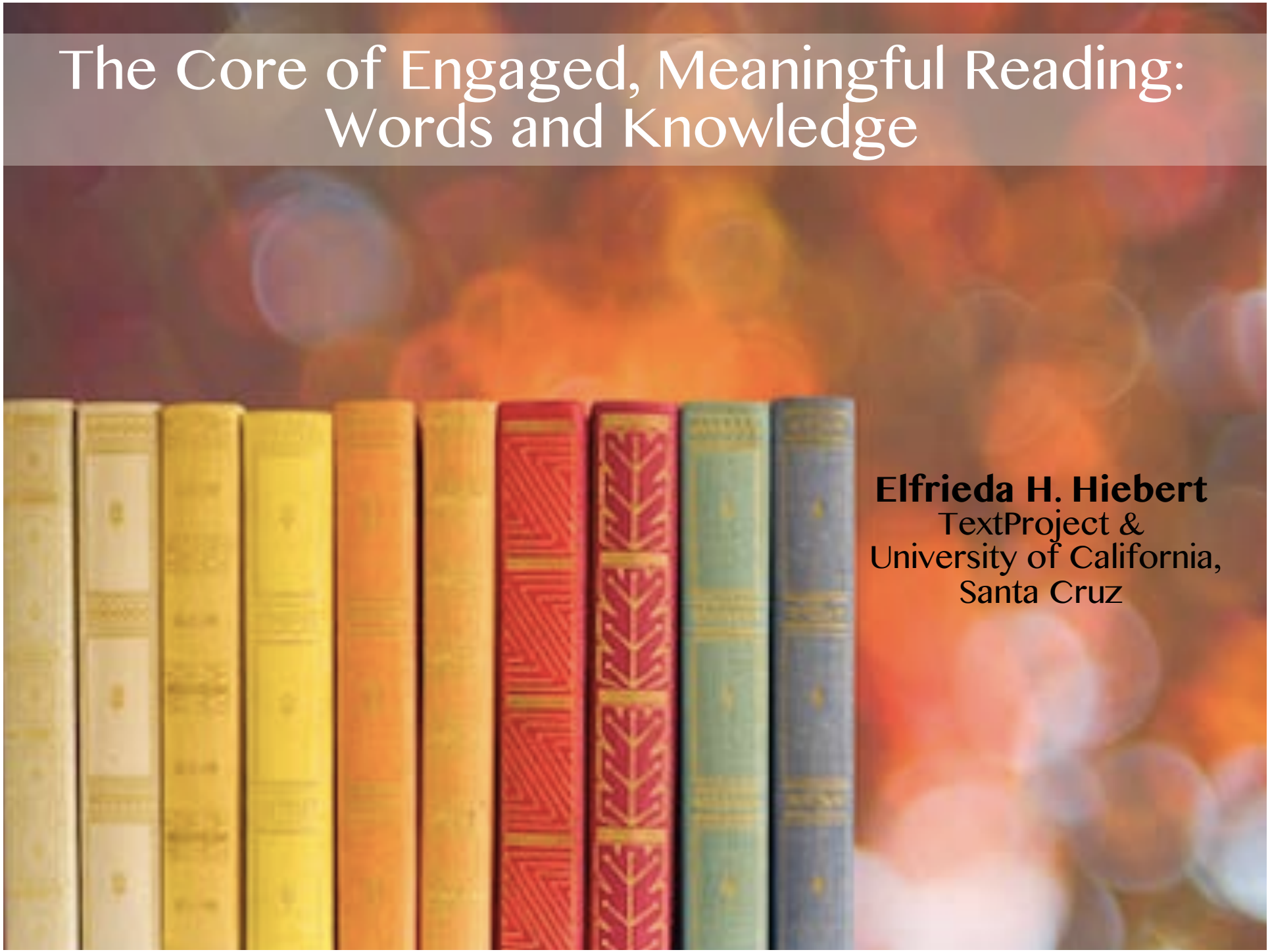
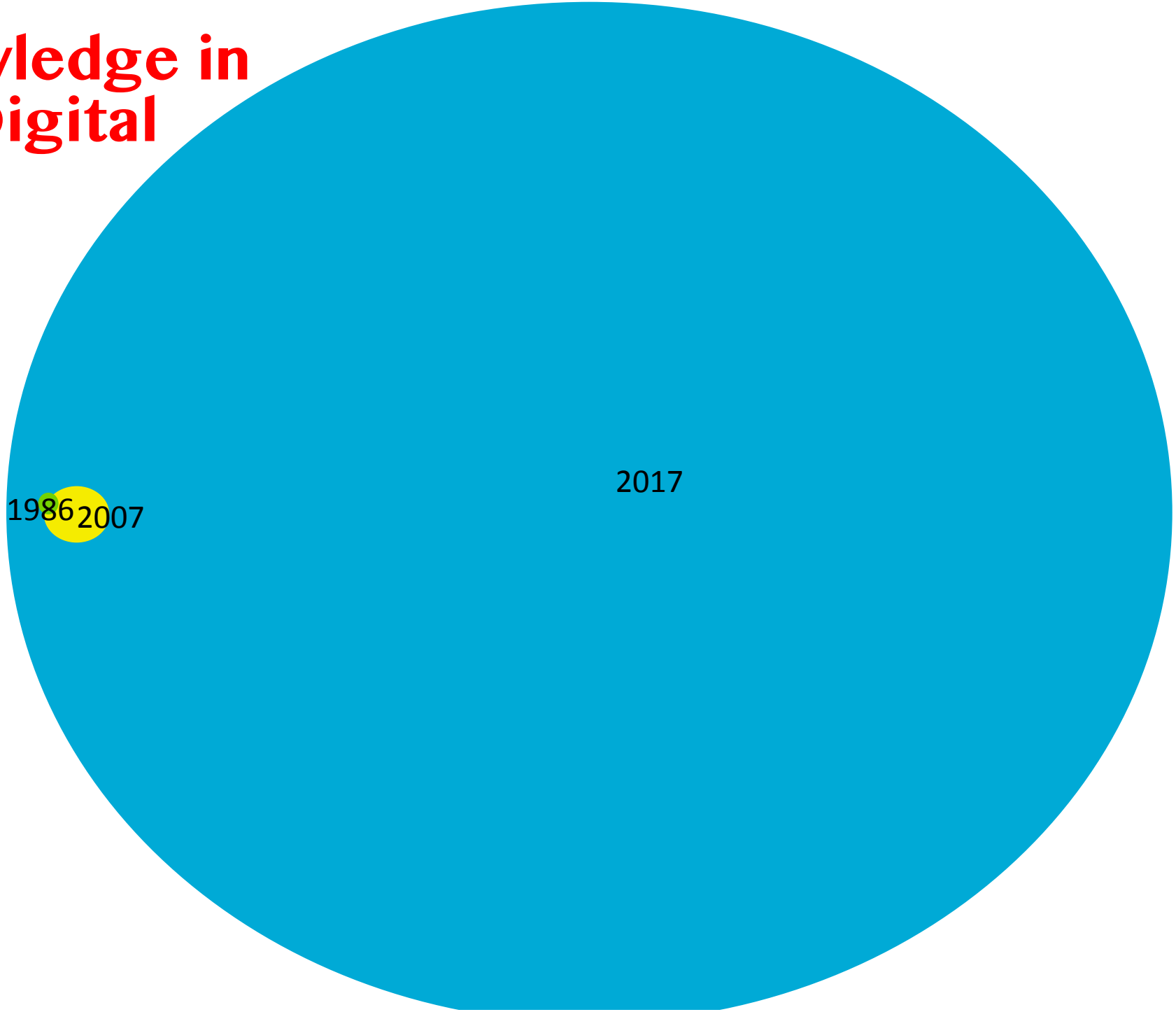
The Core of Engaged, Meaningful Reading: Words and Knowledge

