BACKGROUND KNOWLEDGE AND READING COMPREHENSION

A recent article "Why American Students Haven't Gotten Better at Reading in 20 Years" in The Atlantic addressed the critical role that background knowledge plays in the ability to comprehend. The article subtitle was "Schools usually focus on teaching comprehension skills instead of general knowledge – even though education researchers know better."

The piece suggests that educators have treated comprehension as a set of skills, when in fact comprehension depends primarily on what readers already know. The article refers to a panel of literacy experts convened by officials who oversee the National Assessment of Educational Progress. As a member of the panel, Daniel Willingham, explained:

"Whether or not readers understand a text depends far more on how much background knowledge and vocabulary they have relating to the topic than on how much they've practiced comprehension skills. That's because writers leave out a lot of information that they assume readers will know. If they put all the information in, their writing would be tedious. But if readers can't supply the missing information, they will have a hard time making sense of the text."

Willingham and like-minded literacy experts posit that the best way to boost students' reading comprehension is to expand their knowledge and vocabulary by teaching them history, science, literature, and the arts, using curricula that guide kids through a logical sequence from one year to the next. Willingham has been making this point for a long time. I first read a piece he wrote about this in 2006 "How Knowledge Helps" around the same time I read E.D. Hirsch's book "The Knowledge Deficit", in which Hirsch claims that the solution to improving reading comprehension is to teach a core set of content topics over the grades.

In another 2006 Willingham article, "The Usefulness of Brief Instruction in Reading Comprehension Strategies", Willingham made the case that, even though decades of research shows that teaching reading comprehension strategies is effective, he considered them a "bag of tricks that can indirectly improve comprehension" and called for less explicit instruction of comprehension strategies. He wrote a later article in 2014 "Can Reading Comprehension Be Taught?" that begins with this:

"In this commentary, we suggest that reading comprehension strategy instruction does not actually improve general-purpose comprehension skills. Rather, this strategy represents a bag of tricks that are useful and worth teaching, but are quickly learned and require minimal practice."

Having spent many years successfully teaching comprehension strategies, especially to struggling readers, Willingham's 2006 piece took me aback. Since then, I have gained a better understanding of the complex factors that contribute to reading comprehension and have a greater appreciation for the role that background knowledge plays. However, I still believe that teaching general knowledge is not THE solution to reading comprehension deficits as Willingham and The Atlantic article claim.

Part of the issue has to do with how much inference is typically required during reading. As Willingham notes, writers leave out a lot of information that they assume readers will know. Here are some examples (from Oakhill and Cain, 2016):

Example 1:

Bobby was busy with his bucket and spade. The sandcastle was nearly complete. Then a huge wave crashed onto the shore. On seeing that his day's work has been ruined Bobby started to cry.

Inference: Bobby was making a sandcastle.

Background knowledge needed: a bucket and spade is used to make things out of sand at the beach

Inference: The sandcastle was ruined by the wave

Background knowledge needed: incoming tides cause waves to come onto the beach and flatten sand sculptures

Example 2:

Johnny carried a jug of water. He tripped on a step. Mom gave him a mop.

Inference: Johnny spilled the water when he tripped.

Background knowledge needed: experience with spills and the mess they make

These are very simple examples, but they show why reading comprehension is a dynamic interaction between the reader and the text. It is a process of simultaneously extracting and constructing meaning and most texts cannot be understood without contributions from readers, including background and "world" knowledge.

Clearly, readers must have sufficient background knowledge in order to construct meaning through inferences, especially when reading academic, subject area text. But they ALSO need a set of meta-cognitive strategies to process and organize the information they are reading. That's where explicit instruction of strategies comes in.

Tim Shanahan referenced The Atlantic article in a recent blog post although his position about the importance of background knowledge was more measured:

"Research has long shown the importance of knowledge in comprehension. If a reader knows much about a topic, his/her reading comprehension rises. Studies of what American kids (and adults) know about science, geography, economics, technology, and history suggest that Professor Willingham has a point. Our kids simply don't know enough. (There are great inequities in knowledge distribution, just as there is great inequality in reading attainment.)"

Shanahan points out that, in addition to devoting a significant amount of time to reading and writing instruction, it is important to provide time for reading about content to build background knowledge.

Based on experience, I think the kind of "workbook" activities that were commonly used in the 1970's through the 1990's to teach discreet comprehension "skills" (such as choosing the correct answer from four options for the main idea or a conclusion drawn) were not effective. Students did not apply these skills that they were practicing in isolation to real reading. That's why a long time ago I focused on training content teachers of all subjects to embed strategy instruction and guided practice into content learning using real content reading (see The Key Comprehension Routine). Time and again I have seen very successful results, which is why I can't accept Willingham's conclusion that background knowledge is the main solution and comprehension strategy instruction should be minimal.

