The Influence of Vocabulary on Reading Acquisition

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Introduction: Why Vocabulary is Important

Successful reading requires being able to identify written words and know what those words mean. In recent years, an improved understanding of the skills that underlie reading words and techniques that successfully teach those skills have led to better word reading and better comprehension of written text in first grade.

Unfortunately, learning to read written texts is not the same as learning to understand written texts. It is a problem that many children who successfully learn to read in grade one or two are nonetheless unable to understand books they need to read by grade three or four. The main reason for this is a lack of adequate vocabulary (Becker, 1977; Chall, Jacobs, and Baldwin, 1990; Chall and Conard, 1991; Scarborough, 2001; Spira, Bracken, and Fischel, 2005; Storch & Whitehouse, 2002). The National Reading Panel (2000) has identified vocabulary as one of five key aspects of literacy.

While North American teachers have become more effective at teaching students to read words, we have virtually ignored the impact of teaching students to understand words—especially in the primary grades. There is evidence that a year of kindergarten, grade 1, or grade 2 typically adds nothing to a child’s vocabulary (Cantalini, 1987; Christian, Morrison, Frazier, & Massetti, 2000; Morrison, Smith, & Dow-Ehrensberger, 1995). Consequently, vocabulary is primarily determined by the words learned from parents and neighborhood friends. Not surprisingly, students from advantaged homes learn two or three times as many words as children from disadvantaged homes where many fewer words are used (Hart and Risley, 1995; White, Graves, & Slater, 1990). These findings suggest the importance of improving vocabulary instruction in primary grades.

Vocabulary size has an impact throughout the life span. Students with inadequate vocabularies are at a much higher risk of performing poorly in high school, community college, or university (Hazenberg & Hulstijn, 1995; Cunningham & Stanovich, 1997). The source of these difficulties occurs very early in life. Young children with relatively small vocabularies comprehend less well. Because they comprehend less well, they often choose to read less. Over time students who read less acquire smaller vocabularies and comprehend less in later years (Stanovich, 1986). Children with smaller vocabularies will continue to lag behind children with larger vocabularies.
Key Research Questions

There are several key research questions about vocabulary and literacy. Given that vocabulary size has a substantial relationship with reading comprehension both concurrently and predictively, we need to know:
1. How many words are normally acquired?
2. How much variation is there in vocabulary acquired?
3. Is there a predictable sequence of words acquired?
4. What are the influences on vocabulary acquisition?
5. Can vocabulary acquisition be increased through educational interventions?
6. If vocabulary acquisition is increased substantially by low-vocabulary children, will there be substantial gains in reading (language) comprehension?

Recent Findings on Vocabulary Development

**How many words are normally acquired?**
Various sources now suggest that by the end of grade two, an average child knows about 6000 root word meanings (Anglin, 1993; Biemiller, 2005; Nagy and Scott, 2001). This count of root words includes word forms with different meanings, e.g. lean (slant to the side) and, lean (without fat); but does not include "derived forms", e.g. leans, leaner, etc.). Many "words" have several meanings. Consequently, I usually refer to "word meanings" or "meanings", rather than "words". There are more "meanings" than there are "words". Before grade three, children add an average of 860 root word meanings per year, starting at about age 1. During grades three to six, children acquire about 1000 root word meanings per year. Thus by the end of grade 6, average children understand about 10,000 root words (Biemiller, 2005). These findings are based on a combination of recent empirical research (Anglin, 1993; Biemiller & Slonim, 2001), and data in Dale and O'Rourke's Living Word Vocabulary (1981). Dale and O'Rourke empirically assessed knowledge of some 30,000 root and derived word meanings known between grades four and twelve.