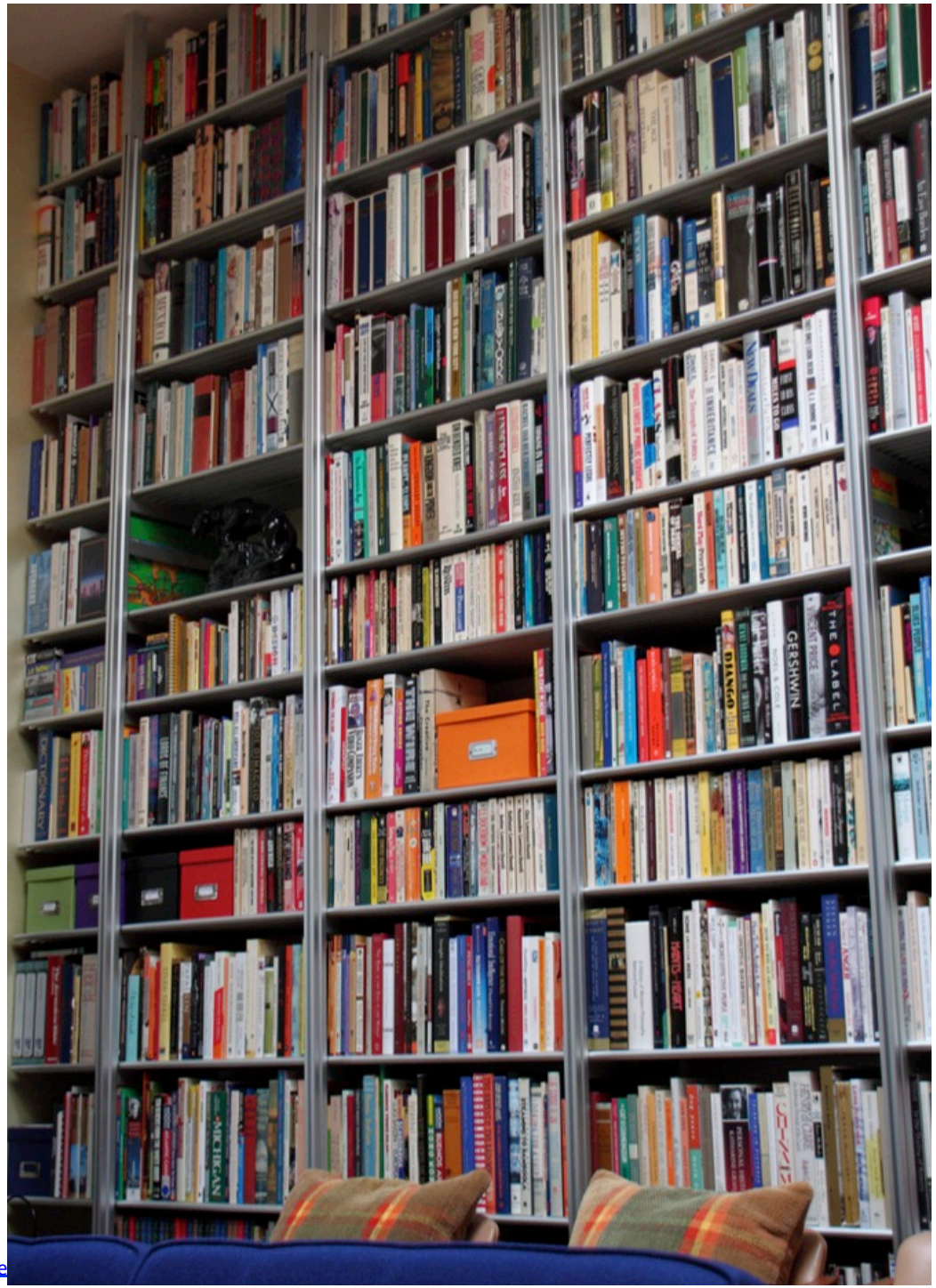


Elfrieda H. Hiebert
TextProject &
University of California,
Santa Cruz

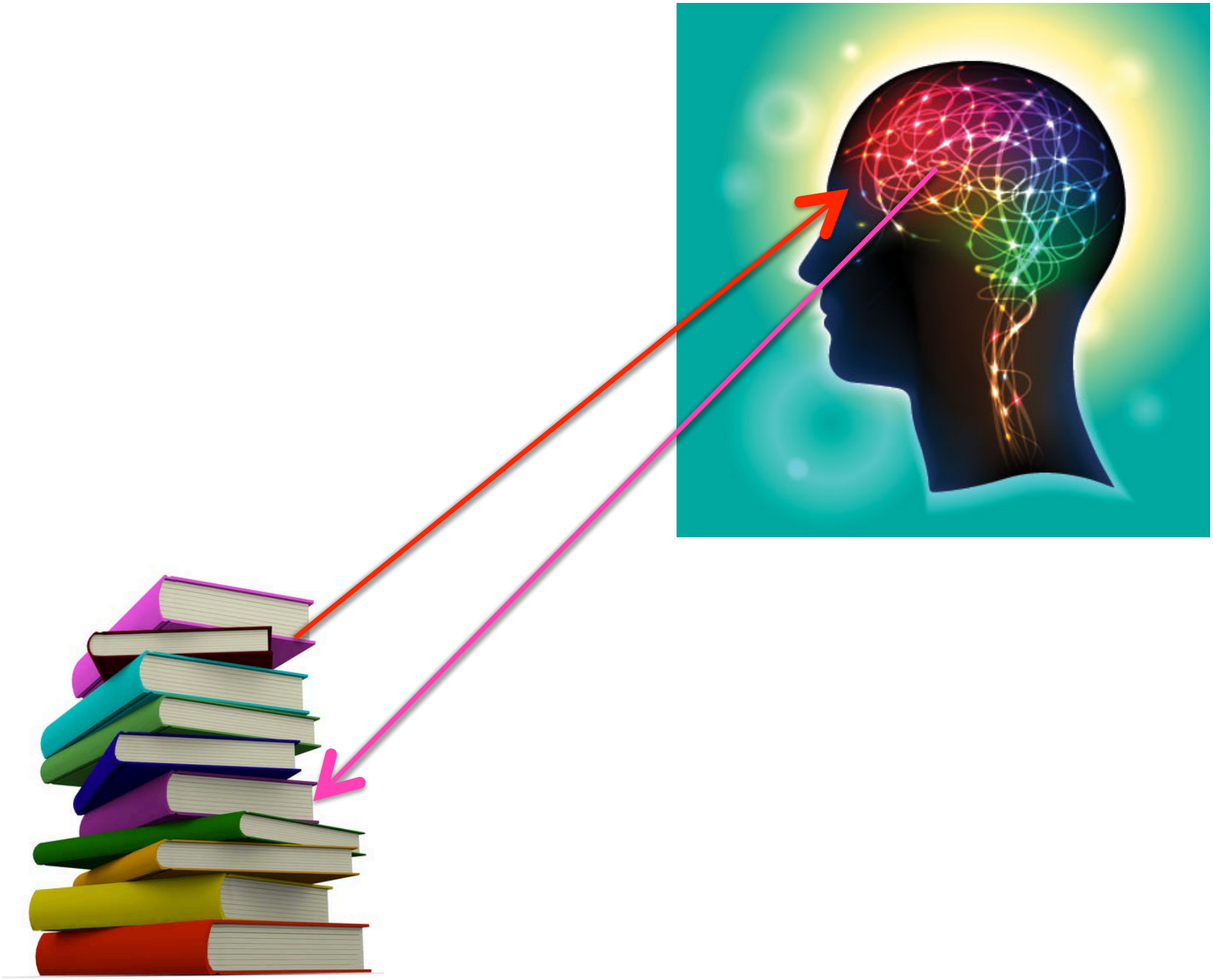
Knowledge in the Digital Age

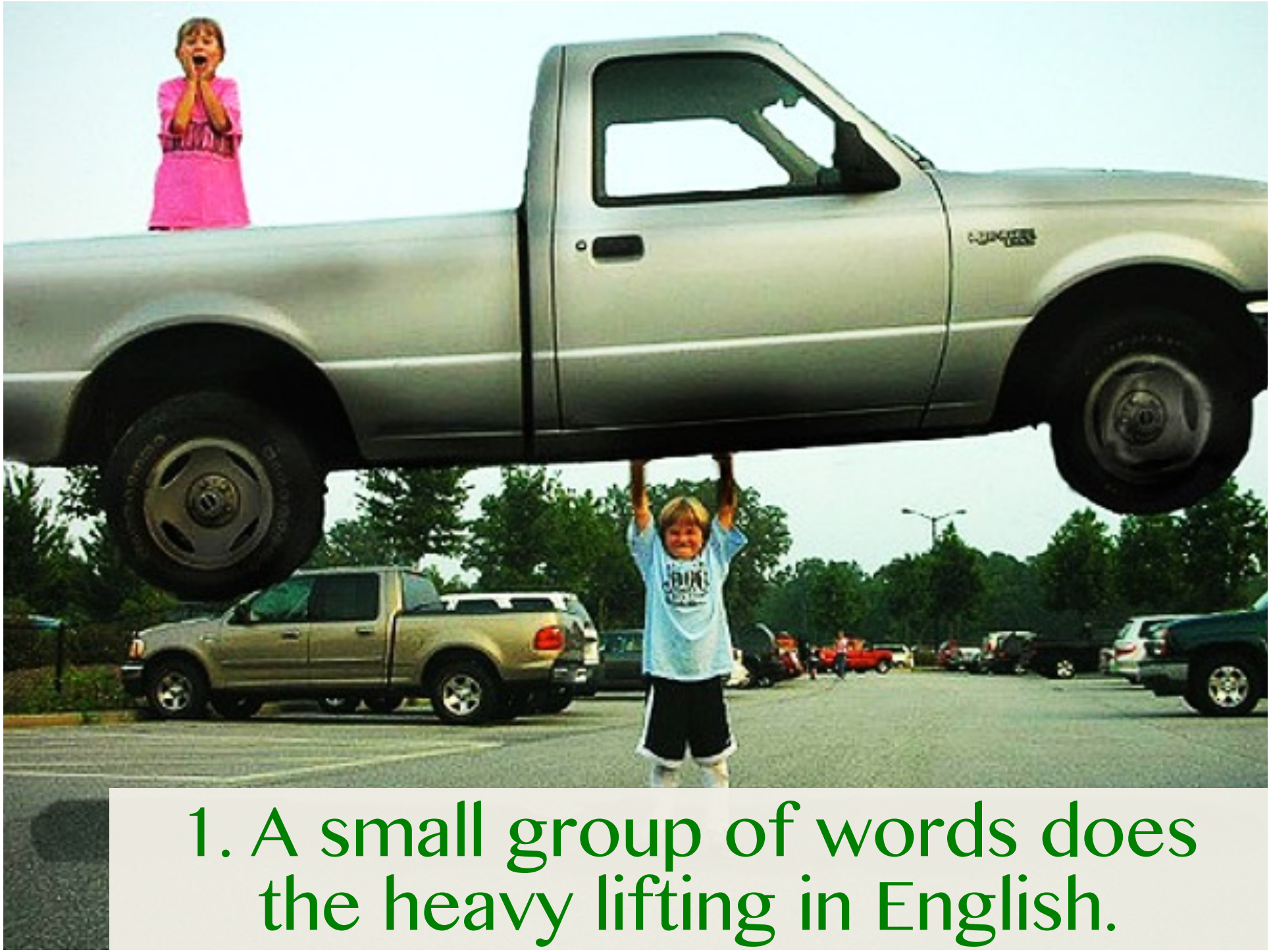


Knowledge is "stored" in texts and…



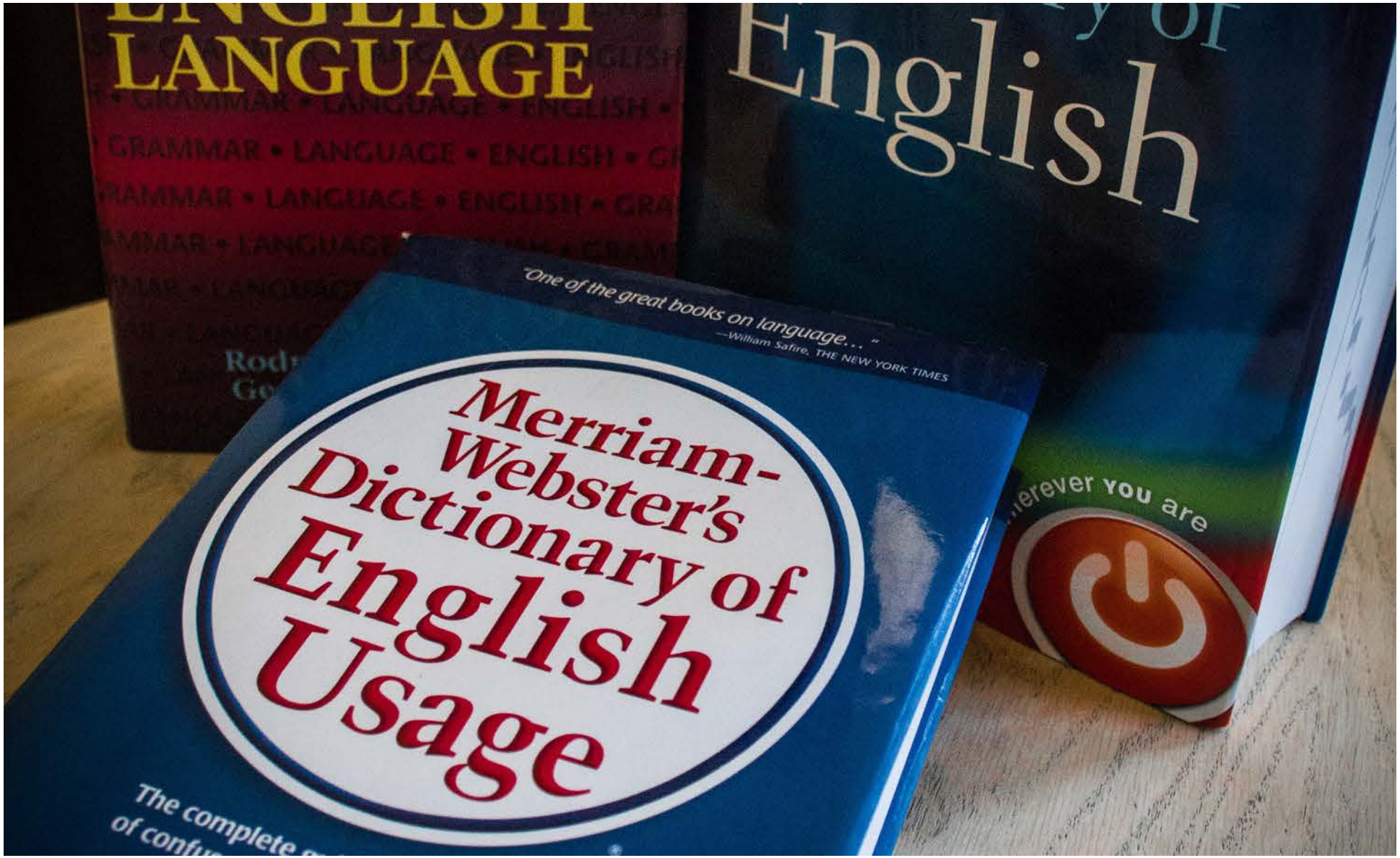