Building Background Knowledge

To comprehend a story or text, young readers need a threshold of knowledge about the topic, and new, tougher state standards place increasing demands on children's prior knowledge. This article offers practical classroom strategies to build background knowledge such as using contrasts and comparisons and encouraging topic-focused wide reading.

We've had our share of lively debates in the field of reading, but not on this particular topic: background knowledge. There is a virtual consensus that background knowledge is essential for reading comprehension. Put simply, the more you know about a topic, the easier it is to read a text, understand it, and retain the information. Previous studies (Alexander, Kulikowich, & Schulze, 1994; Shapiro, 2004) have shown that background knowledge plays an enormous role in reading comprehension (Hirsch, 2003).

The contribution of background knowledge to children's comprehension became all that more clear for us in a recent three-part experiment including 4-year olds from low- and middle-SES (socioeconomic status) families (Kaefer, Neuman, & Pinkham, in press). In the first experiment, we assessed low- and middle-SES children's background knowledge about birds by creating a task with fictional characters and names: "This is a toma. A toma is a bird. Can a toma live in a nest?" and other items in a similar format. The experiment revealed stark differences in knowledge about birds between the two groups: ($t(43) = 3.22$, $p = .002$), Cohen's $d = .93$. Low-SES children had significantly more limited background knowledge than their middle-class peers.

So, to tap how these differences in background knowledge might relate to comprehension in text, we created an 18-page illustrated storybook in our second experiment that featured the adventures of four types of birds (named for extinct species): the moa, faroe, cupido, and kona. The book had a total of 238 words and shared a common plot and story grammar, including the setting (i.e., a house), problem, response, and resolution. Using a receptive comprehension measure that examined children's understanding of critical story events and their ability to make causal inferences, we found once again that the low-SES children experienced greater difficulty comprehending the story than their middle-SES peers. These children demonstrated

significantly poorer comprehension of the text (t(75) = 1.99, p = .050), with a moderate effect size (Cohen's d = .46).

Consequently, in our third study, we attempted to neutralize background knowledge by introducing a storybook narrative context that would be novel to both groups. Here was our reasoning: If children's preexisting background knowledge underlies these differences in comprehension, then we would expect that there would be no differences in learning among our differing SES groups. For this study, we created an 18-page illustrated storybook similar to the one we used in our previous study—with one difference: The storybook used a novel category, wugs (a pseudo-word), and was designed around the adventures of four species of wugs. And our results sustained our hypothesis about background knowledge and comprehension. In this case, there were no differences between groups (t(56) = .57, p = .569, Cohen's d = .15). When we held background knowledge constant by introducing an unknown topic, there were no significant differences between SES groups in children's word learning, comprehension, or ability to make inferences. Taken together, these results suggest that differences in low-SES children's comprehension skills may be attributed, in part, to limitations in their preexisting knowledge base.

This research builds on a large body of work that has shown the effects of background knowledge and comprehension (Anderson & Nagy,1992; Anderson & Pearson, 1984). For example, studies have shown that individual differences in prior knowledge affect the ability to extract explicit and implicit information from text and integrate this text-based information in reading comprehension (Kintsch, 1988). Other studies (e.g., Cain, Oakhill, Barnes, & Bryant, 2001) have examined multiple factors, including the relative contributions of inferential processing, domain knowledge, metacognition, and working memory to learning from text. Our results are consistent with this research (Cain & Oakhill, 2011; Recht & Leslie, 1988), highlighting the role of background knowledge on children's comprehension as early as preschool.

Why is background knowledge so important?

It makes good sense that to comprehend a story or text, readers will need a threshold of knowledge about the topic. Sometimes we call it domain-specific knowledge or topical knowledge. Without such knowledge, it becomes difficult to construct a meaningful mental model of what the text is about. Consider the following examples.

Background knowledge enables readers to choose between multiple meanings of words

For example, think about the word operation. If you were to read the word in a sports article about the Yankees, you might think about Derek Jeter recovering from his latest baseball injury. If you read the word in a math text, on the other hand, you'd think about a mathematical process like multiplication or division. Words have multiple purposes and meanings, and their meanings in particular instances are cued by the reader's domain knowledge.

