

Teaching Vocabulary Early, direct, and sequential

by Andrew Biemiller

During the past 10 years, Jeanne Chall [see [tribute](#), in this issue] encouraged me to focus on the study of vocabulary and how vocabulary growth might be encouraged. Both of us had come to the conclusion that vocabulary growth was inadequately addressed in current educational curricula, especially in the elementary and preschool years and that more teacher-centered and planned curricula were needed, just as had been the case with phonics. Jeanne had come to this conclusion through her work on the stages of reading development (Chall, 1983/1996), her work on textbook difficulty (Chall and Conard, 1991), and especially through the findings of her joint research project with Catherine Snow on families and literacy (Chall, Snow, et al., 1982), as summarized in *The Reading Crisis* (Chall, Jacobs, and Baldwin, 1990). In this book, Chall and her colleagues traced the relative decline in reading achievements experienced by working-class children who had become competent readers by third grade but whose vocabulary limitations increasingly had a negative effect on their reading comprehension as they advanced to seventh grade. (Jeanne mentioned to me several times her disappointment that *The Reading Crisis* was not more widely discussed.)

I had been particularly influenced by Wesley Becker's famous *Harvard Educational Review* article (1977) noting that the impact of early DISTAR success with decoding was muted for reading comprehension in later elementary grades by vocabulary limitations. Becker argued that this was a matter of experience rather than general intelligence by observing that while his DISTAR students' reading comprehension fell relative to more advantaged students by grade 4, their mathematics performance remained high. He suggested that the difference was that all the knowledge that is needed for math achievement is taught in school, whereas the vocabulary growth needed for successful reading comprehension is essentially left to the home. Disadvantaged homes provide little support for vocabulary growth, as recently documented by Hart and Risley (1995). I was further influenced by the finding of my doctoral student, Maria Cantalini (1987), that school instruction in kindergarten and grade 1 apparently had no impact on vocabulary development as assessed by the Peabody vocabulary test. Morrison, Williams, and Massetti (1998) have since replicated this finding. This finding is particularly significant in view of Cunningham and Stanovich's (1997) recently reported finding that vocabulary as assessed in grade 1 predicts more than 30 percent of grade 11 reading comprehension, much more than reading mechanics as assessed in grade 1 do. Finally, I have been influenced by the consistent finding in the oral reading miscue literature that when overall error rates reach 5 percent of running words (tokens), that "contextual" errors (those that make sense in context) virtually disappear. I infer from this that when readers (or listeners?) understand less than 95 percent of the words in a text, they are likely to lose the meaning of that text (and be especially unlikely to infer meanings of unfamiliar words).

In short, as Gough and Tunmer (1986) have pointed out, vocabulary development is both important and ignored. Can we--educators--do better, or are we simply bumping into constitutional limitations that are beyond the power of schools to affect? In the remainder of this article, I am going to summarize a few points that support the argument for an increased emphasis on vocabulary and suggest the need for a more teacher-centered and curriculum-structured approach to ensure adequate vocabulary development.

The consequences of an increased emphasis on phonics. In recent years, we have seen a tremendous emphasis on the importance of phonics instruction to ensure educational progress. We also have seen that while more children learn to "read" with increased phonics instruction,

there have not been commensurate gains in reading comprehension (e.g., Gregory, Earl, and O'Donoghue, 1993; Madden et al., 1993; Pinnell et al., 1994). What is missing for many children who master phonics but don't comprehend well is vocabulary, the words they need to know in order to understand what they're reading. Thus vocabulary is the "missing link" in reading/language instruction in our school system. Because vocabulary deficits particularly affect less advantaged and second-language children, I will be arguing that such "deficits" are fundamentally more remediable than many other school learning problems.