texts typically have more rare words than conversations/ oral language.





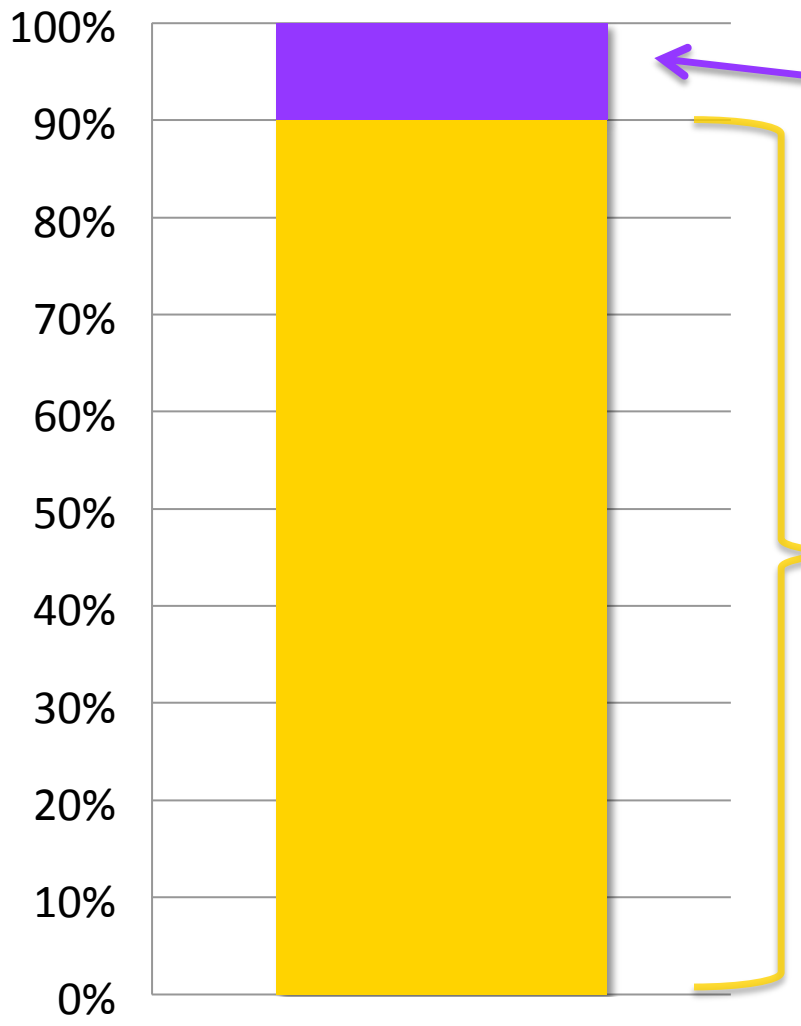
1. A small group of words does the heavy lifting in English.

The number of words in English far out-numbers opportunities to teach each individually.



ENGLISH HAS THREE DISTINCT MORPHOLOGICAL SYSTEMS.

