



1987). Indeed, Coleman and colleagues (1966) used verbal ability as their primary dependent measure (see Madaus et al., 1979, for a discussion). Not surprisingly, the relationship between vocabulary knowledge and academic achievement is also well established. For example, as early as 1941, researchers estimated that for students in grades 4 through 12, there was about a 6,000-word gap between students at the 25th and 50th percentiles on standardized tests (Nagy & Herman, 1984). Using a more advanced method of calculating vocabulary size, William Nagy and Patricia Herman (1984) estimated the difference to be anywhere between 4,500 and 5,400 words for low- versus high-achieving students.

Research also supports the relationship between vocabulary development and access to a wide variety of experiences. For example, Nagy and Herman (1984) found a consistent difference in vocabulary development between groups at different socioeconomic status (SES) levels. They estimated a 4,700-word difference in vocabulary knowledge between high- and low-SES students. Similarly, they estimated that mid-SES 1st graders know about 50 percent more words than do low-SES 1st graders. Michael Graves and Wayne Slater (1987) found that 1st graders from higher-income backgrounds had about double the vocabulary size of those from lower-income backgrounds. Although different researchers use slightly different estimates, all seem to agree that huge variations in vocabulary size exist between students from different backgrounds. Those students with high access to a variety of experiences (generally) have large vocabularies; those with low access (generally) do not.

The Debate Over Vocabulary Instruction

How, then can a school help increase the vocabulary of students? Two somewhat competing approaches currently exist: (1) wide reading, and (2) direct vocabulary instruction.

Wide Reading

Reading widely to enhance vocabulary makes good intuitive sense; the more students read, the more new labels they acquire for the experiences they read about. In fact, some theorists assert that wide reading is the only viable way of enhancing vocabulary. One strong argument for wide reading versus direct vocabulary instruction is that there are just too many words to teach individually. To illustrate, William Nagy and Richard Anderson (1984) estimated that the number of words in "printed school English" (i.e., those words K-12 students encounter in print) is about 85,000. Obviously, it would be impossible to teach this many words one at a time. Steven Stahl and Marilyn Fairbanks (1986) summarize this position in the following way:

Since vocabulary-teaching programs typically teach 10 to 12 words a week or about 400 words per year, of which perhaps 75% or 300 are learned, vocabulary instruction is not adequate to cope with the volume of new words that children need to learn and do learn without instruction. (p. 100)

Nagy and Herman (1987) provide the following logic for wide reading as the sole vehicle for developing vocabulary:

If students were to spend 25 minutes a day reading at a rate of 200 words per minute for 200 days out of the year, they would

encounter a million words of text annually. According to our estimates, with this amount of reading, children would encounter between 15,000 and 30,000 unfamiliar words. If one in 20 of these is learned, the yearly gain in vocabulary will be between 750 and 1,500 words. (p. 26)

Thus, if one takes the previous discussion at face value, direct vocabulary instruction may not only be inadvisable but downright foolish. Indeed, providing opportunities for students to read widely as a part of their regular schooling makes good sense.

Programs that facilitate wide reading for students have been in place for decades (Hunt, 1970). Many of those programs use the name of Sustained Silent Reading (SSR) or similar variants such as Free Voluntary Reading (FVR), Uninterrupted Sustained Silent Reading (USSR), and Positive Outcomes While Enjoying Reading (POWER). A simple Sustained Silent Reading program is one in which students (and quite often teachers) read silently for about 10 to 20 minutes from books of their choice. As we have seen, the logic underlying this approach is that it incidentally increases vocabulary. Another rationale for this approach is that if students are ever to become proficient independent readers, they must break from the heavily scaffolded and structured reading activities commonly used in their class work.

The research on SSR has produced ambiguous results on its effectiveness in improving reading comprehension (National Institute of Child Health and Human Development, 2000; Holt & O'Tuel, 1989; Pilgreen & Krashen, 1993). One explanation might be that teachers and schools have

employed so many variations that the defining characteristics have been lost (Nagy, Campenni, & Shaw, 2000). Wide reading has also been shown to have a positive impact on vocabulary development, but, again, the findings are inconsistent (Elley, 1989; Morrow, Pressley, Smith, & Smith, 1997; Pressley, 1998; Robbins & Ehri, 1994; Rosenhouse, Feitelson, Kita, & Goldstein, 1997).

