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Vocabulary, Reading Comprehension, and Content:

Why We Need All Three

by Nancy Frey

Literacy, defined as reading, writing, speaking, listening, and viewing, is deeply embedded in the content of science instruction. These literacies serve as a pathway for accessing the knowledge of the subject. In fact, vibrant elementary science instruction and curriculum relies on a science-literacy integration approach and includes vocabulary building and collaborative structures for oral language development (Cervetti, Barber, Dorph, Pearson, & Goldschmidt, 2012; Slavin, Lake, Hanley, & Thurston, 2014). But the reverse must also be true. That is, science instruction must also build the literacies of children. How does a science-literacy integration program like *Panorama* promote reading acquisition and consolidation?

What Reading Skills Must Elementary Students Develop?

The domains of elementary reading instruction are clustered in five categories: phonemic awareness, phonics, fluency, vocabulary, and reading comprehension (National Reading Panel, 2000). But these do not develop across the same trajectory, as some are mastered early, others take a bit longer, and a few evolve across an entire lifetime. One way of thinking about these skills is to consider which are constrained and which are unconstrained.

Constrained Skills

A constrained skill is one that has finite boundaries—in other words, an end point. In reading, these are the foundational skills of:

- *phonemic awareness:* the sounds of the language;
- *alphabetics:* the graphs of the language;
- *phonics:* the ability to bolt the sounds of the language onto letters and letter combinations; and
- *fluency:* the ability to read accurately, with prosody and expression, and at a smooth and steady rate.

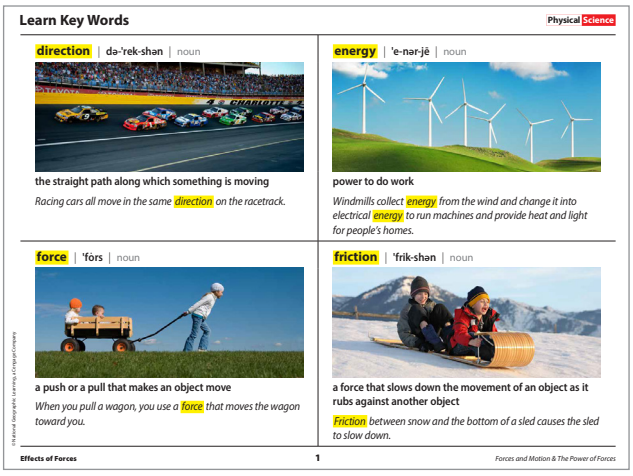
Each of the aforementioned constrained skills is finite, meaning that they can be counted. There are 44 phonemes in the English language and 26 letters in the alphabet, and students making expected progress will master these in the primary grades. They will predictably have full control of phonics by the end of third grade. Reading fluency takes a bit longer to develop, but students who make expected progress in fluency master it by the end of eighth grade. We rely on normed tables to assess oral and silent reading fluency (Hasbrouck & Tindal, 2017), but the point is that there is a limit as to one's reading pace. Once mastered, you don't acquire more sounds of the language, discover new letters and letter combinations, or read increasingly faster throughout your life. Mastery of these skills leads to automaticity, which is to say the ability of a reader to accurately decode connected text in order to devote more cognitive resources to sense making (LaBerge & Samuels, 1974). Having said that, these foundational reading skills, while important, are not sufficient on their own for reading success. Learners must also develop the unconstrained skills at the same time.

Unconstrained Skills

Unconstrained skills are what propel readers forward in their development as proficient readers. Unconstrained reading skills consist of (Paris, 2005):

- *vocabulary*
- *comprehension*

Unlike constrained skills, these have no boundaries. They develop over a lifetime. Your vocabulary is wider and deeper today than it was a decade ago. Your reading comprehension will be better next year compared to this year. That's because vocabulary and comprehension are fueled by knowledge. A young reader who developed her constrained reading skills, but did not develop unconstrained skills, would fail to progress. In fact, the well-known fourth grade reading slump is largely a product of lagging knowledge building, not decoding. As well, wise teachers know that a reading program that focused solely on constrained skills, without dedicated attention to the knowledge building necessary for the development of vocabulary and reading comprehension, would fail to adequately support young readers.


Learn Key Words

Physical Science

direction | də-'rek-shən | noun

the straight path along which something is moving

Racing cars all move in the same direction on the racetrack.

energy | 'e-nər-jē | noun

power to do work

Windmills collect energy from the wind and change it into electrical energy to run machines and provide heat and light for people's homes.

force | 'fȯrs | noun

a push or a pull that makes an object move

When you pull a wagon, you use a force that moves the wagon toward you.

friction | 'frik-shən | noun

a force that slows down the movement of an object as it rubs against another object

Friction between snow and the bottom of a sled causes the sled to slow down.

Effects of Forces 1 Forces and Motion & The Power of Forces

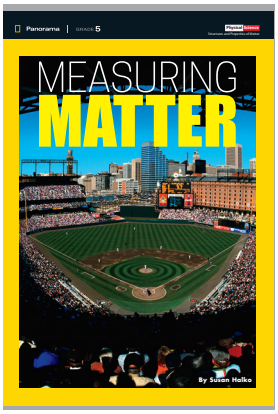
The unconstrained higher-order reading skills of vocabulary and comprehension must be attended to with the same intentionality as constrained skills. These skills develop simultaneously and independently, meaning that foundational skills and higher-order skills are not one and the same. You won't learn much in the way of vocabulary by focusing solely on decoding. Knowledge-building must be part of the equation. Tarchi reminds us that "instruction in high-order reading comprehension should be a specific educational target, and treated independently from basic skills instruction" (2015, p. 80).

How Are Knowledge and Reading Related?

The more you know about something, the better you're able to understand what's written about it. It's common sense, but it is something that can be overlooked in the effort to promote the reading skills of elementary students. In an iconic study on the relationship between reading comprehension and knowledge, middle school students were assigned to one of four groups, depending on their reading ability and knowledge of baseball. (The researchers selected readings about baseball to test their theory because it is a nonacademic topic.)

- High reading ability/high level of baseball knowledge
- High reading ability/low level of baseball knowledge
- Low reading ability/high level of baseball knowledge
- Low reading ability/low level of baseball knowledge

They measured reading comprehension through verbal retellings, summarization of the text, and the ability to determine important ideas and details from unimportant ones. It should come as no surprise that the high-ability readers who also possessed a high degree of baseball knowledge performed best on measures of reading comprehension of the passages. But what is surprising is that those with low reading ability, but a high degree of baseball knowledge, performed at the same level. In fact, they performed significantly better than those with high reading abilities but low levels of baseball knowledge. The researchers went on to report that "students with high reading ability but low knowledge of baseball were no more capable of recall or summarization than were students with low reading ability and low knowledge of baseball" (Recht, & Leslie, 1988, p. 19). For these students, generic comprehension skills could not compensate for a lack of topical knowledge. Why? Because comprehension and vocabulary skills work in tandem with knowledge acquisition.



Vocabulary + Comprehension + Content Knowledge = Reading Success

All children need the foundational skills of reading—phonemic awareness, alphabetics, phonics, and fluency—in order to make initial progress in reading. But without a deliberative focus on the development of content knowledge, reading progress will stall. The unconstrained skills of vocabulary and reading comprehension, along with content knowledge, must be developed from the very beginning of a child's reading life.

Panorama provides the space for the unconstrained skills of vocabulary and reading comprehension to flourish. Science is integrated into content skills and knowledge development, as knowledge is the catalyst for higher-order skills acquisition. *Panorama* leverages the rich content from National Geographic to ensure that students are at the leading edge of science knowledge. It is this consolidation of these three key elements—vocabulary, reading comprehension, and knowledge—that are at the heart of an effective science-integrated reading program.

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