The 90:10 Distribution of Words in Writing



10% "Unique" or "Complex" Words: around 88,000 word families/200,000+ words

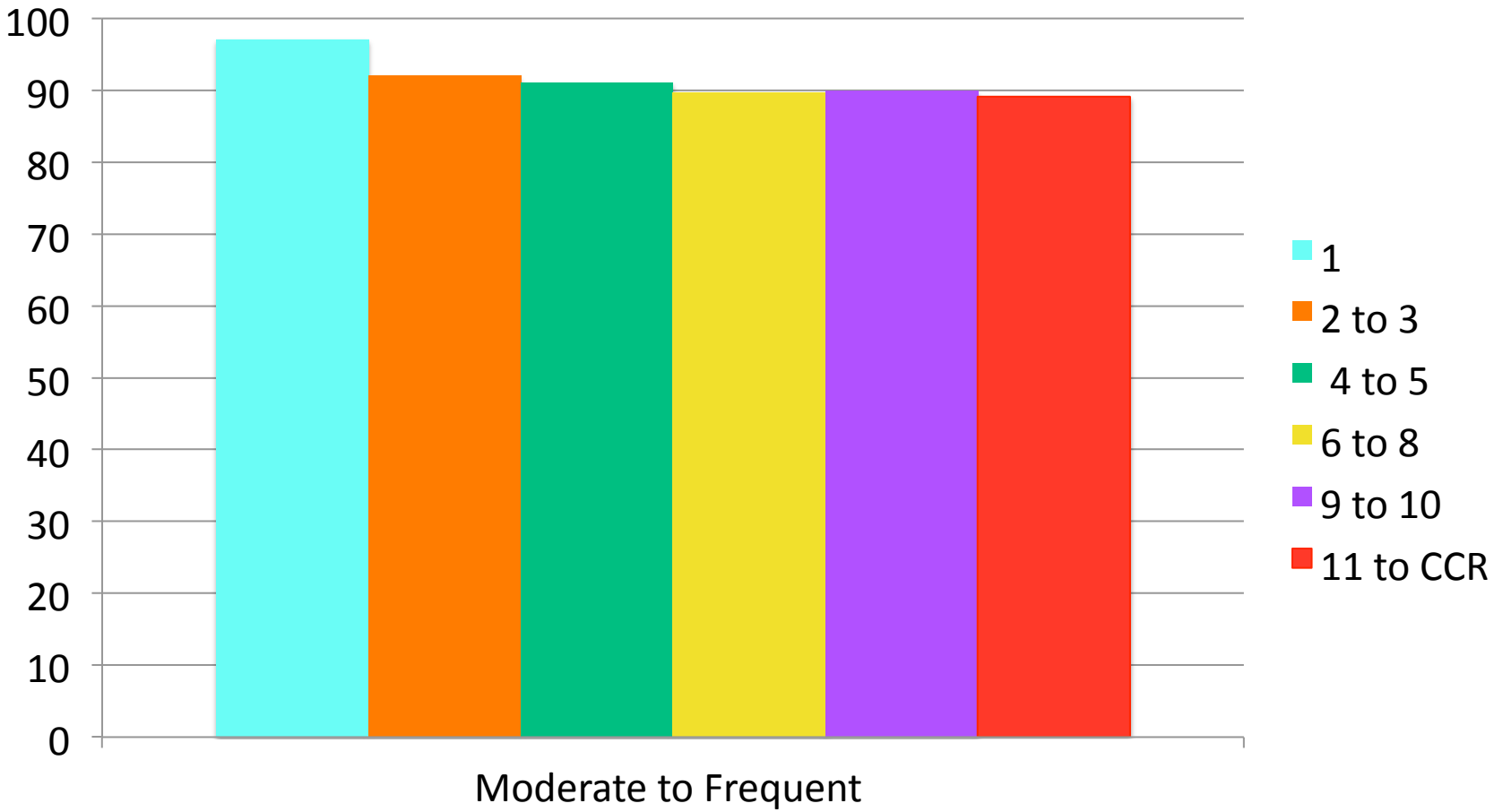
90% "Core" Words: 2,500 complex word families (+helpful, unhelpful, helpless)

http://textproject.org/assets/library/resources/WordZones_4000-simple-word-families.pdf

Examples of the Words in the Core Vocabulary

	words
1st 100	the, by, no, through, must
101-300	long, great, put, last, family
301-1,000	power, north, story, strong, answer
1,001-1,500	valley, imagine, motion, nearby, importance
1,501-2,000	character, responsible, design, presence, trail
2001-2,500	mixture, discovery, civilization, attitude, assume

How These Words Appear in Texts



Grade 3 STARR (TX, 2017)

Mrs. Snavin looked at the screen, and then she looked at this book, and then back at the screen again. Then she shook her head and let out this big sigh. I could tell she was almost ready to call Mrs. Reed.

I've always liked computers, and I know how to do some stuff with them. Like turn them on and open programs, play games and type, make drawings, and build Web pages, things like that. So I got

up from my desk, pointed at the screen, and said, "Mrs. Snavin, if you double-click on that little thing right there, then the program will start running. And then you click on this, and that opens up the part

about number lines."

How did the animal shelter know that Scrub belonged to Noble? How did the workers there know how to contact her? All this information was available because of the microchip that had been placed under Scrub's skin many years earlier. A microchip is a computer chip about the size of a grain of rice that is used to keep track of pets. The chip is placed under an animal's skin with a needle, usually between the pet's shoulder blades. Once the chip is in place, the pet does not feel it anymore. Microchips have helped thousands of owners get their lost pets back.

Grade 5 STARR (TX, 2017)

R2's "brain," or computer, is in its stomach. R2's arms can hold 20 pounds. Each bendable finger has 5 pounds of grasping force. R2's hands are also skillful. Since its hands are shaped like human hands, R2 can use human tools to complete tasks traditionally performed by astronauts. Nic Radford, the deputy project manager of R2, says that astronauts "absolutely have their day packed from the minute they wake up until they go to bed. If Robonaut can provide just an hour's worth of relief to the crew doing something they don't want to do, that would make it worth it right there."

In addition to helping her team at the university, Catchings made a big change in her life. Coach Summitt noticed that players sometimes had to repeat instructions to Catchings while on the court. Summitt convinced Catchings that wearing hearing aids would not only help her be a better player but also help others who were hearing-impaired by allowing her to serve as a role model. Catchings started wearing her hearing aids and eventually began to speak openly about her hearing loss. As Coach Summitt predicted, Catchings has been an inspiration to many children. She has proved that having a disability does not have to be a disadvantage.

Grade 7 STARR (TX, 2017)

Then he zeroed in on protons. “Atoms may be mostly space,” he said, “but a proton is nothing but a proton. Small as an atom is, a proton is millions of times smaller. You could squint till your eyeballs pop out and you'll never see one," he said, daring me to try.”

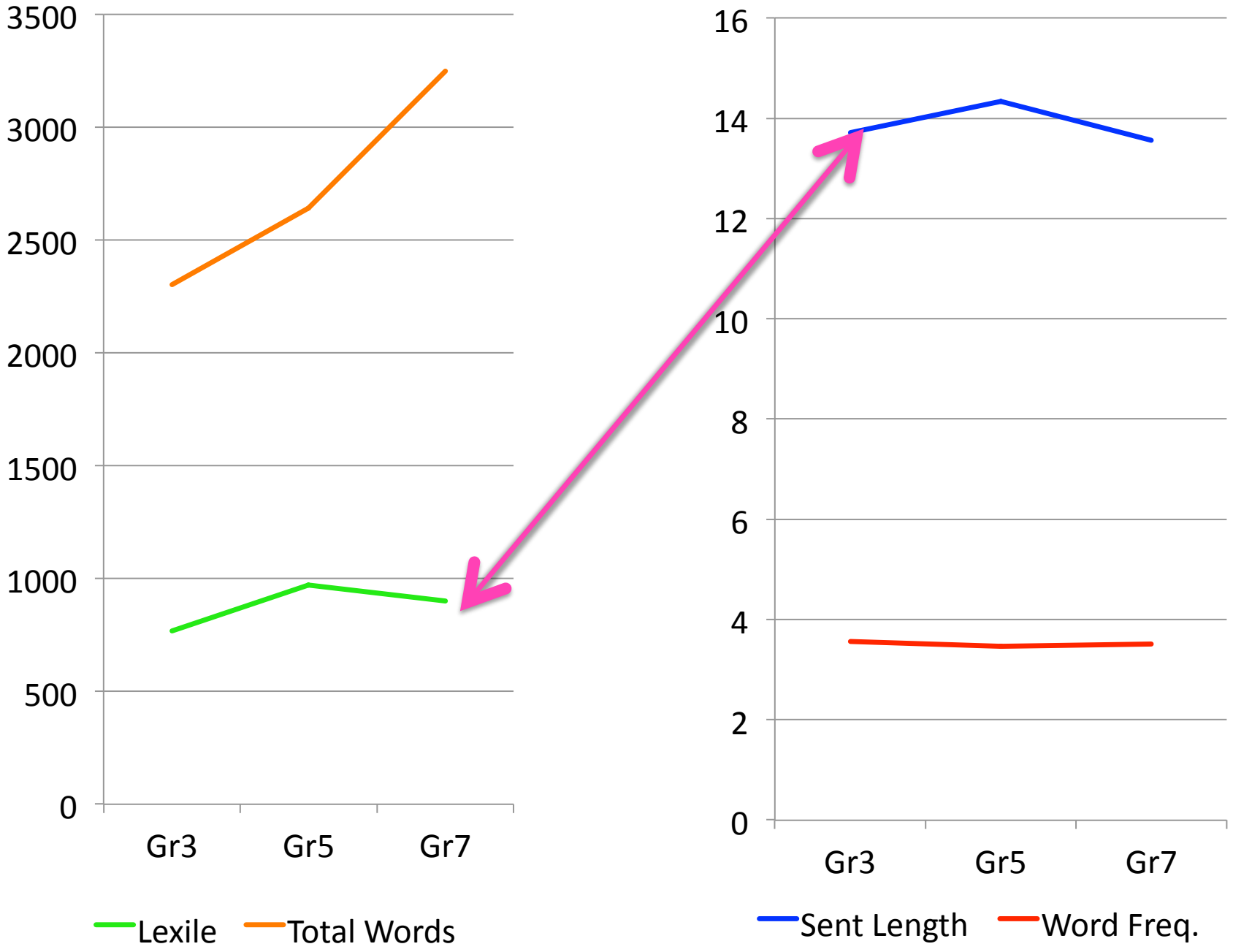
"And you know what the coolest thing about protons is?” he said.

