduce the number of children requiring subsequent remedial services? The Congressional Research Service (CRS) has examined the potential growth in the population of children with learning disabilities in order to project full funding costs of IDEA under alternative assumptions.⁵³ One of these alternatives assumes that the percentage of children identified as learning disabled could be reduced over time by 50% (via an estimated 70% reduction in the 80% of learning disabled children whose primary disability is in reading) due to early reading interventions such as those provided by Reading First and Early Reading First. It should be emphasized that CRS does not predict that such a reduction will actually occur, but is only exploring the implications of such an assumed reduction in pupils with disabilities. Employing these assumptions, the number of children identified as learning disabled would be significantly reduced over time. Under these assumptions CRS estimates that by 2010, 6.6 million children would be identified as learning disabled compared to the ED's Budget office projected estimate of 7.4 million.⁵⁴

⁵² (...continued)

of cases, there is no systematic identification until third grade, by which time successful remediation is more difficult and more costly.” For more on ESEA Title I see CRS Report RL31487, *Education for the Disadvantaged: Overview of ESEA Title I-A Amendments Under the No Child Left Behind Act*, by Wayne Riddle.

⁵³ See CRS General Distribution Memorandum, *Estimating Maximum Funding for IDEA Part B Grants to States Under Current Law, H.R. 1350, and A. 1248*, by Richard N. Apling, July 30, 2003. (Hereafter cited as Apling, *Estimating Maximum Funding for IDEA*.) Under IDEA, a child with a disability is defined as one:

(i) with mental retardation, hearing impairments (including deafness), speech or language impairments, visual impairments (including blindness), serious emotional disturbance (hereinafter referred to as “emotional disturbance”), orthopedic impairments, autism, traumatic brain injury, other health impairments, or specific learning disabilities; and

(ii) who, by reason thereof, needs special education and related services. IDEA also permits states and LEAs to include a child as having a disability who is: “experiencing developmental delays ... in one or more of the following areas: physical development, cognitive development, communication development, social or emotional development, or adaptive development.” IDEA, Section 602, 3(A).

In addition, children aged 3-9 may be classified as a child with a disability, under the discretion of the LEA, if they are experiencing developmental delays, and as a consequence need special education and related services.

⁵⁴ These assumptions on the overall percent decline in children with learning disabilities are based on research by Reid Lyon. CRS further assumes that the slowing growth in the number of children with disabilities due to these reading interventions will be gradual, i.e., in the first year after implementation it assumes a reduction of children in 1st grade identified as learning disabled; in the second year, the reduction in growth will affect children in first grade and the previous first graders now entering second grade. This trajectory is assumed to continued over time. See Apling, *Estimating Maximum Funding for IDEA*.

Co-Occurring Disabilities and “Treatment-Resistors”. When considering how to reduce the number of children who will require intensive subsequent intervention it is important to briefly mention the issue of co-occurring disabilities and so called treatment-resistors. First, there are children who suffer from multiple disabilities. Children with co-occurring disabilities may respond positively to reading interventions, but may still require ongoing intensive treatment (such as special education and related services) for other disabilities. The U.S. Department of Education’s 22nd Annual report on the implementation of IDEA (2000) includes a chapter discussing available data on co-occurring disabilities. ED notes that although co-occurring disabilities are common, because of data limitations, including differing definitions of disability and differences in populations studied, estimates of co-occurring disabilities have varied from 19% of special education students to 48%.⁵⁵ Secondly, reading researchers have pointed out that there are a group of children called ‘treatment-resistors’ who do not respond positively to typical reading interventions. Torgesen, et al., have noted in their research that the non-responders were children with multiple areas of reading related difficulties, i.e., they had weaknesses in phonological awareness, rapid automatic naming ability, and knowledge of letter-sound correspondences, as well as weaknesses in general oral language skills. Thus, even if early intervention in reading succeeds in significantly reducing the number of children requiring more intensive intervention, the research is clear that there will remain a group of children who will continue to need subsequent intensive intervention.

Assuming that early intervention in reading succeeds in significantly reducing the pool of children who need intensive remedial education, such as the services provided under IDEA; there remains an issue regarding whether these remedial services are being effectively targeted to the children who continue to need it. Some researchers argue that current eligibility determinations for receiving IDEA services may be delaying and limiting the pool of children who are receiving intensive reading assistance under IDEA. In order to be eligible under IDEA a child must be found to have a disability, and many children are not identified as having a disability until 3rd grade. In addition, many states and LEAs employ a discrepancy standard (e.g., the point spread between IQ and achievement scores) to determine whether a child qualifies for services under IDEA as having a specific learning disability.⁵⁶

⁵⁵ U.S. Department of Education, *Twenty-Second Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act*, 2000, p. II-34.

⁵⁶ Many children are covered by IDEA because of Specific Learning Disability(s), which is defined as:

“(A) IN GENERAL. The term ‘specific learning disability’ means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations.

(B) DISORDERS INCLUDED. Such terms includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.

(C) DISORDERS NOT INCLUDED. Such term does not include a learning problem that
(continued...)

Some researchers contend that the discrepancy standard is not a valid indicator of learning disabilities, arguing that most children who experience difficulty in acquiring early word reading skills have phonological processing difficulties, and that these difficulties occur in children with low general intelligence as well as those with normal general intelligence.⁵⁷ Lyon, among others, contends that applying this discrepancy standard results in a ‘wait to fail’ model because the discrepancy formulas usually cannot reliably identify a child as learning disabled until 3rd grade.⁵⁸ Legislative proposals in the 108th Congress to reauthorize IDEA (H.R. 1350 and S. 1248), include a provision that specifically states that LEAs need not use the discrepancy standard in determining whether a student has a specific learning disability.⁵⁹

⁵⁶ (...continued)

is primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural or economic disadvantage.” IDEA, Section 602, item 26.

⁵⁷ Torgesen, *Catch Them Before They Fall*, pp. 33-34. Phonological processing is often measured by assessing phonemic awareness, defined as “the ability to identify, think about, or manipulate the individual sounds in words.”

⁵⁸ Lyon, et al., *Rethinking Learning Disabilities*, p. 260. “Because there is no strong evidence that the IQ-achievement discrepancy criterion either (1) describes an intrinsic reading-related processing difference within low-achieving readers (nondiscrepant versus discrepant), or provides a differential prediction of response to intervention or education outcomes, the use of such discrepancy requirements to deny specialized services and/or accommodations to nondiscrepant poor readers is arbitrary and problematic.”

⁵⁹ For more on IDEA see CRS Report RL31259, *Individuals with Disabilities Education Act: Statutory Provisions and Selected Issues*, by Richard Apling and Nancy Jones.

Glossary of Selected Terms Used in This Report

The definitions included in this glossary are taken verbatim from the publication: *Put Reading First*. Ambruster, Bonnie, Fran Lehr, and Jean Osborn. June 2003. This report was published by the Partnership for Reading, which includes the National Institute for Literacy, the National Institute of Child Health and Human Development, and the U.S. Department of Education. *Put Reading First* is intended to provide teachers information on what works in teaching reading based on scientifically-based reading research.

- A *phoneme* is the smallest part of *spoken* language that makes a difference in the meaning of words. English has about 41 phonemes. A few words, such as *a* or *oh*, have only one phoneme. Most words, however, have more than one phoneme: The word *if* has two phonemes (/i/ /f/); *check* has three phonemes (/ch/ /e/ /k/), and *stop* has four phonemes (/s/ /t/ /o/ /p/). Sometimes one phoneme is represented by more than one letter.
- A *grapheme* is the smallest part of *written* language that represents a phoneme in the spelling of a word. A grapheme may be just one letter, such as *b*, *d*, *f*, *p*, *s*, or several letters such as *ch*, *sh*, *th*, *-ck*, *ea*, *-igh*.
- *Phonics* is the understanding that there is a predictable relationship between phonemes (the sounds of *spoken* language) and graphemes (the letters and spellings that represent those sounds in *written* language).
- *Phonemic awareness* is the ability to hear, identify, and manipulate the individual sounds — phonemes — in spoken words.
- *Phonological awareness* is a broad term that includes phonemic awareness. In addition to phonemes, phonological awareness activities can involve work with rhymes, words, syllables, and onsets and rimes.
- A *syllable* is a word part that contains a vowel or, in spoken language, a vowel sound (*e-vent*, *news-pa-per*, *ver-y*).
- *Onsets and rimes* are parts of spoken language that are smaller than syllables but larger than phonemes. An *onset* is the initial consonant(s) sound of a syllable (the onset of *bag* is *b-*, of *swim*, *sw-*). A *rime* is the part of a syllable that contains the vowel and all that follows it (the rime of *bag* is *-ag*; of *swim*, *-im*).