Schools now do little to promote vocabulary development, particularly in the critical years before grade 3. The role of schooling in vocabulary acquisition has been the subject of much debate. Early (pre-literacy) differences in vocabulary growth are associated with social class (Duncan, Brooks-Gunn, and Klebanov, 1994; Hart and Risley, 1995; McLloyd, 1998). Nagy and Herman (1987) and Sternberg (1987) argue that much vocabulary acquisition results from literacy and wide reading rather than from direct instruction. However, it is obvious that a great deal of vocabulary acquisition occurs before children become literate, and before they are reading books that introduce unfamiliar vocabulary (Becker, 1977). Cantalini (1987) and Morrison, Williams, and Massetti (1998) both report that vocabulary acquisition in kindergarten and grade 1 is little influenced by school experience, based on finding that young first-graders have about the same vocabulary (Peabody Picture Vocabulary Test) as older kindergarten children. Cantalini reported the same result for second grade.

The relatively small number of words that need to be learned. It is sometimes argued that the number of words children need to learn is so great that this can only happen incidentally through wide reading (Anderson, 1996; Nagy and Herman, 1987; Sternberg, 1987). This argument is quite reminiscent of the argument that the spelling-to-sound structure of English is so difficult that it can't be taught but only learned through experience. In both cases, the complexity of what needs to be learned has been somewhat exaggerated. Many years ago, Lorge and Chall (1963) argued that traditional dictionary sampling methods for assessing vocabulary had greatly overestimated the volume of vocabulary children needed to acquire. As Lorge and Chall, Beck and McKeown (1990), and others have noted, we need to focus on root word growth rather than the acquisition of all inflected and derived forms of words. Jeremy Anglin's (1993) monograph suggests that children acquire about 1,200 root words a year during the elementary years with perhaps half that many root words learned per year prior to grade 1. (He also argues that perhaps twice that many words need to be learned, particularly including idiomatic forms.) My own research (Biemiller and Slonim, in press) suggests that the average number of root word meanings acquired per year may be somewhat smaller, more like 600 root word meanings a year from infancy to the end of elementary school. This conclusion, based on root word meanings sampled from Dale and O'Rourke's Living Word Vocabulary (1981), is partly based on the observation that many similar meanings are acquired at about the same age and probably do not require separate instruction.

Evidence that vocabulary differences present by grade 2 may account for most vocabulary differences in elementary school. There has been relatively little discussion or examination of individual differences in vocabulary growth. Hart and Risley (1995) observed large differences associated with word learning opportunities in the preschool years. In our current research, Naomi Slonim and I are finding that large vocabulary differences are present by the end of grade 2--amounting to more than 3,000 root words between high and low quartiles in a normative population (Biemiller and Slonim, in press). After grade 2, cross-sectional data indicate that the lowest-quartile children may actually add root word vocabulary faster than the higher-quartile children. However, by grade 5, they have only reached the median for grade 2 children. Thus, if we could find ways of supporting more rapid vocabulary growth in the early years, more children would be able to comprehend "grade level" texts in the upper elementary grades. (Note that the "reading grade level" of texts is in fact almost entirely determined by the vocabulary load of those texts (Chall and Conard, 1991; Chall and Dale, 1995). Thus early vocabulary limitations make "catching up" difficult even though once in school, children appear to acquire new vocabulary at

similar rates. To "catch up," vocabulary-disadvantaged children have to acquire vocabulary at above-average rates.

The sequential nature of vocabulary acquisition. Much evidence clearly indicates that vocabulary is acquired in largely the same order by most children. The existence of empirical vocabulary norms (as in the Peabody and Living Word Vocabulary) indicate that some words are acquired later than others. Slonim and I have found very high correlations (mostly over .90) between mean scores for words obtained from different grades (Biemiller and Slonim, in press). We also found that when data is ordered by children's vocabulary levels rather than their grade level, we can clearly identify a range of words known well (above 75 percent), words being acquired (74 percent-25 percent) and those little known. Furthermore, these ranges are sequential. At any given point in vocabulary acquisition, a preliminary conclusion from this work is that there are about 2,000-3,000 root words that a child is likely to be learning. This makes the construction of a "vocabulary curriculum" plausible.

Defining an essential vocabulary for high school graduates. A corollary of the sequential nature of vocabulary acquisition is the possibility of defining a common vocabulary needed by most high school graduates. Several studies have shown that college entrants need 11,000 to 14,000 root words, while college graduates typically have about 17,000 root words (D'Anna, Zechmeister, and Hall 1991; Goulden, Nation, and Read, 1990; Hazenberg and Hulstijn, 1996). We need further research on the degree to which we can identify these words. (It is clear that all do not know the same exact words. It is equally clear that there is a substantial common vocabulary plus a further more discipline-specific vocabulary.)

The hypothesis that most root word and idiomatic vocabulary learned before and during elementary school results from direct explanation of words. We know relatively little about the processes by which children add words to their vocabularies. Some of the data are negative--evidence that children do not easily acquire words by inference, especially children younger than age 10 (Robbins and Ehri, 1994; Werner and Kaplan, 1952). In Bus, Van Ijzendoorn, and Pellegrini's (1995) summary of the effects of reading to children, there is evidence that younger children profit less from simply being "read to." There is also positive evidence that children do readily acquire vocabulary when provided with a little explanation as novel words are encountered in context (Beck, Perfetti, and McKeown, 1982; Elley, 1989; Feitelson et al., 1986; Feitelson et al., 1991; Whitehurst et al., 1998). Preliminary evidence from directly interviewing children about word acquisition suggests that as late as grade 5, about 80 percent of words are learned as a result of direct explanation, either as a result of the child's request or instruction, usually by a teacher (Biemiller, 1999b). Overall, I believe that before age 10, the evidence supports the conclusion that a substantial majority of new root words are acquired through explanation by others (including explanations in texts) rather than by inference while reading, as has often been argued by Anderson, Nagy and Herman, and by Sternberg. For practical purposes, we should be prepared to ensure the availability and use of explanations of word meanings throughout at least the elementary school years.

Although children differ in their opportunities to learn words and the ease with which they learn words, evidence suggests that most can learn vocabulary at normal rates. There is clear evidence that vocabulary is associated with socioeconomic status--presumably reflecting differences in opportunity (as documented by Hart and Risley, 1995; and Snow, Burns, and Griffin, 1998). There is also clear evidence relating vocabulary development to various phonological skills or capacities (e.g., Gathercole et al., 1997). It is likely that environment and "capacity" interact--that constitutionally more-advantaged children also may be environmentally more advantaged. However, a number of studies summarized in Biemiller (1999a), Stahl (1999), and elsewhere clearly indicate that children can acquire and retain two or three words a day through instruction involving contextualized introduction and explanation of new words. Furthermore, while less verbally fluent or lower vocabulary children and adolescents have been found to benefit little from inferring word meanings (Cain and Oakhill, in preparation; Elshout-

Mohr and van Daalen-Kapteijns, 1987), more-direct approaches have been reported to work well with these children (see Elley, Feitelson, and Whitehurst references cited previously). Overall, I hypothesize that most children (90 percent plus) can acquire new vocabulary at rates necessary to reach "grade level" or near grade level vocabulary in middle elementary school, if given adequate opportunity to use new words and adequate instruction in word meanings.

The need for planned introduction and explanation of vocabulary plus various tools to help children become more independent in dealing with new vocabulary. I have suggested above the hypothesis that 80 percent or more of the root words learned by grade 6 are learned as a result of direct explanation by parents, peers, teachers, and texts. Those who learn more words almost undoubtedly encounter more words and receive more explanations of word meanings. This suggests that we could do considerably more than we now do to ensure the development of adequate vocabulary through systematic exposure to two to three new words a day combined with adequate explanation of these words and opportunities to use them. (I am referring to new meanings not simply words that are unfamiliar in print.) Present school practices fall far short of this objective in the primary grades. (Schools may do better in the upper elementary grades.) Other types of vocabulary instruction (e.g., using affixes, word family approaches, and direct instruction in inferencing) will also be useful, especially in grades 3 and above.

This particular objective raises the possibility of returning to a more basal approach, at least as one component of classroom language and reading instruction. If vocabulary acquisition is largely sequential in nature, it would appear possible to identify that sequence and to ensure that children at a given vocabulary level have an opportunity to encounter words they are likely to be learning next, within a context that uses the majority of the words that they have already learned. Some researchers are already beginning to work on this objective (e.g., David Francis and Barbara Foorman in Texas, Jan Hulstijn in the Netherlands, Margaret McKeown and Isabel Beck in Pittsburgh, William Nagy in Seattle, and John Morgan and myself in Toronto). Many problems need to be solved. Existing lists of words (e.g., Living Word Vocabulary) do not correspond closely enough to observed sequences of word acquisition to be great guides (although they are better than nothing). Word frequency in print data (e.g., Carroll, Davies, and Richmond, 1971) bears relatively little relationship to observed word knowledge. (In my studies, Carroll's SFI index accounted for 7 percent of observed root word knowledge. In contrast, Living Word Vocabulary levels accounted for more than 50 percent of our data.) William Nagy (personal communication) has proposed combining Dale and O'Rourke's data with expert ratings--a very plausible suggestion.

Given the establishment of plausible vocabulary lists, teachers could relate these lists to vocabulary being introduced in books (short stories, novels, texts) being studied, be aware of words to introduce or explain (or to query children about if they don't ask!), and be aware of some important words that aren't going to be covered in the established curriculum. These words could be taught directly, or other materials (e.g., stories to be read to class) could be introduced that include them.

Conclusion: A substantially greater teacher-centered effort is needed to promote vocabulary development, especially in the kindergarten and early primary years. In her last book, *The Academic Achievement Challenge*, Jeanne Chall (2000) presented a summary of research supporting the effectiveness of "teacher centered" approaches to education. The information reviewed here similarly points to the need for more planned (but contextualized) introduction of vocabulary. This is especially true in the pre-reading years (before grades 3 or 4 when children begin to read books that are likely to introduce new vocabulary). Specifically, increased teacher-centered vocabulary work should include the deliberate introduction of a wider range of vocabulary in the early primary years through oral sources (most children are limited in what they can read at this age level), ensuring coverage of about 4,000 root words by the end of grade 2. In the later elementary years, continued development will include adding another 500 to 750 root words per year, additional idioms, and increased fluency in using derived words. In

addition, in the upper elementary grades, instruction is needed in deriving word meanings from affixes, word families, etc., as well as in ways of inferring word meanings. If we are serious about "increasing standards" and bringing a greater proportion of schoolchildren to high levels of academic accomplishment, we cannot continue to leave vocabulary development to parents, chance, and highly motivated reading.

Thus, I strongly recommend a more teacher-directed and curriculum-directed approach to fostering vocabulary and language growth. If education is going to have a serious "compensatory" function, we must do more to promote vocabulary. Our current data show large "environmental" effects in kindergarten to grade 2. Large differences remain by grade 5 (e.g., children in the lowest grade 5 quartile have vocabularies similar to median second-grade children). Is this simply the product of "intelligence"? I believe it is in considerable part the result of different learning opportunities. After grade 2, vocabulary growth rates look similar or faster for "low quartile" children. If we could keep them from being so far behind by grade 2, they apparently wouldn't be so far behind in grade 5!

I don't believe we can make all kids alike. But I think we could do more to give them similar tools to start with. Some kids may have to work harder to add vocabulary. Educators may have to work harder with some kids. So what's new? But now, educators do virtually nothing before grade 3 or 4 to facilitate real vocabulary growth. By then, it's too late for many children.

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