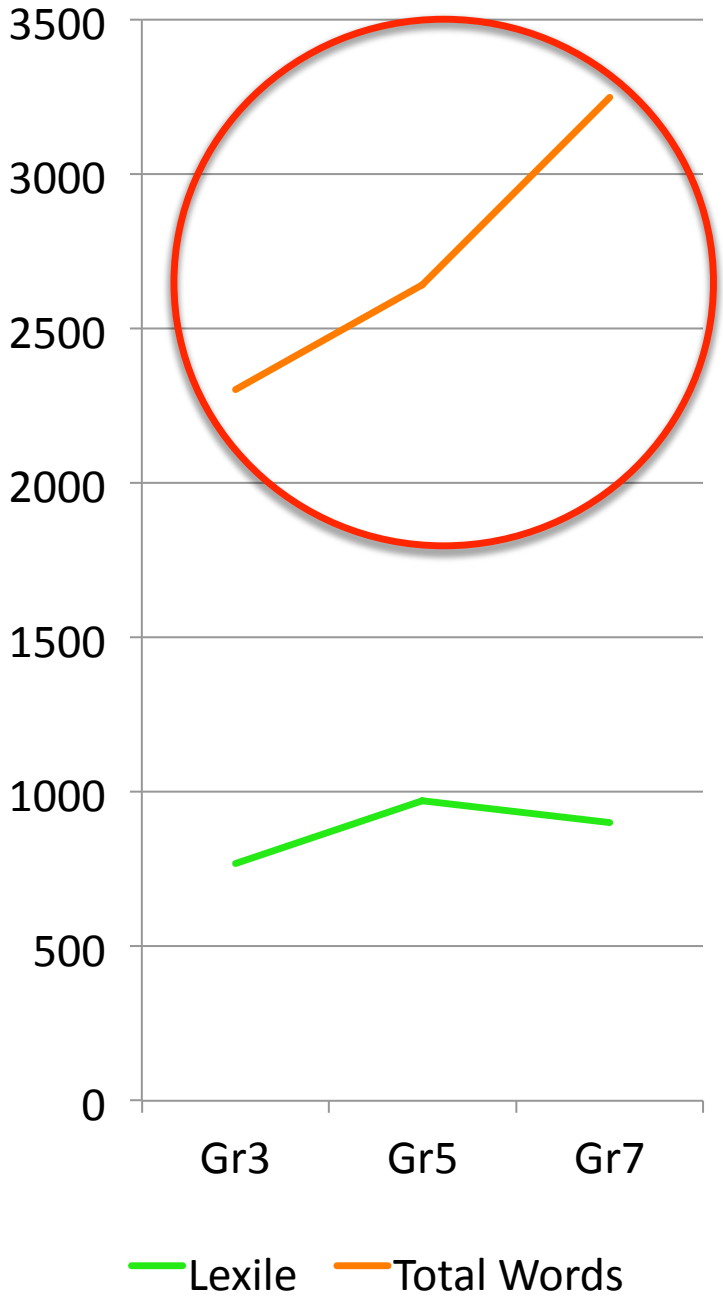
"What?” I said.

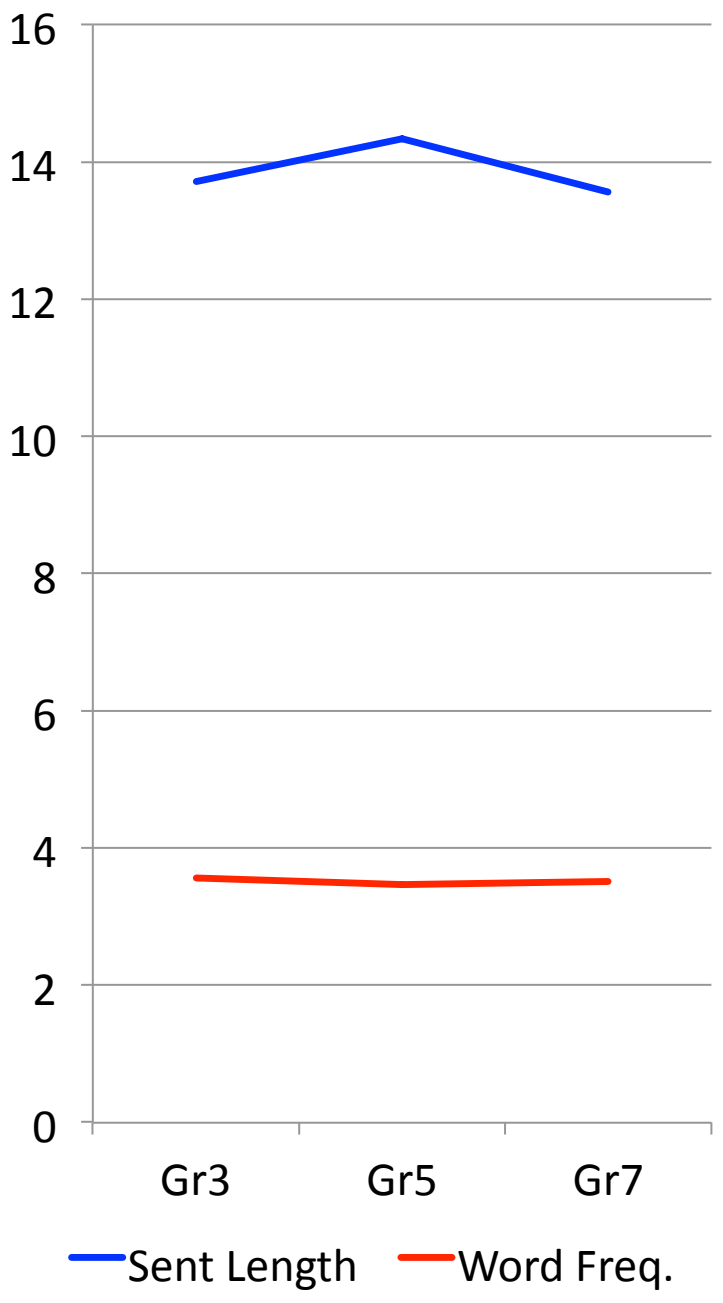
He clacked his jawbreaker for a while, building the suspense. "You can't do anything to them," he said. "You can't break them. You can't burn them. You can't blow them up. Atoms you can smash, but you can't smash a proton."

The Global Crop Diversity Trust wants to prevent this by preserving as many varieties of seeds as possible. The assortment at the vault ensures that food supplies can be maintained or replenished if necessary.

The Svalbard Seed Vault opened in 2008 with more than 11,000 seed samples from around the world. It has the capacity to store 4.5 million seed samples. The entry to the vault is a carefully guarded tunnel behind a steel door illuminated by fiber-optic light and sunlight reflected off mirrors. There is no full-time staff at the automated facility, and no single person has all the codes to gain entry to the chambers.