Reading and listening require readers to make inferences from text that rely on background knowledge

Even the most immediate oral language exchanges, like "What do you say?" to a young child who just received some Halloween candy, require some level of inferencing. From infancy on, oral language comprehension requires children to actively construct meaning by supplying missing knowledge and making inferences. This, of course, becomes even more complicated when we turn to written texts, since it may require students to make inferences based on limited information in the text itself. In fact, many of our greatest writers engage readers through their writing to think beyond the text.

Understanding text depends on readers supplying enough of the unstated premises to make coherent sense of what is being read. But to do this well, readers need to have a foundation of knowledge about the topic. Otherwise, as studies have shown, they can get caught on the "seductive details" (Garner, Gillingham, & White, 1989) of a text—highly interesting and entertaining information that is only tangentially related to the topic—which can distract the reader and disrupt the comprehension of text. Background knowledge, in contrast, acts as a road map for students, allowing them to stay on target despite the interesting details. This suggests that once print has been decoded into words, reading comprehension and listening comprehension requires the active construction of inferences that rely on background knowledge and are implicit in the text.

Literacy language requires background knowledge

Second-language learners know for certain that many metaphors, idioms, and other literary devices are based on background knowledge. For example, if we say that you "really hit the ball out of the park" after you gave a presentation to your colleagues, you would quickly understand the compliment. We know that it can't be taken literally because we know what the saying refers to. Writings are heavily dependent on metaphors and idioms. Studies (e.g., Ortony, Schallert, Reynolds, & Antos, 1978) have shown that idioms are often processed just as rapidly as literal meanings, indicating that we are constantly activating background knowledge in comprehension.

Informational text requires background knowledge

Informational text tends to have a greater density of vocabulary and concepts that are directly related to students' background knowledge (Price, Bradley, & Smith, 2012). And these demands placed on background knowledge only accelerate as students progress through the grade levels. Students will be required to apply previously learned concepts to increasingly complex text. They must read, discuss, and write about topics that are conceptually more difficult, and they will need to increasingly draw on intertextual linkages across subject areas. They'll be required to provide evidence from text, show deep and thorough understanding of these concepts, and think creatively about applying these concepts in new ways.

Consequently, in much of the literature in reading, we have focused on skills associated with comprehension: decoding, vocabulary development, strategy instruction, and metacognition, among many others. But what we can see from this brief summary is that we have given very little instructional time to a skill that can play an enormous role in comprehending text. We would venture to guess that students' understanding of text is unlikely to improve unless we begin to more deliberately teach background knowledge.

How to build background knowledge

The question then becomes, how do we build children's background knowledge? Core reading materials often encourage us to activate, support, build on, and tie to children's existing knowledge base. But what do we do when there is no existing knowledge base? Or when there is little to build on? If you asked us, for example, to read an elementary physics text building on our previous knowledge base of physics, you would likely see blank stares, akin to a deer in headlights.

This issue becomes even more complicated in the age of Common Core State Standards (CCSS). The CCSS place a premium on the amount of background knowledge we provide to children prior to reading a text. It's not that the standards negate background knowledge or its contribution to comprehension; rather, the authors of the publishers' guidance to the CCSS emphasize close reading, developing knowledge through text, regarding the deliberate and careful analysis of text as the gateway for developing independent readers (National Governors Association Center for Best Practices & Council of Chief State School Officers,2010).

Although at times, this clash of perspectives might seem like a catch-22, the problem is solvable. Teachers can effectively build children's background knowledge early on (Neuman & Wright, 2013). However, at the same time, we must recognize that knowledge is not just accumulating facts; rather, children need to develop knowledge networks, comprised of clusters of concepts that are coherent, generative, and supportive of future learning in a domain. Here's how we do it:

Begin by teaching words in categories.

For example, you can try something as simple as this: "I'm going to say the following words:strawberries, bananas, papayas, pineapples. They all are a type of… (fruit)." Categories of objects begin to develop concepts, and the use of generic nouns (fruit) has been shown to be highly related to language and vocabulary development.

Use contrasts and comparisons.

For example, you can give children puzzlers like, "Is an artichoke a type of fruit? Why is it or is it not a kind of fruit?" Puzzlers help children think outside the immediate

context and consider the reasoning behind these contrasts and comparisons, which can further their understanding of categories and concepts.

Use analogies.

An analogy is another type of comparison, but this time the comparison is made between two things that are usually thought to be different from each other. Analogies help children build knowledge because they compare something new to something we already know. For example, try something like, "bird is to feather as dog is to… (fur)." Children can use similes (comparisons using the words like or as) or metaphors (comparisons without using like or as) to build new knowledge.

