Vocabulary Size

Estimates of student vocabulary size vary dramatically (Anderson and Freebody 1981). The variation occurs because of differences in the procedures used by vocabulary researchers and in the definition of what is counted as a distinct word (Anderson 1996). Researchers Nagy and Anderson (1984) and Biemiller (2005b) use different descriptive terms for what is counted as a distinct word.

Nagy and Anderson (1984) attempted to resolve questions about the size of the vocabulary-learning task. Using a corpus of words gathered from school materials and textbooks (Carroll, Davies, and Richman 1971), they grouped related words into families by judging whether a student who knew the meaning of only one of the words in a family could infer the meanings of other related words in the family. For example, *sweet, sweetness,* and *sweetly* belong to the same word family. Compound words were judged in a similar way. From this analysis, Nagy and Anderson estimated that there are about 88,500 distinct word families in printed school English, and that an average twelfth grader probably knows about 40,000 of them.

While Nagy and Anderson (1984) count occurrences of word families, Biemiller (2005b) counts occurrences of root words. But since one word family is equivalent to one root word (and its related forms), the approach is essentially the same for both. Biemiller believes that when the meaning of a root word is known, derived words (i.e., other words in the word family) and compound words can probably be largely inferred from context while reading. According to Biemiller (2004), in Dale and O'Rourke's *The Living Word Vocabulary* (1981) there are about 17,500 root words known by students in Grade 12. Of these root words, they estimate that about 15,000 words are known well by a majority of students.

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WORD FAMILY

a group of words related in meaning

88,500 distinct word families in printed school English

40,000 word families known by Grade 12

ROOT WORD

a single word that cannot be broken into smaller words or parts

17,500 root word meanings in *The Living Word Vocabulary* (Grades K–12)

15,000 root word meanings known well by Grade 12

SEE ALSO . . .

> By the end of Grade 2, students know an average of about 6,000 root word meanings.
>
> —BIEMILLER, 2005a

How Many Root Words Are Acquired per Year?

According to Biemiller (2005a), children through Grade 6 typically acquire about 800 to 1,000 root-word meanings per year. From age 1 through Grade 2, children gain an average of 860 root words per year, or about 2.4 words per day. From Grades 3 to 6, they gain an average of 1,000 root words per year, or about 2.8 root words per day. Biemiller's estimates are based on the known number of root words at each level of *The Living Word Vocabulary* (Dale and O'Rourke 1981).

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Average Number of Root Words Acquired by Average Students

Age or Grade	Per Year	Per Week	Per Day
Ages 1–4	860	16.5	2.4
Grades K–2	860	16.5	2.4
Grades 3–6	1,000	19.2	2.8

Based on Biemiller 2005a.

Estimates of Cumulative Root-Word Knowledge

Age or Grade	Average Number of Root Words
End of Age 1	860
End of Age 2	1,720
End of Age 3	2,580
End of Age 4 (Pre-K)	3,440
End of Age 5 (K)	4,300
End of Grade 1	5,160
End of Grade 2	6,020
End of Grade 3	7,020
End of Grade 4	8,020
End of Grade 5	9,020
End of Grade 6	10,020

Based on Biemiller 2005a.

How Many Derived Words Are Acquired per Year?

A study by Anglin (1993) indicates that in Grade 1 the number of derived words (i.e., affixed or compound words) that students acquire is three times the number of root words. By Grade 5, the number of derived words and idioms increases to five times the number of root words.

	Grade	Root Words	Ratio	Derived Words
Ratio of Root Words Acquired to Derived Words Acquired per Year	Grade 1	860	860 x 3	2,580
	Grade 5	1,000	1,000 x 5	5,000

Based on Biemiller 2005a; Anglin 1993.

How Many Words Can Be Taught Directly?

When it comes to the number of root words or word families that can be taught in a school year, vocabulary researchers are basically in agreement. About 2 words per day, or 10 per week, can be taught directly.

	Per School Week	Per School Year/180 days	Researcher
Average Number of Root Words or Word Families That Can Be Taught Directly	about 10	360 root words	Biemiller 2005a
	about 8 to 10	about 400 word families	Beck et al. 2002
	about 8 to 10	300 to 400 word families	Stahl et al. 1986

The Vocabulary Gap

Profound differences exist in vocabulary knowledge among learners. The word knowledge gap between groups of children begins before children enter school. This gap is too often not closed in later years. Hart and Risley (1995) found, for example, that three-year-olds from advantaged homes had oral vocabularies as much as five times larger than children from disadvantaged homes. Without intervention, this gap grows ever larger as students proceed through school.

> Focusing vocabulary instruction on acquiring root words is an effective way to address the large number of words that students must learn each year.
>
> —BIEMILLER
> & SLONIM, 2001

Biemiller (2005a) estimates that the bottom 25 percent of students begin Kindergarten with 1,000 fewer root-word meanings than average students. To make matters worse, these students who have the smallest vocabularies acquire only about 1.6 root words per day as compared with average students, who acquire about 2.4 root words per day. By the end of Grade 2, this results in a difference of about 2,000 words between average students and lower-quartile students. In fact, the number of root words known by a second grader in the lowest vocabulary quartile is about the same as the number of root words known by an average Kindergartener (Anglin 1993; Biemiller and Slonim 2001; Biemiller 2005a).

The Vocabulary Gap in Root-Word Knowledge

Grade	Average Student (at 2.4 root words per day)	Bottom 25% (at 1.6 root words per day)
End of Pre-K	3,440	2,440
End of K	4,300	3,016
End of Grade 1	5,160	3,592
End of Grade 2	6,020	4,168

To close the vocabulary gap in students who have impoverished vocabularies, vocabulary acquisition must be accelerated (Biemiller 2005b). According to Biemiller (2003, 2005a), "at the very least, it would seem desirable to prevent further decrements" by teaching at least two root-word meanings a day to students in Kindergarten through Grade 2. After Grade 2, all students, including those in the lowest quartile, apparently learn new root words at about the same rate (Biemiller and Slonim 2001). However, because of the initial vocabulary gap, if students in the lowest quartile are to ever "catch up" with their higher-level peers, they will need to learn words at an even faster rate—3.5 to 4 root words per school day (Biemiller 2003).