**How much variation is there in vocabulary acquired?**
By the end of grade two, children's vocabulary already differs a great deal. English-speaking children whose vocabulary is in the lowest 25 percent know an average of 4000 root word meanings. Children with average vocabulary know about 6000 root word meanings. Children in the highest 25 percent vocabulary group know an average of 8000 root word meanings (Biemiller, 2005). Thus very large differences in vocabulary have developed in the preliterate period before children have had much opportunity to acquire vocabulary from reading. Even if children with low vocabularies add 1000 meanings per year after grade two (as many do), by the time they begin grade six they will have about the same size vocabulary as children from the top 25 percent had at the end of grade two. They continue to be an average of two grade levels behind average children in vocabulary—which shows up in the ranges of grade-equivalents seen in standardized reading comprehension by grade six. This is sufficient to make success in high school unlikely. (In fact, 30% of students are reported to "drop out" of high school in the U.S. Greene & Winters, 2006)
Is there a predictable sequence of words acquired?

Children with high, average, or low total vocabularies acquire word meanings in roughly the same sequence. The best evidence for this is the similar sequence of how well root word meanings are known when obtained from different groups. For example, in adjacent grades (e.g., grade 1 and grade 2 or grade 5 and grade 6) certain words are understood by most children, other words are understood by about half of the children, and still other words are understood by few or no children. In addition, English language learners appear to learn words in the same order as their average and above average peers (Biemiller, 2005). For example, English language learners in grade 5 have about the same sized vocabulary as average grade 3 children. More importantly they know mainly the same word meanings.

Given that word meanings are being learned in a predictable sequence, it is possible to anticipate which meanings will be learned in the near future by a child. We can’t be precise, but we can estimate that children will mainly be learning word meanings from among the next 2000 or 3000 meanings in a list of word meanings. Some researchers believe that the stable sequence of vocabulary learning occurs because the word meanings learned earlier are prerequisites to understanding word meanings learned later. Others suggest that the word meanings encountered more frequently are learned earlier. Certainly, words and meanings not encountered cannot be learned. Finally, some researchers suggest that words with more mentally complex meanings are learned later (e.g., biology). This certainly appears to be a factor in when word meanings are acquired but doesn’t account for the whole sequence. The existence of a robust sequence should not be ignored for instructional purposes.

What are the influences on vocabulary acquisition?

Home influences. Children’s vocabulary differs markedly by the end of grade two. One source of these differences is vocabulary exposure in the home environment. Clearly, words that are not heard or read cannot be learned. Hart and Risley (1995) have shown that by the age of three, children living in advantage homes hear three times as many words spoken as children living in disadvantaged homes. Furthermore, in advantaged homes and some working class homes, parents actively explain word meanings in the course of conversation, story reading, etc. (Weizman & Snow, 2001; Hart and Risley, 1999). Thus it is not surprising that by age three children from advantaged homes already understand many more word meanings than children from disadvantaged homes.

School influences. We might hope that once children enter school at age 4 or 5, there would be more opportunities for children from less advantaged homes to build vocabulary—even to “catch up” with more advantaged children. Unfortunately, the limited available data on the effects of school attendance on vocabulary in primary grades is discouraging—kindergarten, grade one, and grade two children appear to gain no vocabulary as a result of a year in a primary grade. The youngest first graders (i.e. children born in December) are only one month older than the oldest kindergarteners (i.e. children born in January). Although, the youngest first graders have experienced an extra year of schooling, on average they have only one month’s more vocabulary
than the oldest kindergarteners (Cantalini, 1987; Christian, Morrison, Frazier, & Massetti, 2000; Morrison, Smith, & Dow-Ehrensberger, 1995). Similarly, the youngest second graders average just one month’s more vocabulary than the oldest first graders.

**Person influences.** It is very likely that there are inherited abilities that can facilitate acquisition of words and word meanings. There is some evidence that individuals with small vocabularies are less likely to guess new word meanings from surrounding context (Robbins & Ehri, 1992; Nicholson & Whyte, 1992; Penno, Wilkinson & Moore, 2002; Elshout-Mohr & van Daalen-Kapteijns, 1987). Being unable to guess may be the cumulative effect of knowing fewer word meanings. Thus a child with a large vocabulary may be guessing only one word meaning while knowing all of the other words in a text. A child with a small vocabulary trying to infer the same word meaning may also lack the meanings of ten percent of the other words in the text. Successful guesses will be less likely in the second case.