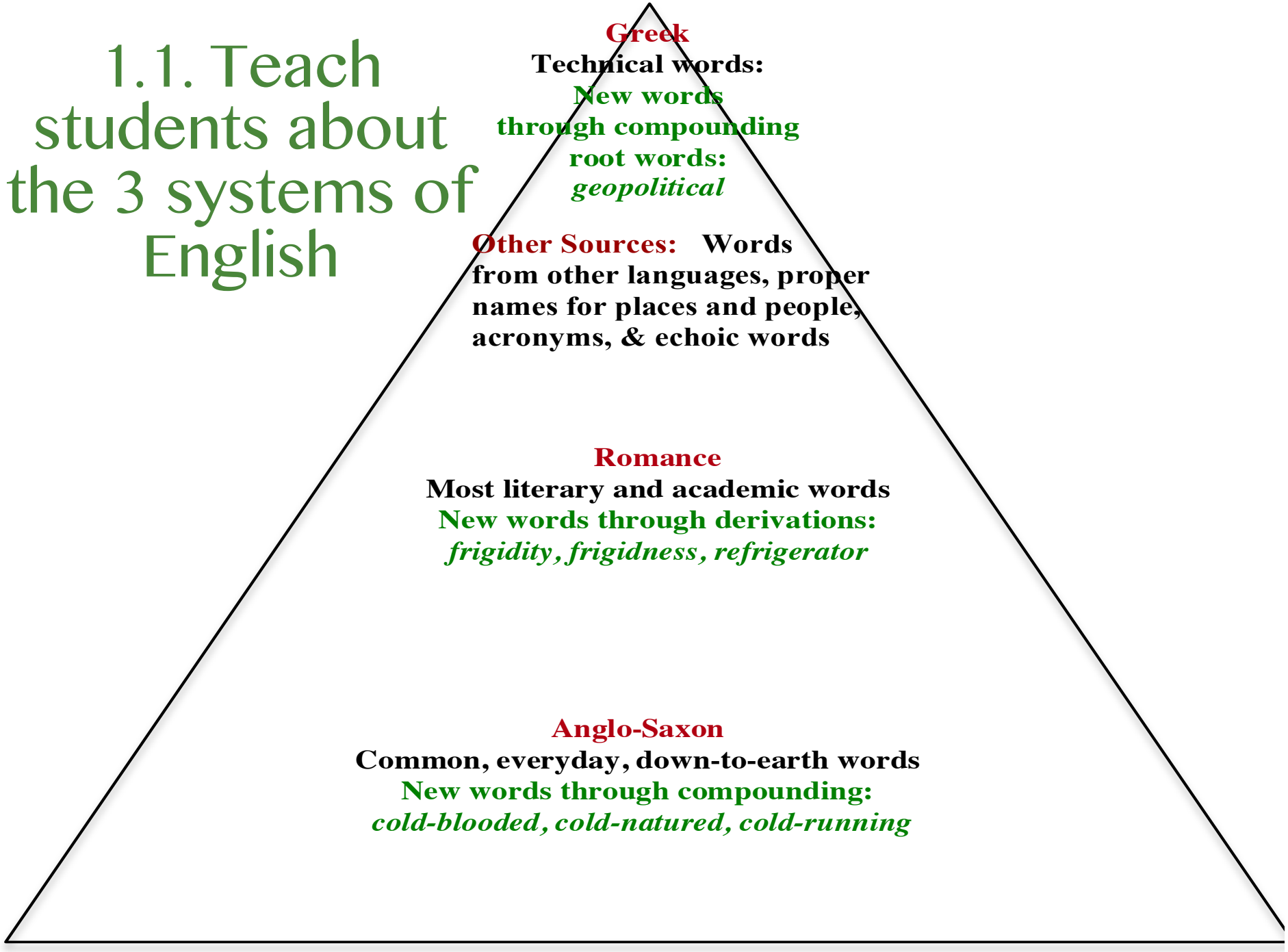

3500
3000
2500
2000
1500
1000
500
0
Gr3
Gr5
Gr7
Lexile
Total Words
16
14
12
10
8
6
4
2
0
Gr3
Gr5
Gr7
Sent Length
Word Freq.


3500
3000
2500
2000
1500
1000
500
0
Gr3
Gr5
Gr7
Lexile
Total Words

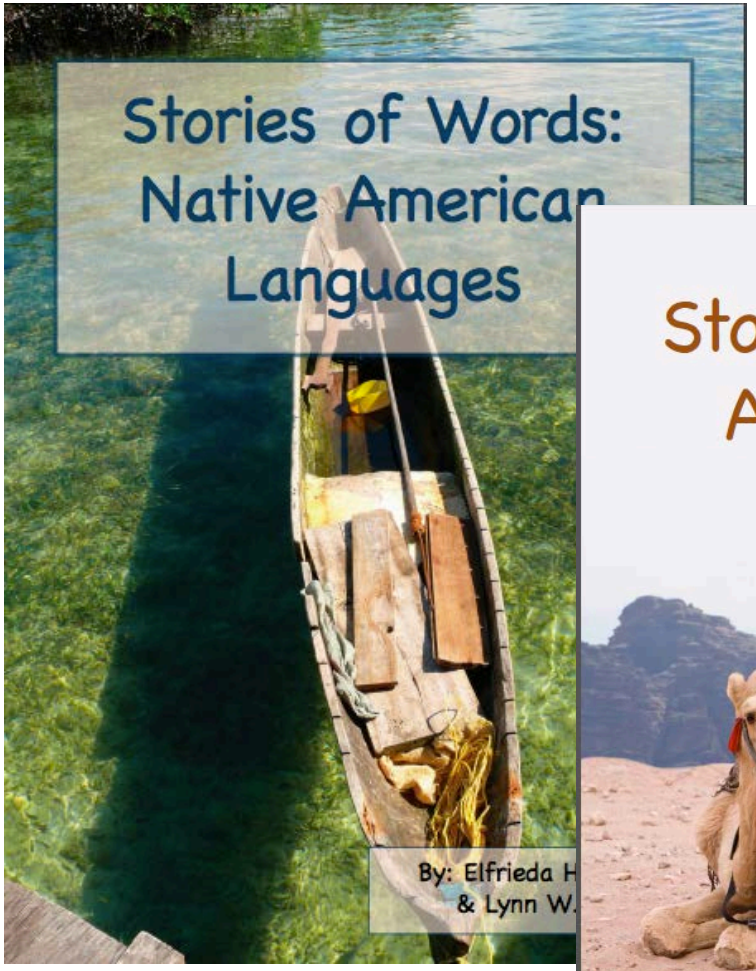

16
14
12
10
8
6
4
2
0
Gr3
Gr5
Gr7
Sent Length
Word Freq.

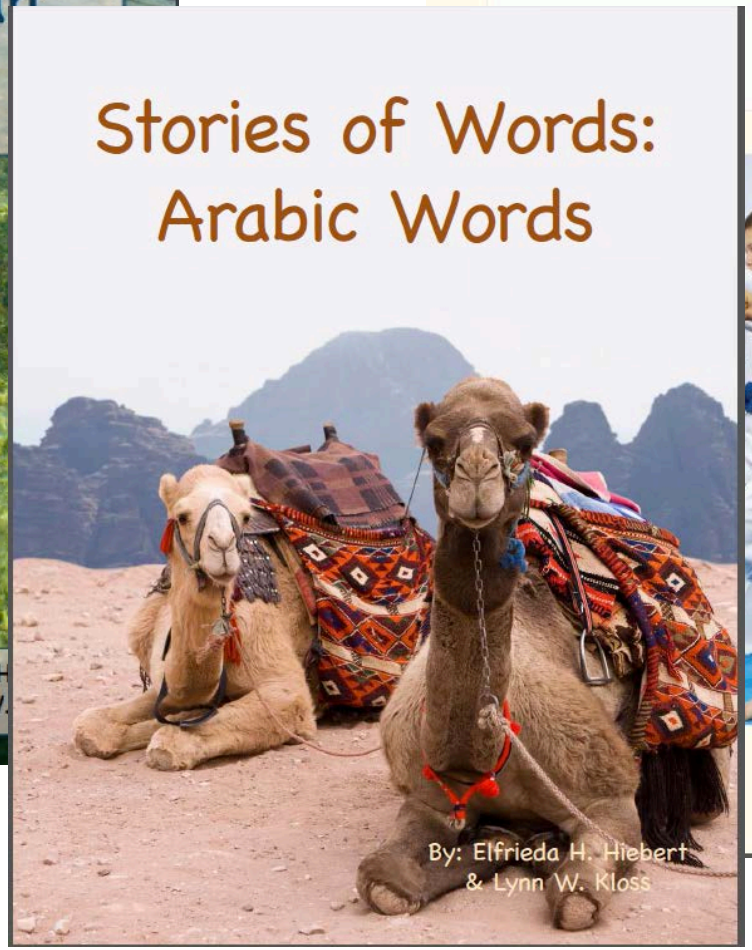
Actions for 1: “A small group of words does the heavy lifting.”

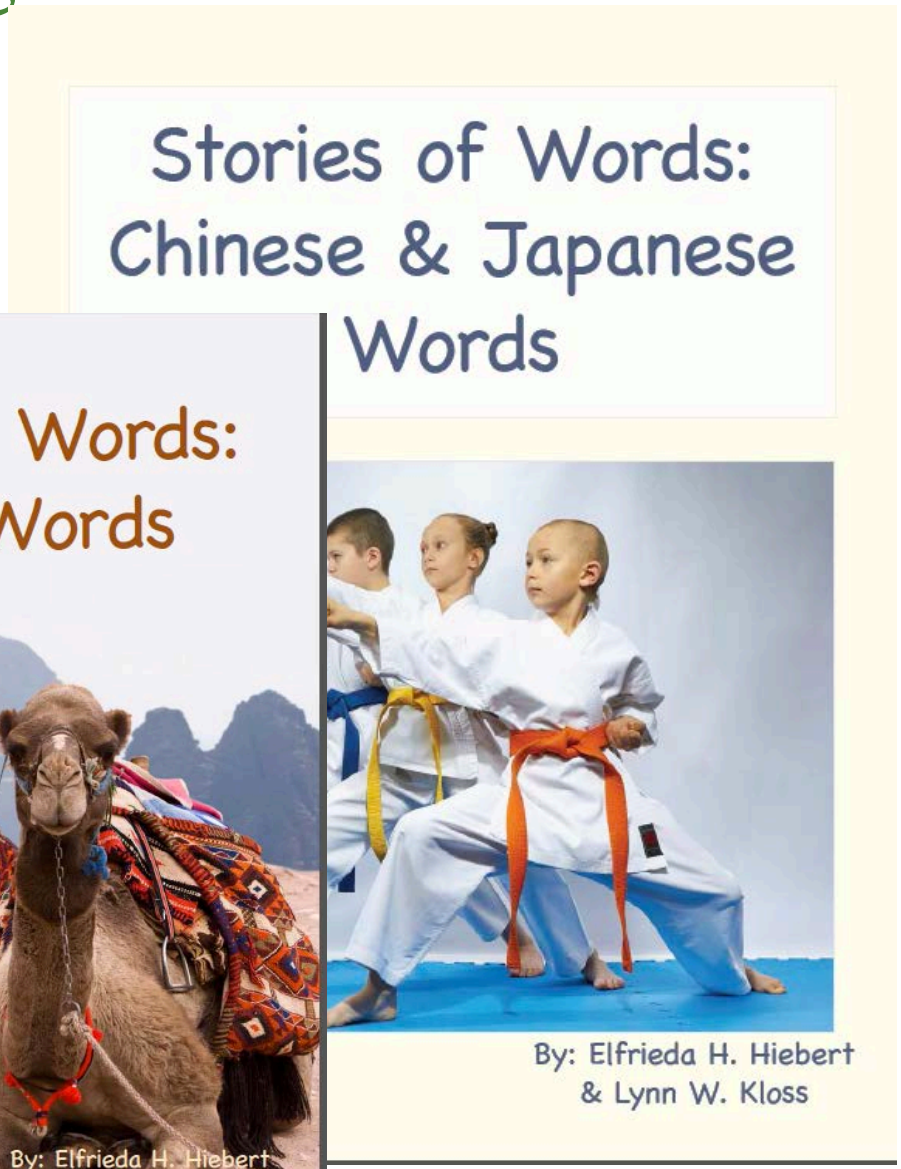
1.1. Teach students about the 3 systems of English



