

Vocabulary: Why and How? An SRA Open Court Reading® White Paper

Andrew Biemiller February 11, 2016

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Abstract

Due to both opportunity and aptitude, some children acquire more word meanings than other children. Even by the primary grades, a limited vocabulary predicts poor educational achievement throughout students’ public school careers. For children in need of more vocabulary, this white paper addresses the following questions. Roughly how many words do lower vocabulary children need to learn? What meanings ought to be taught directly? What word meanings ought to be introduced, but not necessarily taught? What meanings can be left to experience without instructional attention? How does this differ for pre-literate children, and literate students through grade 6?

What has not changed?

Vocabulary is the largest determinant of comprehension of language. Teachers often ask: What words make up vocabulary for preschool, primary, and upper elementary school students? What words are likely to be needed? In this article, I will discuss ways of teaching and fostering needed vocabulary at the preschool, primary, and upper elementary and middle school grades.

The vocabulary needed to comprehend a specific text consists of knowledge of *most* of the words in that text. Some word meanings are learned earlier than others. Thus, if most of the words in a text are known by most children by age 5, that text would be considered appropriate to read to kindergartners, or to be read by beginning readers. Conversely, a text with a substantial number of words not understood by the majority of children in grade 2 would not be appropriate for primary grade children to read independently. By kindergarten, the number of words known orally by children (i.e., vocabulary) is the strongest predictor

of their reading comprehension when they reach the upper elementary grades (Scarborough, 2001). Cunningham and Stanovich (1997) extended those findings to high school. While there are variations in how quickly children acquire reading skills in the primary grades, by grade 3 the *lack of vocabulary* is a far greater obstacle to comprehension than a lack of other reading skills, such as phonics and word recognition (Biemiller, 2005; Chall, Jacobs, and Baldwin, 1990).

How many word meanings are needed before and during the primary grades?

I refer to “word meanings” rather than “words.” Especially at the preschool and primary levels, I specific word forms (e.g., **lean**, **place**) access a number of “meanings.” Some meanings for a word are related and some are not. Meanings that really differ (e.g., *lean meat* vs. *lean the rake on the wall*) simply are different “roots” that have to be learned separately. On the other hand, words with different grammatical variations (e.g., *lean* vs. *leaned*) do not have different root meanings. Many word meanings fall between these two extremes. For example, “*Lean* on me when you’re feeling sad,” is a related meaning, but it may have to be learned separately.

I estimate that at the beginning of kindergarten, average children probably know the meanings of around 3,000 roots.¹ In homes where many words are used and explained, children add vocabulary rapidly, compared to children in homes where fewer words are used or explained (Hart & Risley, 1995, Hart & Risley, 1999; Hoff, 2003).

By the end of grade two, English-speaking children with the lowest (25%) vocabularies know on average the meanings of around 4000 roots.² Children with the largest vocabularies (highest 25%) know an average of 8000 root meanings—**twice as many!** The average at the end of grade 2 is around 6000 roots (Biemiller, 2005). Children add an average of 1000 roots per year during the primary grades.

Not all words children acquire have been directly explained. Many are acquired without conscious attention, if a word is used frequently enough. Some are actively inferred. Some children may be more talented at word inference than others (Shany and Biemiller, 2009). However, for lower-vocabulary students, adding some direct instruction clearly results in building a larger vocabulary (Biemiller and Boote, 2006; Marulis and Neuman, 2010).

How do we determine what word meanings to teach?

Determine priority word meanings. One strategy is to find word meanings that children with large vocabularies know and make a point of introducing these meanings to children with smaller vocabularies. A list of such priority word meanings was included in my book, *Words Worth Teaching* (Biemiller, 2009)³. To a considerable degree, children learn words in a predictable order (Biemiller

¹ +/- 500 words, depending on month born ranging from youngest to oldest within a kindergarten class. This estimate is derived from the 6,000 roots known by the average child at the end of grade 2.

² These data are based on English-speaking Canadian children from a wide range of socio-economic groups. It is possible that children from highly disadvantaged homes or second-language families could have even smaller English vocabularies.