In addition, some of the difference in vocabulary size may involve having less ability to discriminate phonemes (word sounds), memory for words just heard, or other mental processes. These differences can directly affect the ability to learn new word meanings (Lonigan, 2007; Gathercole, 2007).

Clearly, school attendance has thus far done little for children’s vocabulary in the primary grades. We need to develop more effective ways of fostering vocabulary among our primary grade children.

**Can vocabulary acquisition be increased through educational interventions?**

**Preschool and primary grades or preliterate children.** Substantial differences in vocabulary acquisition have already occurred by the time children come to preschool or early kindergarten programs at age four (Hart & Risley, 1995). Schools cannot change this (although early intervention programs could—see for example Tizard, Cooper, Joseph, and Tizard, 1972). However, schools could do much more to prevent further widening of vocabulary differences during the primary school years by providing effective vocabulary instruction leading to acquisition of words already known by advantaged children.

Story-based vocabulary instruction in primary grades is one effective technique. This instruction technique simply involves reading books out loud two or more times, and explaining some word meanings on each reading (studies reviewed in Biemiller & Boote, 2006). Children can acquire 8-12 word meanings per week at school—enough to maintain average vocabulary gains during the primary years, *if such programs can be sustained over a school year.* No other methods of building vocabulary in the primary years have been empirically demonstrated/evaluated.

**Selecting words for instruction for primary instruction.** There are currently two approaches for identifying words for instruction or attention in primary grades. Beck and McKeown distinguish between “Tier 1” words, which will be learned without educational intervention, “Tier 2” words, which should be taught, and “Tier 3” words, which are
relatively rare, usually technical words that can be learned when encountered in
disciplinary topics/courses (Beck, McKeown, & Kucan, 2002). Thus Tier 2 word
meanings are the meanings which should be taught, used, and discussed. These are
“….words of high frequency for mature users. They are also words of general utility, not
limited to a specific domain.” (Beck & McKeown, 2007, p 195). They recommend
instruction of such words as they occur in books read to children in primary grades.
Unfortunately Beck and McKeown do not specify a list of such words.

The other approach was developed by Biemiller, who recommends teaching word
meanings of general value that are known by 40 to 80 percent of children at the end of
grade two and that are not too specific in meaning. These are meanings that will
typically be known by children with large vocabularies but not by children with small
vocabularies. There are 1600 such words that could be taught during the primary
grades. Many of these words appear to be not sufficiently advanced for the “Tier 2”
status described by Beck and McKeown. This approach emphasizes accelerating the
normal sequence of word acquisition, while agreeing with Beck & McKeown’s views on
Tier 1 words (too easy to teach) and Tier 3 words (technical, teach when needed in
specific contexts). Biemiller’s wordlist will appear in Words Worth Teaching (under
review).

**Upper elementary grades or literate children.** Older children continue to benefit from
vocabulary explanations when books are read aloud repeatedly with explanations of
some word meanings (Brabham & Lynch-Brown, 2002; Brett, Rothlein & Hurley, 1996).
Beck, Perfetti, & McKeown (1982) have evaluated another method of teaching word
meanings leading to an increase in reading comprehension. The method, which proved
effective, involves teaching eight word meanings from a semantic class (e.g., “people”)
each week for 12 weeks. Each week the words are defined, students generate
sentences using them, discuss appropriate contexts for using each word, practice the
definitions, and write a weekly test of meanings. (For more detail, see Beck, McKeown
& Kucan, 2002.)

During the upper elementary grades, children can probably take more responsibility for
learning needed meanings. This means consciously noticing unknown words and
finding needed meanings. Literate children have the advantage of being able to stop
reading and inquire about missing meanings because they can read fluently. However,
classroom practices can help less skilled readers identify needed meanings, and make
students responsible for learning missing meanings. Many writers have referred to this
attention to missing meanings as word consciousness (Beck, McKeown, & Kucan,
2002; Graves, 2006). Regrettably, no long-term studies of the effectiveness of
enhanced word consciousness have been conducted (Pressley et al, 2007).