Plus Other Language Contributions To English







1.2. Talk often about 90:10 distribution

New Words in New Texts

Why?

- Develop the understanding that every complex text has new, challenging vocabulary. Vocabulary instruction gives students the means for figuring out new words in text, not instruction in every single word that might appear in new texts.

When?

- Talks about the vocabulary of new texts need to occur across a school year (with extra doses prior to assessment periods).

How?

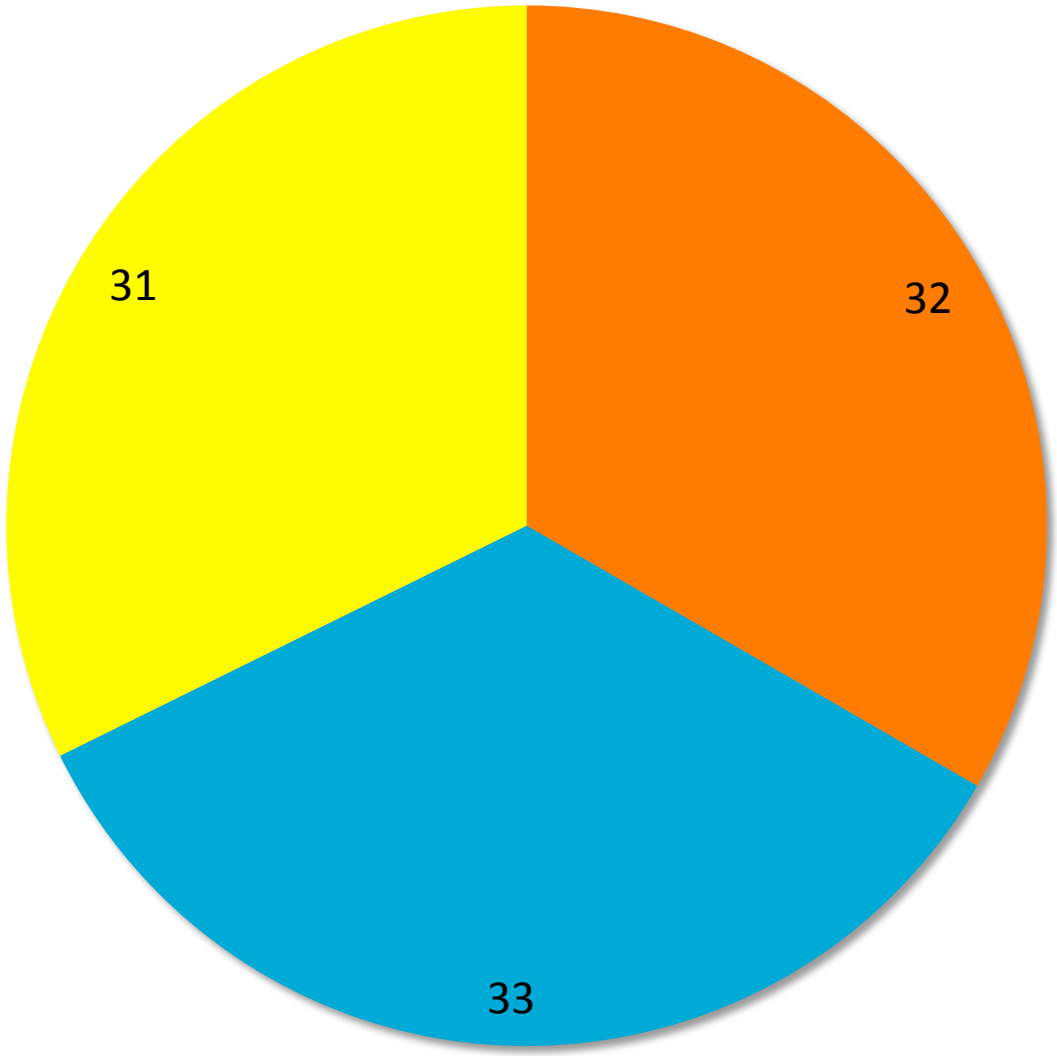
- Take a portion of the text (25 or 50 words is enough). Use a highlighter to mark the words in the 1,000-2,000 most-frequent words (list on textproject.org)
- Mark the words that are potentially challenging with a different colored highlighter. (List of 4,000 simple word families at: http://textproject.org/classroom-materials/lists-and-forms/lists/word-zones-for-5-586-most-frequent-words/

--An example of a snippet of text for a board/projection is the following, which comes from a sample assessment for Grade 7 http://www.parcconline.org/samples/english-language-artsliteracy/grade-7-reading-informational-text-(Amelia-Earhart-2)

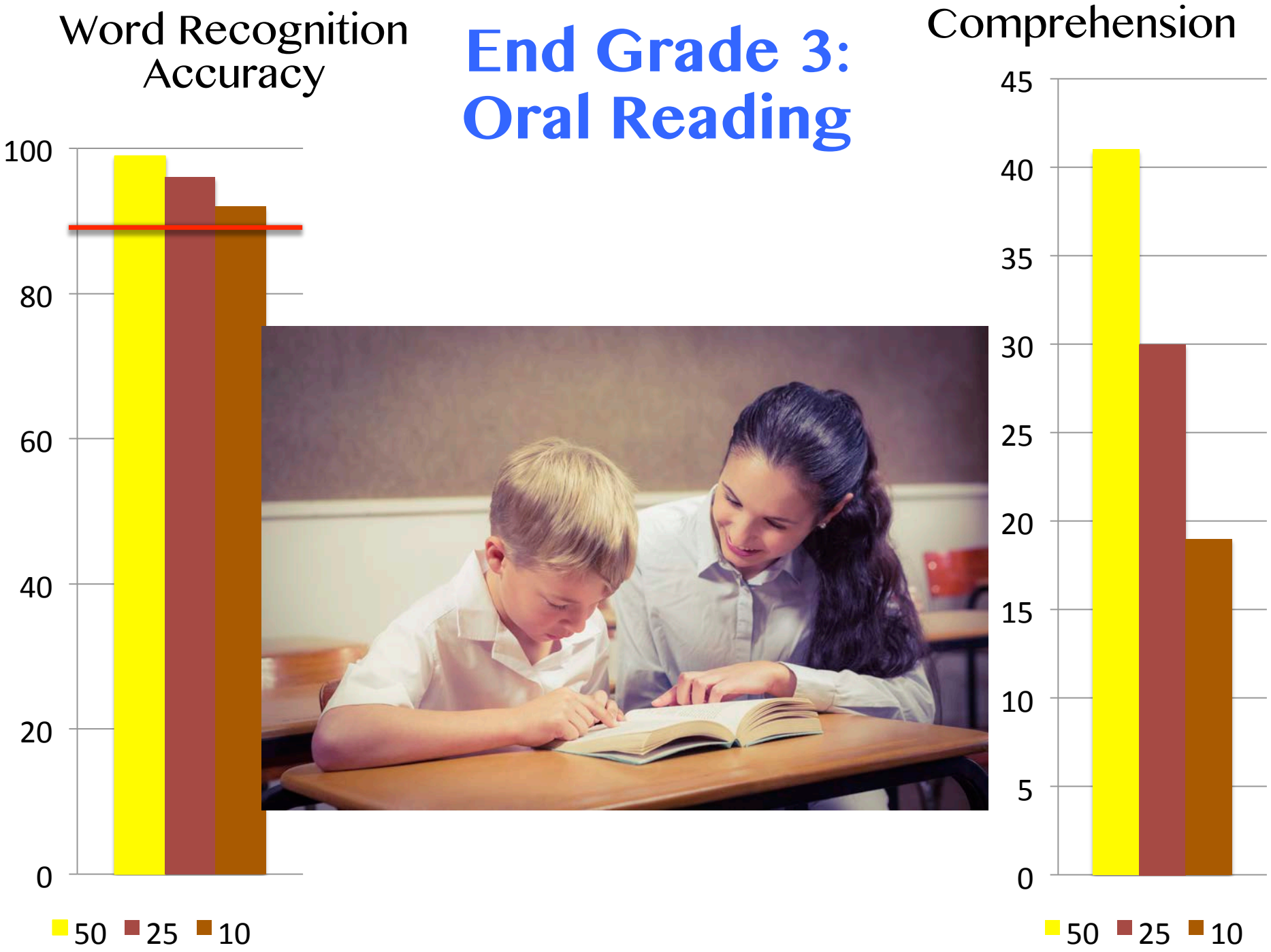
When 10-year old Amelia Mary Earhart saw her first plane at a state fair, she was not impressed. "It was a thing of rusty wire and wood and looked not at all interesting," she said. It wasn't until Earhart attended a stunt flying exhibition, almost a decade later, that she became seriously interested in aviation.