& Slonim, 2001). Consider three children who know the meanings of 8,000 roots—the average for fourth grade. One child is in second grade, another is in fourth grade, and another in sixth. About 85% to 90% of the word meanings that these three children know are likely to be the same. Thus, these students have been learning mainly the same words at *different rates*. “Priority word meanings” are word meanings that children with large vocabularies (for given ages) know but children with small vocabularies don’t yet know. By the time these low-vocabulary children learn such words, they are comprehending “below grade level.” To a considerable degree, this method was used to identify instructional vocabulary for *Open Court Reading 2016*.

Another method of determining priority words can be based on the importance of words “of high utility for mature language users and are found across a variety of domains” (Beck, McKeown, and Lucan, 2013, p 9). However, these authors do not provide a listing of the 7,000 words that they suggest fit this description.

Still another method uses print frequency. However, among the more common words, there are many *homographs*—words with more than one meaning. Print frequency data ignores multiple meanings and can be misleading (Biemiller et al, 2014).

How Can We Foster Vocabulary Acquisition?

Acquiring vocabulary is different from acquiring skills

Once learned, many skills such as *swimming, cycling, word reading, and adding or subtracting numbers* can be used throughout life. However, becoming *literate* requires more than mastery of word-reading skills. Children also need an adequate *vocabulary*. Unlike basic reading and math skills, acquiring an adequate vocabulary requires *ongoing support for many years*. Young children clearly build vocabulary from the language used around them as well as from direct explanations. However, the “language around them” varies dramatically for children from less advantaged homes versus those from more advantaged homes (Hart & Risley, 1995, 1999; Hoff, 2003).

Unfortunately, during the primary grades, disadvantaged children continue to fall further behind advantaged children in word meanings known (Biemiller & Slonim, 2001; Cantalini, 1986; Christian et al, 2000). Schools will have to take more responsibility to ensure adequate vocabulary development across the primary years if disadvantaged children are to break out of poverty and surmount linguistic barriers.

Since the publication of *SRA Imagine It!* (2008), and especially *Open Court Reading 2016*, McGraw-Hill Education has added substantial vocabulary components to its reading/literacy program. In *Open Court Reading 2016*, over 300 word meanings are addressed directly in each grade.

³ In 2016, I estimate that I have missed about 15 percent of word meanings in Dale and O’Rourke’s *Living Word Vocabulary* that should be in *Words Worth Teaching*.

The Preschool Period

These are not literate children—they cannot acquire new vocabulary through their own independent reading.

Important word meanings in the preschool period

Many of the words learned in the preschool years have *perceptual* (or “concrete”) meanings (things that can be pointed to or acted out). Deacon (1997) and Peirce (1903/1955) call these “indexical” meanings that relate words to *nonverbal perceptions* of objects, places, or events.⁴

However, young children also learn *relational meanings* from age 2 on. There are many function words that some children have learned by age 3 but many other children only learn later (Hart ad Risley, 1999).

Among relational meanings are

- function words specifying relationships including auxiliary verbs (*could*), conjunctions (*both*), prepositions and locations (*after, instead, inside*), pronouns (*whose*), and quantifiers and articles (*all, enough, a*); and
- other words involving relations including nouns such as *aunt/niece* or *boss/worker*, verbs such as *balance* or *put*, and modifiers such as *big/small, good/bad* and *quickly/slowly*.

These *relational* word meanings may be the most important preschool meanings for their later vocabulary development.

Relational meanings are often not assessed in preschool vocabulary tests—probably because they cannot be illustrated with a single picture, as in the Peabody Picture Vocabulary Test. However, it is difficult to construct many sentences without using function words, or modifiers. I suspect that many function words and other relational meanings also have nonverbal indexical meanings.

Preschool children learn few, if any, true “symbolic” meanings. Symbolic meanings are defined in terms of other word meanings (*e.g. add, plan, science, history, divide*), rather than perceptual referents (real objects, settings, actions, etc.) or relational referents (locations, pronouns, prepositions, conjunctions, as well as objects related to other objects, modifiers, or verbs that operate on relations.)