Where wide reading certainly is critical to vocabulary development, research over the decades simply does not support the position that it is sufficient in and of itself to ensure proper vocabulary development. As Isabel Beck and Margaret McKeown (1991) explain: "research spanning several decades has failed to uncover evidence that word meanings are routinely acquired from context" (p. 799).

A study by Joseph Jenkins, Marcy Stein, and Katherine Wysocki (1984) dramatically demonstrates this point. They found that to adequately learn a new word in context (without instruction), students must be exposed to it about six times before they have enough experience with it to ascertain and remember its meaning. Beyond six exposures, the increase in learning was negligible. These findings are consistent with Stahl and Fairbanks (1986) who reported that multiple exposures to words produced a better understanding of meaning (although Stahl and Fairbanks do not identify an optimum number of exposures).

These conclusions seriously undermine the logic of the "wide reading" approach to vocabulary development *as the sole vehicle for vocabulary development.* Again, the working principle underlying the wide reading approach to vocabulary development is that students will figure out the meaning of and

remember a portion of the new words they encounter in their reading. However, this argument fails to acknowledge the fact that students will encounter the vast majority of new words only a few times. Indeed, word frequency studies indicate that most words appear very infrequently in written material. More than 90 percent of the words students encounter while reading occur less than once in a million words of text; about half occur less than once in a billion words (Nagy & Anderson, 1984). Thus, the encounters students have with new words in their reading are, for the most part, isolated, single encounters that will not produce enough exposure to learn the new words.

Direct Vocabulary Instruction

Direct instruction does not imply rote memorization of definitions. One of the critical elements of direct vocabulary instruction is that students should elaborate on the meaning of new words they encounter. This simply means that the student "expands on" the information initially presented about a word (Pressley, 1998). This is the antithesis of memorizing definitions.

As the work of Allan Paivio suggests, one of the best ways to elaborate on a newly learned vocabulary term is to generate imagery representations of its meaning. The research on the impact of generating images to learn and remember new words is quite strong. In an analysis of 11 controlled studies, Glen Powell (1980) found that instructional techniques using imagery produced achievement gains in word knowledge that were 34 percentile points higher than techniques that did not:

Use imagery to elaborate on a new word

A distinct difference exists between the effects of instruction in words from generalized vocabulary lists and words specific to a given topic. Many vocabulary development programs use vocabulary lists of high-frequency words—words that commonly appear in the written language (Carroll, Davies, & Richman, 1971; Harris & Jacobson, 1972). These high-frequency lists typically do not focus on the vocabulary from academic subject areas. Yet these are the words that should be the focus of instruction in a vocabulary development program designed to enhance academic achievement. In a meta-analysis, Stahl and Fairbanks (1986) found that instruction in general words like those found in high-frequency word lists enhanced students' ability to understand new content by 12 percentage points. However, when the words are selected because they are critical to academic content, the effect is a 33 percentage point gain. The dramatic difference indicates that direct instruction in words specific to academic content can have a profound effect on students' abilities to learn that content.

Class words necessary for specific academic content

Considered together, the research on wide reading and direct vocabulary instruction paint a fairly clear picture of what a comprehensive program of vocabulary development might look like. For example,

- students are engaged in wide reading about subject matter content and content of their choice;
- students receive direct instruction on words and phrases that are critical to their understanding of academic content;
- students are exposed to new words multiple times; and

Summary ↑

- students are encouraged to elaborate on their understanding of new words using mental images, pictures, and symbols.

Action Steps

I recommend three action steps to promote the acquisition of learned intelligence and background knowledge.

Action Step 1. Involve students in programs that directly increase the number and quality of life experiences students have.

Ways to accomplish this might include trips to art galleries, museums, companies, and different areas of the city. If resources are limited, a viable alternative is to provide mentoring designed specifically to enhance life experiences. This is particularly important for those students who do not come from experience-rich environments. Reilly (1992) cites several sources for volunteer mentors including

- major businesses,
- other school volunteer programs,
- service organizations and clubs,
- postsecondary education institutions,
- media (newspaper, TV, or radio) announcements,
- chambers of commerce,
- volunteer referral services, and
- local religious and cultural organizations.