Encourage topic-focused wide reading.

Reading builds knowledge, but wide reading has typically been interpreted as reading about a lot of different topics, demonstrating breadth rather than depth in reading. Try this variation: Encourage children to identify an interest and read as many books as they can on one topic. What you find is that children will develop a deeper knowledge and expertise on a topic. These interests will drive children to read more.

Embrace multimedia.

We often think that direct experiences are the most compelling ways to build knowledge. As many teachers can attest, there is nothing more thrilling than watching children engage in learning through direct experiences or seeing their delight and excitement on field trips and other activities. Although it is certainly not a replacement for real-life experiences, multimedia can often provide a wealth of information that we could only wish to experience firsthand. Further, it can introduce children to important words and concepts in a highly motivating way and build a shared knowledge base among all of your students.

Conclusion

The importance of background knowledge is especially salient in the age of Common Core. To meet the demands of these new standards, children will be expected to develop knowledge through text, both narrative and informational, within specified difficulty ranges at each grade level. Informational text, in particular, is likely to have a greater density of conceptual language and academic terms than typical storybooks or narrative texts. Consequently, these texts will place increasing demands on children's prior knowledge, further attenuating other risk factors.

Without greater efforts to enhance background knowledge, differences in children's knowledge base may further exacerbate the differences in children's vocabulary and comprehension. The imperative to foster children's background knowledge as a means for providing a firm foundation for learning, therefore, is greater than ever.

Organizational Patterns of a Paragraph

The basic unit of thought

Perhaps one of the best ways to improve your reading ability is to learn to read paragraphs effectively. Many experts believe the paragraph, not the sentence, is the basic unit of thought of a selection. If one can quickly grasp the meaning of each of these though units while reading, then comprehension will be heightened.

It is important to identify with the author's perspective by discovering the way the message is being sent. Every writer has a purpose for writing and some plan of action for getting a message across. This plan of action is the order in which the material will be presented in the text. This order, often called a pattern of organization, should be present in acceptable writing from the smallest to the largest unit of writing: the paragraph, groups of paragraphs, sub-chapters, chapters, groups of chapters, whole books, and even series of books. Each of these, then, contains a certain pattern of organization.

Anticipating the order in which the material will be presented helps you put the facts into perspective and to see how the parts fit into the whole. For example, if the selection begins by indicating that there are four important components of management, you are alert to look for four key phrases to mark and remember. Likewise, if a comparison is suggested, you want to note the points that are similar in nature. For material that shows cause and effect, you need to anticipate the linkage and note the relationship.

The importance of these patterns is that they signal how the facts will be presented. They are blueprints for you to use.

In textbook reading the number of details can be overwhelming. The mind responds to logical patterns; relating the small parts to the whole simplifies complexities of the material and makes remembering easier.

Although key **signal words** help in identifying the particular type of pattern, a single paragraph can be a mixture of different patterns. Your aim is to anticipate the overall pattern and then place the facts into a broad perspective.

The following six examples are the patterns of organization that are most frequently found in textbooks.

Simple Listing

Items are randomly listed in a series of supporting facts or details. These supporting elements are of equal value, and the order in which they are presented is of no importance. Changing the order of the items does not change the meaning of the paragraph.

Signal words often used for simple listing are:

- in addition
- another
- for example
- also
- several
- a number of

Description

Description is like listing; the characters that make up a description are no more than a simple listing of details.

Definition

Frequently in textbook reading, an entire paragraph is devoted to defining a complex term or idea. The concept is initially defined and then further expanded with examples and restatements.

Signal words often used for definition are:

- is defined as
- means
- is described as
- is called
- refers to
- term or concept

Chronological (Time) Order or Sequence

Items are listed in the order in which they occurred or in a specifically planned order in which they must develop. In this case, the order is important and changing it would change the meaning.

Signal words often used for chronological order
or sequence are:

- first, second, third
- before, after
- when
- later

- until
- at last
- next

Comparison - Contrast

Items are related by the comparisons (similarities) that are made or by the contrasts (differences) that are presented. The author's purpose is to show similarities and differences.

Signal words often used for comparison-contrast are:

- similar, different
- on the other hand
- but
- however

- bigger than, smaller than
- in the same way
- parallels

Cause and Effect

In this pattern, one item is showed as having produced another element. An event (effect) is said to have happened because of some situation or circumstance (cause). The cause (the action) stimulates the event or effect (the outcome).

Signal words often used for cause and effect are:

- for this reason
- consequently
- on that account

- hence
- because
- made