How can acquiring word meanings be supported in the preschool period?

Word meanings are probably best taught with concrete examples. As with later learned word meanings, they are learned in meaningful verbal contexts. Short stories and shorter contexts (paragraph-length passages) that illustrate words are useful. Some of Richard Scarry’s

⁴ Eleanor and James Gibson have described “perception” as the evolved system for perceiving objects (and agents), places, events (and actions) (E. Gibson, 1968; J. Gibson, 1979). People (and animals) can distinguish between novel objects and previously-encountered objects (and other kinds of phenomena). To do this requires some kind of internal “representations” of previously encountered objects. I consider these to be “perceptual” meanings. Deacon (1997) and Peirce (1903/1955) refer to nonverbal meanings as “indexical.”

“word books” provide shorter paragraph-length contexts. So do pattern books such as *The Very Hungry Caterpillar*. Preschool children usually want books read many times. Different words can be discussed on different readings. Neuman and Wright (2013) have a number of additional suggestions for the preschool period. For example, children learned to use words such as *compare*, *contrast*, *observe*, and *predict* in science instruction in Head Start programs for 4 year-old children. In another example with preschoolers, children learned words related to a semantic category— for example *abdomen*, *lungs*, *heart*, and *brain* as “parts of the body.”

The Primary Period

Most children in the primary period are still preliterate—they cannot acquire much new vocabulary through their own reading, even if they can read some texts.

Important word meanings in the primary period

During the primary years, the largest number of new meanings that children acquire continue to be perceptual (Biemiller, 2009 and reanalyzed for this paper). However, relational and symbolic meanings acquired in these grades may be more important for future vocabulary development.

Sustaining vocabulary growth is greatly needed during the primary grades (K, 1, 2) at 1,000 root word meanings per year or *more*. At present, most low-vocabulary children not only start kindergarten with smaller vocabularies, but also continue to build vocabulary *more slowly* during kindergarten, first grade, and second grade (Biemiller & Slonim, 2001; Cantalini, 1987; Christian et al, 2000). English Language Learners also lag in acquiring English vocabulary (Biemiller, 2005).

Many word meanings are learned during these grades. Some of these new meanings continue to be *perceptual*—things or people you see and touch or things you can do (e.g., *hammock*, *mechanic*, *to ride*). Other word meanings are less concrete, including *relational* meanings (e.g., *should*, *either*, *against*, *whatever*, *several*) and *symbolic meanings* (e.g., *avoid*, *business*, *community*). I suspect that these relational and symbolic meanings will be more important for teachers to teach or otherwise introduce. Acquiring these meanings may depend more on parent or teacher *explanations*. They certainly depend on whether such words are being *used* with the children.

The list of priority words in *Words Worth Teaching* includes some 1,600 meanings for introduction or use between kindergarten and grade 2. These are most of the meanings of the *roots* known by 40 to 80 percent of children at the end of grade 2. In addition, teachers may see other words in texts they suspect that children in their primary classes may need as well as words specified in board or state curricula.

Among these 1,600 word meanings, 40 percent are *perceptual* meanings. I suspect that many unknown perceptual or “concrete” word meanings can either be inferred or illustrated in accompanying pictures (*dairy*, *to quiver*, *crutch*). These concrete words refer to things that can be pointed to or acted out. Thus their priority may be lower than the priority of *relational* and *symbolic* meanings.

Priority *relational* meanings can often be illustrated as well, but the picture must include two or more objects or agents and a physical or temporal relationship. When not known, these relational words should be taught. Examples of relational function words acquired by *some* children in the primary grades include *after*, *opposite*, and *or*. Examples of other relational meanings known by *some* students by grade 2 are *companion*, *to transfer*, and *slight* (or small as in “slight delay”). In *Words Worth Teaching*, there were over 130 function words and 500 other relational meanings that ought to be taught sometime between kindergarten and grade 2. In addition, among words classified as “Easy”—known by grade 2—there are another 175 function words that may be needed by some children.

The *priority symbolic* meanings (non-picturable) are words that should often be taught (e.g., *science*, *to divide*, *evidence*). There are over 600 symbolic words known by most students by the end of grade 2. In addition, there are some 700 symbolic meanings often known by *some* students by grade 2 but which may require attention in the primary grades (e.g., *add*, *plan*, *history*). These symbolic meanings may include “figurative” terms such as a *time line*, or *lean* on someone for support.

How can acquiring word meanings be supported in the primary period?

P *Primary children are still mainly preliterate.* Until they become reasonably fluent at reading language in print, primary children can find unknown word meanings to be confusing. Children often do not know whether they have misread a familiar word or correctly read an unfamiliar word. If students are to consolidate their reading skills through practice, they should have reading texts with mostly familiar vocabulary or reading support, especially in kindergarten and first grade. In *Open Court Reading*, first readings of texts are done with the teacher, ensuring that children can identify each word.

In the primary grades (kindergarten, grade 1, and grade 2), new word meanings will still mostly come from oral sources such as stories *read to or with children*, introductory demonstrations, field trips, or videos. Primary schoolchildren typically cannot understand texts they read that are as advanced as texts they can understand when read to them (Sticht and James, 1984). Primary children also read many fewer words per day than students read in later grades.

To build new vocabulary, *re-reading* stories or other texts (or re-viewing digital/TV “texts”) is often necessary. As teachers know, primary grade children generally welcome re-readings (within reason). In our experience, up to eight to ten word explanations can be used with or after each of the second and later re-readings (Biemiller and Boote, 2006). We have found that children dislike interruptions on a first reading. Similarly, Dickinson and Smith (1994) reported that digressions during the *first* reading of a text did not enhance language development.

In *Open Court Reading*, weekly texts are normally first read *with* students (often in groups), after which the students may read the text again on their own or as a class. A few words (preferably not more than three) are introduced *before* the first reading. During later readings and in other classroom activities, additional words are explained. A total of ten word meanings may be addressed each week.

Reviewing word meanings after each reading with explanations, as well as providing an additional review at the end of a week, results in learning more word meanings. This is the method used in *Open Court Reading*. In our experience, children in kindergarten, first grade, and second grade could acquire around 10 new word meanings per week if roughly *double that number of word meanings were taught* in whole-class lessons (Biemiler and Boote, 2006). (Children don't know all the same word meanings. Thus, you need to find good contexts for—and *teach*—20 to 25 word meanings per week if children are to acquire 10 new meanings per week.) If children do *acquire* 10 word meanings per school week, they can acquire 300–400 new meanings per year. This addition of directly taught meanings should also facilitate the acquisition of more meanings by inference and “latent” meaning acquisition (Landauer & Dumais, 1997; Landauer, 2007). A number of studies have now demonstrated that continuing vocabulary instruction for half a school year continues to lead to learning word meanings (review by Marulis and Neuman, 2010).

Summary: Acquiring meanings in the primary period

Expanding vocabulary during kindergarten is a step in the right direction. *However, unless vocabulary support is continued throughout the primary years, less advantaged children will not continue to add enough needed vocabulary in the rest of the primary years.* It is quite possible that children who reach the end of the primary grades with what is now an average vocabulary and fluent reading skills will be able to progress thereafter with normal classroom reading and classroom vocabulary instruction.

The Upper Elementary and Middle School Period

By this period, children acquire much of their new vocabulary through classroom and independent reading.

Important word meanings in the upper elementary and middle school grades

In grades 3–6, the priority words found in *Words Worth Teaching* are similar to many of Beck et al's (2013) “Tier II” words, and also include many “Academic” words listed by Averil Coxhead (2006). Most of these meanings are *symbolic*. A small number are additional *relational function* words. Examples of *symbolic* meanings include *attitude* (a way of feeling, acting, or thinking); *document* (an important paper; to give written proof—a different meaning); and *probability* (likely to happen). Among *relational function words* typically acquired in the upper elementary grades are *only* (except that), *through* (because of), and *while* (period of time). Note that these are new meanings of words previously encountered. In *Words Worth Teaching*, I list some 2,900 priority word meanings for introduction or use between the third and sixth grades. Again, teachers will encounter other words that children in their classes may need.