In addition to many fine mentoring programs like BBBS and SAS, Gregory Clinton (2002) notes the schools can also design their own school-based programs. As a guide, Clinton

recommends the steps articulated by Jay Smink, Director of the National Dropout Prevention Center:

- secure the commitment of the district leadership,
- identify and select program staff,
- establish program goals and objectives (i.e., enhance the life experiences of students),
- prescribe activities and procedures,
- identify students,
- promote the program and recruit mentors,
- train mentors and students,
- match mentors and students,
- monitor the program, and
- evaluate ongoing and terminated cases.

Action Step 2. Involve students in a program of wide reading that emphasizes vocabulary development.

There is no single way to design a wide reading program at the school level. (For a discussion of how to organize and manage an SSR program see *The SSR Handbook: How to Organize and Manage a Sustained Silent Reading Program* by Janice Pilgreen, 2000). Guidelines that are commonly observed in a wide reading program include

- A period of time (e.g., 10 to 20 minutes) is set aside during the school day for all students to engage in silent reading.
- Students are expected to bring their own (appropriate) choice of book and read silently.
- Reading materials are selected outside of the reading time unless the teacher takes

the class to the library to select reading material.

- Teachers are encouraged to set aside a secure location in their room for students to leave books.
- Students are not allowed to sleep or do homework during reading time.
- Reading time should not create extra work for teachers in terms of grading or record keeping.

Two additions should be made to the typical SSR approach: (1) ask students to identify interesting words and try to determine their meanings, and (2) encourage students to keep track of these words in a personal vocabulary notebook. Using what is known about learning words during reading (Pressley, 1998), you might provide students with a process like the following for learning words from context:

- As you are engaged in silent reading in class or at home, identify new words you find interesting.
- Write these words on a small piece of paper and mark the page using the slip of paper.
- When you finish reading, go back and try to figure out the meaning of these words using the information and clues surrounding the word. If you are not sure, make your best guess.
- Write the word and your guess in your vocabulary notebook.

Then, integrate these student-selected words with words directly taught to students.

Action Step 3. Provide direct instruction in vocabulary terms and phrases that are important to specific subject matter content.

A sustained silent reading program with a vocabulary emphasis is only half of a comprehensive intervention to indirectly enhance learned intelligence. The other is direct instruction in terms and phrases selected because of their importance to academic content.

Researchers at Mid-continent Research for Education and Learning (McREL) have identified 6,700 terms that are critical to the understanding of 14 different subject areas (Marzano, Kendall, & Gaddy, 1999). Consider a few mathematics terms and phrases within the general category of probability that are appropriate for students in grades 6–8:

- experiment,
- odds,
- theoretical probability,
- tree diagram,
- simulation, and
- experimental probability.

Two significant aspects are revealed in the McREL academic vocabulary list. First, the number of terms is small enough to make direct instruction feasible. If students were to receive instruction in about 18 words per week over the course of their K–12 schooling, they would be exposed to all 6,700 terms covering 14 subject areas. Of course, the number of terms directly taught can be reduced if only selected subjects are targeted. Second, by definition, these terms are the

Favorite words!
great idea!

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ones students are most likely to encounter in their subject matter classes. Lists of subject matter terms, then, provide a new foundation for vocabulary development—one that has the potential of enhancing students' academic background knowledge.

Given that a viable list of subject matter terms is being used, teachers can systematically teach these terms as a regular part of classroom instruction and students add these words to their vocabulary notebooks. Coordination of effort from teacher to teacher and grade level to grade level is important. To ensure that students receive instruction in all the critical terms at appropriate times, teachers must do cross-grade planning.

The research implies that a sequential process is best for learning these academic terms:

1. Students are presented with a brief, informal explanation, description, or demonstration of the term and asked to describe this information in their own words.
2. Students are presented with an imagery-based representation of the new term.
3. Students are asked to create their own imagery-based representations for the term.

4. Students are asked to elaborate on the term by making connections with other words.
5. Over time, students are asked to add new information to their understanding of terms and delete or alter erroneous information.

Summary

Between crystallized and fluid intelligence, crystallized intelligence has the stronger relationship with academic achievement. Background knowledge and crystallized intelligence are, for all practical purposes, identical, particularly as they relate to academic achievement. A strong link is established between crystallized intelligence and vocabulary knowledge. This theory base implies that academic or learned intelligence can be directly enhanced by deepening the experiential base of students and indirectly enhanced by a combined program of wide reading and direct vocabulary instruction. I recommended three action steps to promote the acquisition of learned intelligence and background knowledge.

→ How this term kind? Tested?
Evaluated? What age kids?
In other languages?
What settings?