

Reading the Code, Reading the Whole



Researchers wrangle over the nature and teaching of reading

By BRUCE BOWER

In Joni R. Ramer's kindergarten class in Bradenton, Fla., youngsters with virtually no prior exposure to books learn to read under a system of teaching that emphasizes reading the children interesting stories and encouraging them to write stories of their own. This "whole-language" approach to reading has spawned fundamental changes in reading instruction throughout the world during the past decade and stands squarely at the center of a nationwide debate among educators and reading researchers.

Rather than teach about the sounds associated with letters or letter combinations that make up words—the "phonics" approach found in most 20th-century U.S. classrooms—Ramer deals only in entire stories. She reads aloud from children's literature, encourages her students to write their own stories and read them aloud, provides individual help based on each child's progress and promotes collaborations among children in their fledgling attempts at literacy. Marked progress in reading and writing ability routinely occurs over the course of a school year, she says.

Meanwhile, Earline Alexander's first-grade reading class in Houston relies on a structured phonics program that stresses the repeated sounding out of words and the use of a "basal reader," a long-standing teaching tool that includes age-appropriate stories, teachers' manuals, student workbooks and reading comprehension tests. In previous decades, youngsters followed the antics of Dick and Jane in basal readers.

Most Houston elementary schools shelved basal readers and adopted whole-language methods in the mid-1980s, but officials at Alexander's school clung to their phonics program despite the loss of federal funds to pay for it. The vast majority of students at the school score high on district-wide standardized reading tests.

Disenchanted with reading performances under the whole-language banner, eight other Houston elementary schools convinced local school officials last November to allow them to return to phonics-based basal readers.

Joni Ramer and Earline Alexander stand on opposite sides in the battle over the theory, if not always the practice, of U.S. reading education. Many elementary school teachers incorporate aspects of both whole-language and phonics instruction into their reading classes but increasingly face tough decisions when their entire school district officially adopts a "pure" whole-language or basal reader approach.

Ironically, debate over the nature and teaching of reading goes largely unheard by a general public concerned about the state of literacy among their children and anxious for school reforms. In fact, a report in the January 1987 *READING RESEARCH QUARTERLY* estimates that about one of five children attending U.S. elementary and secondary schools fails to achieve functional literacy.

Although the scholarly debate reflects the vitality of reading research, whole-language researchers conduct studies and chart reading progress in markedly different ways from scientists concentrating on children's knowledge of letter sounds and individual words.

Passionate disagreement over methods of reading instruction, especially the use of phonics, stretches back more than 100 years—and probably to "the beginning of pedagogy," asserts psychologist Keith E. Stanovich of the Ontario Institute for Studies in Education in Toronto. Reading research has increased dramatically in the past three decades, with investigators arguing over whether skilled readers recognize words as whole units or effortlessly weave together words from their constituent letters and sounds.

In a 1967 book titled *Learning to Read: The Great Debate* (McGraw-Hill), Harvard University's Jeanne S. Chall evaluated research on elementary school reading programs that emphasized either whole-word recognition or phonics. Chall, an education professor, concluded that programs emphasizing phonics instruction produced the best readers.

Whole-language theorists rejected Chall's conclusion because she based it on studies of vocabulary and phonetic knowledge, not comprehension of entire passages. More recently, in the November

1988 *PHI DELTA KAPPAN*, whole-language advocate Marie Carbo of Antioch University in Yellow Springs, Ohio, charged that Chall's analysis contained seriously flawed studies without proper comparisons of phonics and whole-language techniques. Improved literacy depends on more whole-language classrooms and fewer reading workbooks and phonics exercises, Carbo argued.

Scientific evidence clearly shows that acquisition of reading skills in grades one through three depends on the ability to decode the sounds associated with combinations of various letters of the alphabet, Chall responded in the March 1989 *PHI DELTA KAPPAN*. She characterized Carbo's argument as "irresponsible and possibly harmful."

A 1990 review of research concerning how people learn to make sense of the squiggles on a piece of paper, conducted by psychologist Marilyn J. Adams of Bolt, Beranek and Newman in Cambridge, Mass., a private research firm, largely supports Chall's conclusions. Although no universally effective method exists for cultivating literacy in young minds, the best programs integrate phonics—also known as code instruction—with other reading activities, Adams contends in *Beginning to Read: Learning and Thinking About Print* (MIT Press). Adams rejects an exclusive emphasis on either phonics or whole language.

Many psychologists conducting reading research support Adams' stance. However, they also argue that scientific evidence runs contrary to the assumption of whole-language proponents that reading skill develops naturally in youngsters exposed to interesting texts and encouraged to experiment freely with writing. Psychologists also question the assertion of whole-language theorists that beginning readers already possess enough knowledge about print to make highly accurate guesses about the meaning of difficult words embedded within longer passages—in other words, that "context-based" guessing sets the stage for fluent reading.

"The most basic skill in learning to read is word identification," holds psychologist Frank R. Vellutino of the State University of New York at Albany. In the last decade, numerous studies have established that early comprehension of words and texts depends on a knowledge of the sounds associated with letters and letter combinations, not guessing strategies, Vellutino maintains.

"Good readers don't rely on a story's context to identify words, because their alphabetic coding ability is so fluent and automatic," adds psychologist Charles A. Perfetti of the University of Pittsburgh. "Poor readers lack coding skills and have to use context."

Perfetti's point, based on his own investigations of children's reading strategies, receives support from a study of 197 6-, 7- and 8-year-olds in New Zealand. The project, conducted by psychologist Tom Nicholson of the University of Auckland in New Zealand, appears along with two other studies promoting phonetic-based techniques for reading instruction published in the December 1991 *JOURNAL OF EDUCATIONAL PSYCHOLOGY*.

New Zealand schools follow a national whole-language instructional policy. Quebec, Nova Scotia and most Australian states also embrace whole-language frameworks for public schools. And an increasing number of British schools have devised whole-language curricula since the early 1980s.

In Nicholson's study, about half the children first read out loud a short passage that corresponded to their age and reading ability (classified as good, average or poor). Then they read a word list composed of the same passage typed backwards, from last word to first. The remaining youngsters read the list first, then the passage.

Poor readers of all ages and average 6- and 7-year-old readers made fewer errors reading the passage than reading the list in both experiments; initial exposure to the passage did not boost their poor performance recognizing words on the list. In contrast, good 6-year-old readers and average 8-year-old readers read the passage better only when they had read

the list first, presumably because the list gave them practice in reading the same words. Finally, good 7- and 8-year-old readers read the passage and list almost equally well under both conditions, although they made somewhat fewer errors on the list if they had read the passage first.

These findings indicate that only poor readers rely on "enlightened guessing" based on a story's context and that they do so to compensate for their ineffective decoding skills, Nicholson contends. The tactic may work with kindergarten-level stories but increasingly backfires as texts present more difficult vocabulary, he argues. Since New Zealand's whole-language classes offer no specific help in phonics skills, an estimated 15 percent of that country's children require individual reading tutors by second grade, Nicholson asserts.

A second study in the same journal finds that a majority of 4- to 5-year-old children can learn to identify sounds that make up words — known as phonemes — and match the sounds with appropriate letters of the alphabet. Of the 64 preschoolers attending a 12-week course that employed picture and card games in combination with phonetic guidance, 34 passed tests assessing knowledge of phonemes and letters. Of that number, 28 correctly identified simple words composed of previously learned phonemes, report Australian psychologists Brian Byrne and Ruth Fielding-Barnsley, both of the University of New England in Armidale.

Only 11 of 62 preschoolers exposed to the same picture and card games, but without direct phonetic instruction, passed phoneme and letter tests, the researchers say; 8 of those 11 recognized simple words.

Byrne and Fielding-Barnsley plan to examine whether preschoolers given training in phoneme and letter recognition learn to read more easily in the first few years of elementary school.

The third study examined 80 first graders at one, five and eight months into the school year. Half attended reading classes stressing letter-sound correspon-

dences and the blending of sounds that make up words; the rest attended classes emphasizing mainly the study of whole words within relevant stories.

At all three intervals, children in the phonics group produced fewer errors in reading words aloud, both with phonetically regular words, such as "cut" and "but", and with exceptions, such as "put." Their reading performance also improved more dramatically over the school year than did that of the other children.

Experimental research conducted during the 1980s provides additional support for code-oriented instruction with beginning readers, Keith Stanovich remarks. The data suggest that basic perceptual tasks, such as reading, proceed automatically in discrete regions of the brain with no reference to real-world knowledge or expectations.

For instance, studies of eye movements during reading directed by psychologist Keith Rayner of the University of Massachusetts at Amherst indicate that good readers focus for at least a fraction of a second on all or nearly all of the words in a passage, allowing for immediate integration of each word into the overall context of the passage. Given a text missing various words, skilled readers correctly guess only one in four of the absent words, according to research directed by Philip B. Gough of the University of Texas at Austin.

In addition, connectionist computers, also known as neural networks, learn to read simple words through exposure to pairings of letters and phonemes, with no reference to grammatical rules or story context, Stanovich contends.

Whole-language proponents take an entirely different philosophical and practical approach to the study of reading. Just as teachers cannot break language into "bite-size, abstract little pieces" and expect youngsters to read easily, researchers cannot study words and phonemes out of their contexts and expect to understand reading acquisition, argues Kenneth S. Goodman, an education professor at the University of Arizona in Tucson and a founding father of the whole-language movement.

Speaking and reading ability, including knowledge of phonemes and the alphabet, develop naturally in young children who are constantly exposed to spoken and written language, Goodman asserts. In his view, direct phonetic instruction sidetracks the learning process.

Whole language traces its philosophical roots to a 17th-century European educator, John Amos Comenius, who argued that learning must appeal to meaningful aspects of students' lives. Comenius advocated instruction in one's native tongue rather than Latin, which



Gale Zucker

Two boys read together in a classroom that uses whole-language instructional techniques.

was in widespread use throughout Europe at the time.

In the early 20th century, U.S. educator John Dewey called for "progressive education", which would foster learning through social interactions, not isolated study. And later, Swiss psychologist Jean Piaget argued that children construct categories of thought about the world — from the nature of solid objects to printed words — that often clash with adult versions of the world.

These ideas met reading theory head-on in the 1970s with the advent of artificial intelligence research. Digital computer models suggested that reading depends on "hypothesis testing" about a text's meaning rather than visual processing of parts of words.

Each beginning reader reveals his or her hypotheses about a text through "miscues" or errors made while reading aloud, according to much of the research — generally referred to as psycholinguistics — conducted by Goodman and other whole-language theorists over the past 25 years. In studies of small groups of elementary school students tracked throughout the school year, miscues follow general patterns that reflect a child's anticipation of what is to follow in a story, Goodman says. Young readers continuously monitor what they read and revise its meaning when necessary, he adds.

In his 1986 book *What's Whole in Whole Language: A Parent-Teacher Guide* (Heinemann), Goodman describes miscue research and his notion of reading as a "psycholinguistic guessing game" in which the reader constructs meaning based on prior expectations and cultural background.

Other psycholinguistic research, such as a 1985 study of third and fourth graders conducted by Yetta M. Goodman of the University of Arizona and Sandra Wilde of the University of Oregon in Eugene, indicates that beginning readers who regularly write and read their own stories without specific spelling corrections by teachers nevertheless become good spellers over time. Whole-language proponents refer to this instructional technique, which includes extensive collaboration on stories among students, as "invented spelling."

"Innovative [whole-language] practice



is leaping ahead of research," Goodman notes. Perhaps one in 10 U.S. elementary school teachers now takes a whole-language approach, he estimates.

Goodman rejects Marilyn Adams' cautious endorsement of phonics integrated into programs with whole-language techniques. Adams reviewed only studies that broke reading into words and phonemes, while "systematically excluding" psycholinguistic research, he charges.

Investigators have yet to develop a generally accepted measure of reading ability, says Jerome Harste of Indiana University in Bloomington. The focus on decoding of individual words should expand to examine the number of books actually read by nascent readers, what children talk about while reading and what they plan in their lives as a result of reading, he maintains.

"We have to go beyond the kinds of studies summarized by Adams," holds Harste, an education professor and whole-language proponent.

But beyond the theoretical differences of the phonics-oriented and whole-language research camps, many teachers employ some combination of these instructional methods with young readers, Harste notes. Phonics rarely takes center stage in reading classes — it shares the spotlight with the reading of quality children's literature, writing exercises and testing for overall reading comprehension, he says.

Indeed, most code-oriented researchers express no misgivings about many whole-language techniques and concede that a fair number of youngsters figure out the alphabetic code with little or no phonics instruction. Still, the lack of such instruction creates an ever-widening gap between good and poor readers, they assert.

Educators must remember that language revolves around phonology, a small system of meaningless sounds that can convey an infinite number of meaningful messages in numerous languages, argues psychologist Alvin M. Liberman of Haskins Laboratories in New Haven, Conn. "In teaching children to read and write, our aim must be to transfer the wonders of phonology from speech to script," Liberman contends. "This can be done only if the child comes to understand the alphabetic principle."

Teachers who build a love of reading and writing among their students through the whole-language approach allow the "wonders of phonology" to blossom naturally rather than wither under a phonetic assault, Goodman responds.

For now, perhaps all reading researchers can agree on at least one point. In the diplomatic words of Marilyn Adams, "Reading may be the most politicized topic in the field of education." □

Letters continued from p.131

oped a "schema" (abstract framework to hang these facts on) for a particular subject.

Second, developing such abstract frameworks seems to me to be the *point* of education. Too bad the researchers found little evidence of schema formation!

Third, my recollection begins from a time long prior to my entering school. May not excellent memory be a predictor of higher grades, rather than the other way around?

Barbara Szabo
Borrego Springs, Calif.

Virtual reality via PC

In "Looking-Glass Worlds" (SN: 1/4/92, p.8) one gains the impression that virtual reality is available only on expensive computer systems. An article in the February AMIGAWORLD, however, suggests that the public may soon gain access to these strange interactive programs using only personal computers.

Last October, at the "Amiga '91 Cologne Show" (in Cologne, Germany), Commodore's booth demonstrated an experimental product, "Virtuality," from the British company W. Industries, that involves the Amiga personal computer and a "space-age helmet containing dual miniature LCD displays, stereo headphones and a motion sensor" with additional sensors for the arm and fingers. As in your article, the user/wearer can move through and manipulate the computer-generated, three-dimensional objects and stereo sounds. Although the computer graphics appear rather simple at this stage, it shows that virtual reality is not limited to large, high-tech research institutions. And think of the consumer programs: Landscape design would include real "walk-throughs," while shoot-em-up games would be awesome!

Richard C. Hertzberg
Cincinnati, Ohio

Consensus and correctness

It seems to me that the fundamental assumption that several network elements arriving at the same answer produces a *correct* answer is optimistic at best ("Neural-net neighbors learn from each other," SN: 1/11/92, p.23). The machines' answers were judged correct only because the researchers knew the correct answers before they started the tests. This merely puts the "teacher" in the backward-propagation procedure in a different place, but doesn't eliminate it.

Certainly humans often learn by techniques other than backward propagation, and far too often the "consensus" technique leads to disastrous answers, much less merely incorrect ones. Humans can usually find a way to check their "consensus" answers, if only by the results of acting on them. Nowhere in the article does it tell us how these machines check their answers independently, with no researcher to look over their shoulders, as it were.

K.A. Boriskin
Bellingham, Mass.

The machine's answers were judged correct by the elements in the network, not by comparison to a preassigned value, as in back propagation. In this network, there is no independent verification of the answer. However, the researchers are able to see whether the network's answers are correct, which they were.

— E. Pennisi