There are probably another 1,000 root meanings that will be needed in grades 7 or 8, mainly from Coxhead's *Academic Word List* (2006).

How can acquiring meanings in the upper elementary and middle school grades be supported?

After grade 2, most children can and should acquire much of their new vocabulary from books or selections they read. However, because children’s vocabulary already varies widely by third grade, the books they can profit from also vary (Chall and Conard, 1991). Teachers should encourage students in the upper elementary and middle school grades to attend to unfamiliar word meanings encountered while reading. Many students tend to skip over these, even when new meanings are explained in the text (Baumann et al, 2003). Students continue to add an average of 1,000 meanings of new roots during the upper elementary and middle school grades (Biemiller, 2005), and also come to understand four or five times more derived meanings using affixes (Anglin, 1993; Nagy & Scott, 2001).

Thus, by the upper elementary and middle school grades, it may be sufficient for teachers to ensure that

- (A) priority words are used in narrative and expository texts,
- (B) students become skilled in identifying and learning meanings they don’t know, and
- (C) teachers may identify other potential priority words by providing lists of such words appearing in class-assigned reading texts or taught as part of mathematics, science, or social studies curricula.

As much as possible, teachers should encourage students to take responsibility for actually finding meanings for unknown words. Ultimately, students will have to be able to do this in college and in work. However, teachers should continue to assess vocabulary growth, just as they assess growth in reading, spelling, punctuation, and computational skills.

When children can read words fluently (reading known words correctly and quickly), the proportion of unknown word meanings can increase to 3–6 percent of words in texts read independently. However, the new word meanings should appear several times in texts, and they should be explained in various ways: through classroom instruction, appositions (in-text explanations), peer assistance, glossaries, digital vocabulary supports in texts, etc. Note that most of these techniques do *not* require direct instruction of each new word.

In the upper elementary grades, some concrete word meanings are still being learned (e.g., *chowder*, *gander*, *leprechaun*). However, new *relational* and *symbolic* word meanings again are probably both more difficult to learn and more important to learn (e.g., *through*, *nevertheless*, *annihilate*, *border*, *condense*). In a recent study, my colleagues and I have found that symbolic meanings require about twice as many encounters as concrete meanings to be acquired from print at the same age (Biemiller et al, 2014). However, it appears that by the upper elementary grades, children are acquiring more new symbolic meanings than new concrete meanings. In grades 3 to 6, children are still acquiring an *average* of 1,000 new *root* meanings each year.

Does reading, in itself, build vocabulary? To some extent, it does. However, we have found that some children seem to acquire a lot more vocabulary from added reading experience than others (Shany & Biemiller, 2009). Consequently, I emphasize increasing student awareness of unknown word meanings, and that students actively address those unknown meanings.

In the upper elementary grades, children are usually taught more about affixes and also about Latin and Greek word stems (e.g., *demo-*, *-tion*). They also learn additional vocabulary in conjunction with science and social studies curricula. There is evidence that such instruction builds vocabulary and is applied to other known root words. (Baumann et al, 2003). However, when root word meanings are not known, affix knowledge does not help with finding meanings (Bowers & Kirby, 2010).

Summary—acquiring word meanings in the upper elementary and middle school grades

In these grades (3–8), literate students can take greater responsibility for identifying and learning new word meanings. However, students can be taught more about using affixes and compounds and made more aware of multiple word meanings. While there is less need to teach specific word meanings in grades 3–8, some word meanings that are critical for understanding a specific text should be taught directly. Teachers should monitor mastery of priority vocabulary growth.

Conclusion

To summarize, children with small vocabularies are less likely to achieve successfully in the upper elementary grades and on through high school. They are less likely to be ready for post-secondary education or careers. Because vocabulary is a cumulative process, those with low vocabularies at the end of the primary grades are already at a major disadvantage, even if they have been mastering word identification, reading skills and early computational skills. Thus, addressing low vocabulary in preschool, primary grades, and beyond appears to be the most effective approach to give students a fair opportunity for future academic achievement.

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