Direct instruction on word meanings may also be beneficial in the upper elementary
years. Biemiller (under review) has identified 2700 word meanings that might be worth
teaching or drawing to the attention of older students. In addition to root word
meanings, directly teaching about the use of prefixes and suffixes to extend vocabulary
is needed in the upper elementary grades. Teaching students to use prefixes and
suffixes has been shown to improve comprehension of derived words (e.g., paint,
repaints, painted) (Baumann, Edwards, Boland, Olejnik, and Kame’enui, 2003; Graves, 2006; Pressley et al, 2007). Similarly, instruction is also needed on important Latin and Greek “stems”—meanings that never exist as root words but combine to form various meanings (Stahl, 1999). For example, the stem “-logy” refers to “study of…” and is used in bio-logy, psycho-logy, dermato-logy, etc.

**English language learners.** Many studies have shown that English language learners are typically about 2 years behind average first language students in vocabulary, even by the end of grade 6. There is some evidence that their vocabulary growth follows a similar sequence to that seen in native speakers of English (Biemiller, 2005). It is probable that methods helpful for low-vocabulary native speakers of English would also be helpful for second language learners, after they have acquired the first 2500 root words in English. Further discussion of vocabulary work with second language children is discussed in Snow and Kim (2007).

**Conclusion**

At present, many low vocabulary primary grade children typically learn several hundred fewer meanings per year than average children. Probably the single best thing we could do to increase literacy would be to increase vocabulary during the primary grades. Unless this yearly deficit during the primary years can be ended or even reversed, there is little reason to think vocabulary interventions will significantly affect educational achievement.

*If vocabulary acquisition is increased substantially by low-vocabulary children, will there be substantial gains in reading comprehension?*

The truth is that we aren’t sure. It appears reasonable that if children acquired average sized vocabularies, we might expect them to demonstrate roughly average language comprehension. There have been three year-long vocabulary interventions with primary-grade children (Feitelson, Goldstein, Iraqi & Share, 1991; Feitelson, Kita & Goldstein, 1986; Morrow, 1992). Each of these studies showed substantial language comprehension gains from daily oral reading of stories combined with vocabulary explanations and some other discussion. Language comprehension gains of up to 50 percent in comparison to control groups were reported. Unfortunately, all of these studies involved only 1 or 2 treatment classrooms, and the samples were too small to confidently generalize the findings. More extended study of the effectiveness of early vocabulary interventions remains necessary. Similarly, the effect of providing vocabulary support over more than one year should be studied. One year is insufficient to build an adequate vocabulary.

**Future Directions**

It is clear that vocabulary development is a key factor in successful reading development. Children with below-average vocabularies are at-risk of low school achievement. In the future, one research priority may be identifying the methods for fostering vocabulary development and the influence that vocabulary growth has on
other aspects of literacy. Currently, it remains unclear how educational programs can bring low-vocabulary children to current average levels or higher. Does the robust sequence of vocabulary acquisition have practical implications for future instruction? Do effective programs need to *directly teach* hundreds of word meanings per year, or is it sufficient to *use* hundreds of new words with children each year and emphasize learning the unfamiliar meanings? A related question is to what degree will improving children’s vocabulary positively impact comprehension of written text. Until programs have been successfully implemented over full school years, we really won’t know whether acquiring hundreds more word meanings will result in significantly improved oral and reading language comprehension. What is certain is that without acquiring substantially more meanings, by grade three or four many children will continue to be unable to comprehend grade level texts and will continue to be at considerable risk of continued low achievement (Chall, Jacobs, & Baldwin, 1990; National Reading Panel, 2000).

**Date Posted Online:** 2007-02-15 09:59:55
References


To cite this document: