A Scientific Approach to Reading Instruction

By: Barbara Foorman, Jack Fletcher, and David Francis (1997)

Direct, systematic instruction about the alphabetic code is not routinely provided in kindergarten and first grade, in spite of the fact that at the moment this might be our most powerful weapon in the fight against illiteracy.

Important research findings

1. Reading problems occur primarily at the level of the single word.

2. Decoding problems in reading are primarily associated with problems segmenting words and syllables into phonemes. This is true in virtually all poor readers, including children, adolescents, and adults at all levels of IQ and in socially disadvantaged children and adults. Reading is alphabetic, which means that for languages like English and Spanish the code is in the alphabet. The code is always based on sounds and how sounds map onto print, even in languages that are not alphabetic, like Chinese. Chinese is logographic, but the radicals represent information relevant to sounds.

   Once a child has learned how sound structures relates to print, he or she has become a proficient decoder. However, in order to become an efficient decoder, the decoding process must become fast and accurate. Once decoding is efficient, attention and memory processes are freed for comprehension monitoring.

   The majority of children seem to become proficient decoders regardless of how they are taught. Nonetheless,

3. Reading problems occur as part of a natural, unbroken continuum of ability. What causes good reading also causes poor reading. Nonetheless,

4. At least 10 million children in the United States are poor readers.

5. The prevalence is 17% of school-aged children depending on how poor reading is defined and where it is studied.

6. Reading problems occur with equal frequency in boys and girls; schools identify four times more boys than girls, largely on the basis of behavioral, not learning, characteristics. Unfortunately, the magnitude of the reading problem is increasing.

7. Special education figures show that less than 25% of children in special education were identified as learning disabled before 1980; by 1993, this figure increased to over 50%.

8. Of all children identified as learning disabled in schools, 80% are primarily impaired in reading; 90% of these children have problems with the development of decoding skills.

9. The assumption is sometimes made that children will grow out of their reading problem with the passage of time. However, research shows that 74% of children who are poor readers in the third grade remain poor readers in the ninth grade.

10. But won't comprehension make up for poor decoding? No, because comprehension depends on decoding and other skills. Slow, inaccurate decoding is the best predictor of poor reading comprehension.
11. There are multiple causes of poor reading. Regardless of the cause, the primary problems occur at the level of the single word.

**Causes of poor reading**

1. Neurological: Brain metabolism when doing reading tasks involving sounds of words, such as whether they rhyme, is different in good and poor readers. The problem is not brain structure, but brain function. The question is whether improved reading results in changes in brain function.

2. Familial: Reading problems run in families and have a genetic component, but several genes are involved and the penetration is low. This means that the environment also has significant influence on reading outcomes. For example, adults who read poorly are less likely to read to their children. Instructional factors are more critical for children where there is a family history of poor reading.

3. Social Disadvantage/Cultural: Print exposure, parental literacy, laptime reading to the child are clearly important. The influence is somewhat overestimated because intervention studies are remarkably successful in socially disadvantaged populations.

4. Instructional: The influence of instructional factors is underestimated, as discussed below. What is important is that the skills that lead to poor reading can be taught early in school, in kindergarten and in grades 1 and 2. For many children these skills must be taught explicitly for several years.

**Important intervention findings**

1. Direct instruction in decoding skills emphasizing the alphabetic code results in more favorable outcomes than does a context-emphasis or embedded approach. (all NICHD studies)

2. The type of direct instruction alphabetic program is less important than the intensity, duration, and teacher training/monitoring so long as the program is structured and explicit. (Florida State University)

3. Over 90% of children reading below the 15th percentile at the beginning of first grade read at or above grade level by the end of the first grade with appropriate intervention. (SUNYAlbany)

4. Fifteen minutes of instruction in the alphabetic code as part of a standard kindergarten curriculum led to significant gains in phonological analysis skills relative to children in the same curriculum who did not receive this training. Facilitation of reading ability occurred only if the program was continued into subsequent school years. (University of Houston)

5. Comparisons of direct instruction phonics, embedded phonics, and two context-emphasis approaches in socially disadvantaged (Title 1) first and second graders showed that only the direct instruction approach was associated with average levels of reading proficiency after one school year of intervention. Curriculum effects outweighed effects of tutoring and variability across teachers. In fact, many children in the context-based approaches showed no gains. (University of Houston)

6. Decoding and phonological analysis skills are necessary but not sufficient skills for successful reading. They are not the (w)hole story. Once you can decode, you must be able to decode rapidly words that represent the orthographic elements of English (e.g., morphological units and writing conventions). Comprehension processes are separable and must also be taught. Print awareness, immersion in literacy, and reading to children also account for variability in reading outcomes, but they are less robust predictors of longterm outcomes relative to single word skills.

**Necessary & sufficient conditions for learning to read**

1. Phonological Awareness: Sensitivity to the sound structure (rather than the meaning) of speech
2. Phonemic Awareness: The ability to deal explicitly and segmentally with sound units smaller than the syllable (i.e., phonemes)

3. Alphabetic Principle: The insight that written words are composed of letters of the alphabet that are intentionally and conventionally related to segments of spoken words

4. Orthographic Awareness: Sensitivity to the structure of the writing system (spelling patterns, orthographic rules, inflectional and derivational morphology, etymology)

5. Comprehensive Monitoring Strategies: Strategies that help students attend to and remember what they read

What colleges of education need to teach about reading

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What teachers need to know

(psychol) linguistics and reading

Diagnosis & assessment of reading and spelling skills

Reading intervention strategies

About the authors

Dr. Barbara Foorman, professor of education psychology, is the principal investigator for the University of Houston Learning Disabilities Intervention Project at the University of Houston in Houston, TX. Dr. Jack Fletcher from the University of Texas Medical School and Dr. Davis Francis from the University of Houston are also members of the Houston Project group. The Houston Research Group is one of the research programs supported by the National Institute of Child Health and Human Development (NICHD). The NICHD Learning Disability Research Network was established to identify critical research needs in LD and to implement comprehensive studies to address issues relevant to identification, prevention, etiology, and treatment.

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