2. ALMOST ALL STUDENTS CAN RECOGNIZE ALMOST ALL WORDS. BUT…. THEY HAVEN'T READ A LOT AND THEIR READING IS SLOW & TEDIOUS.

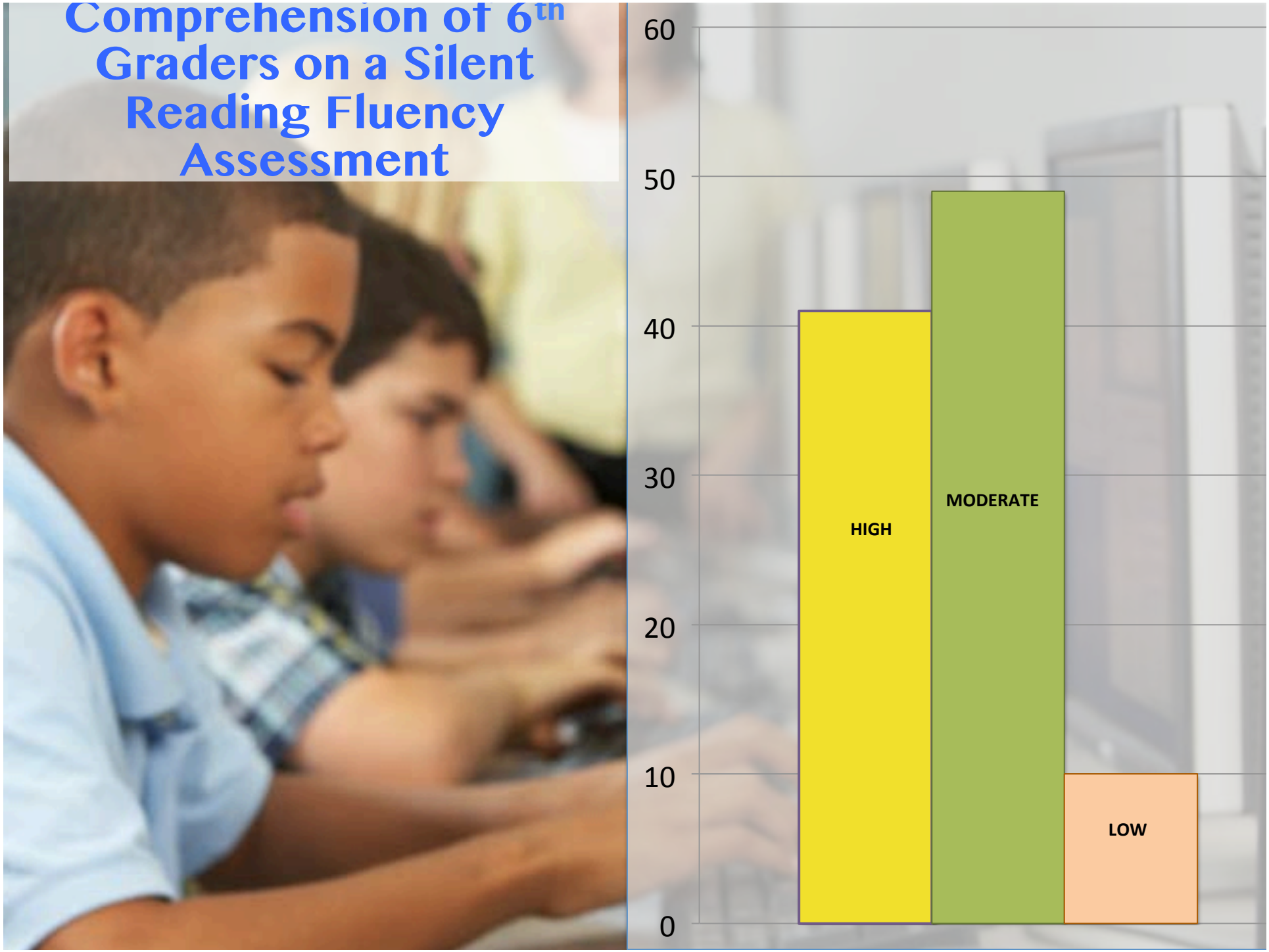
NAEP 2015: Grade 4



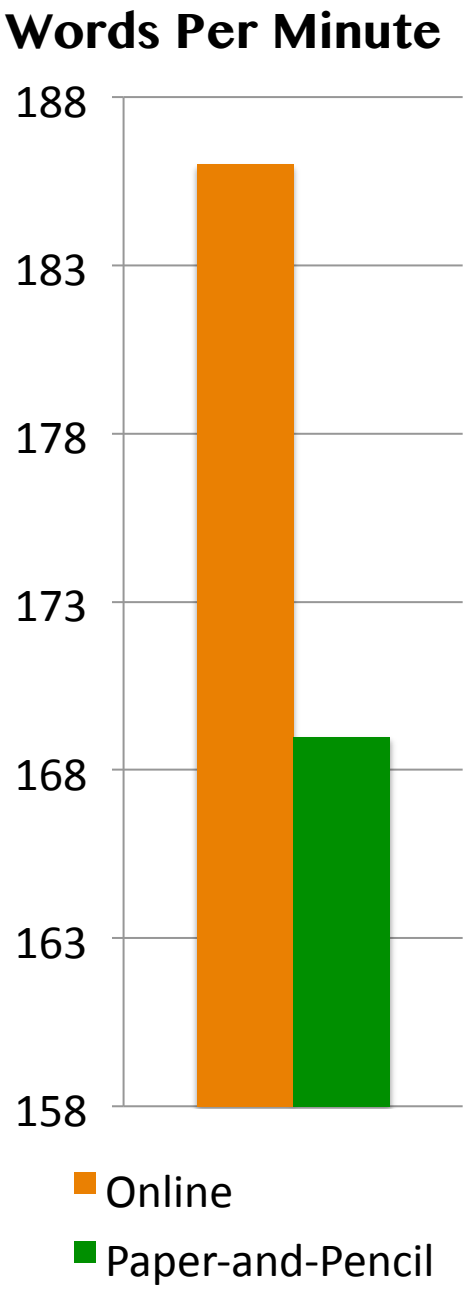
End Grade 3: Oral Reading

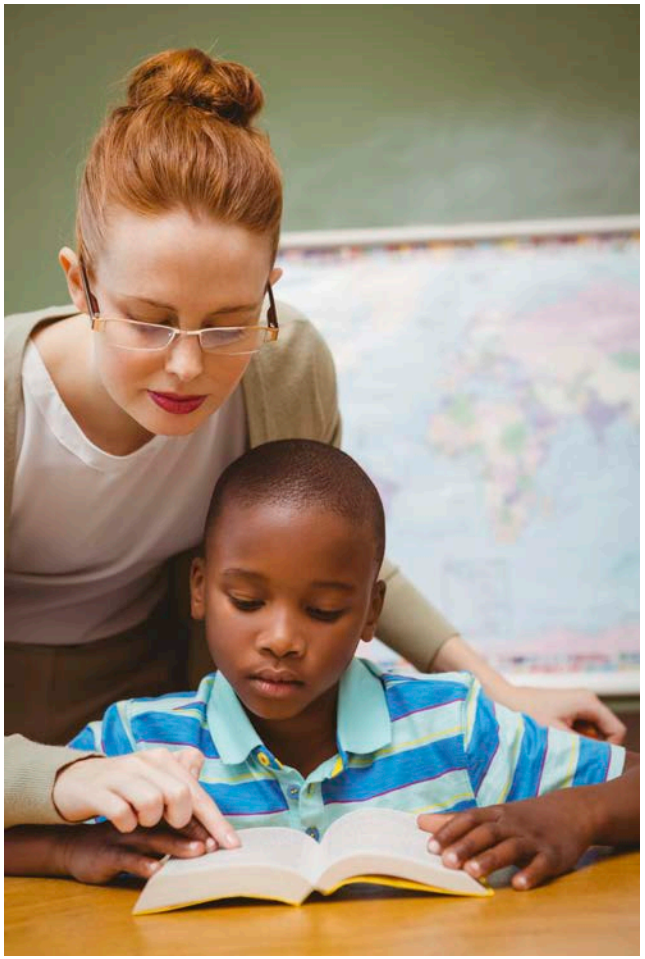


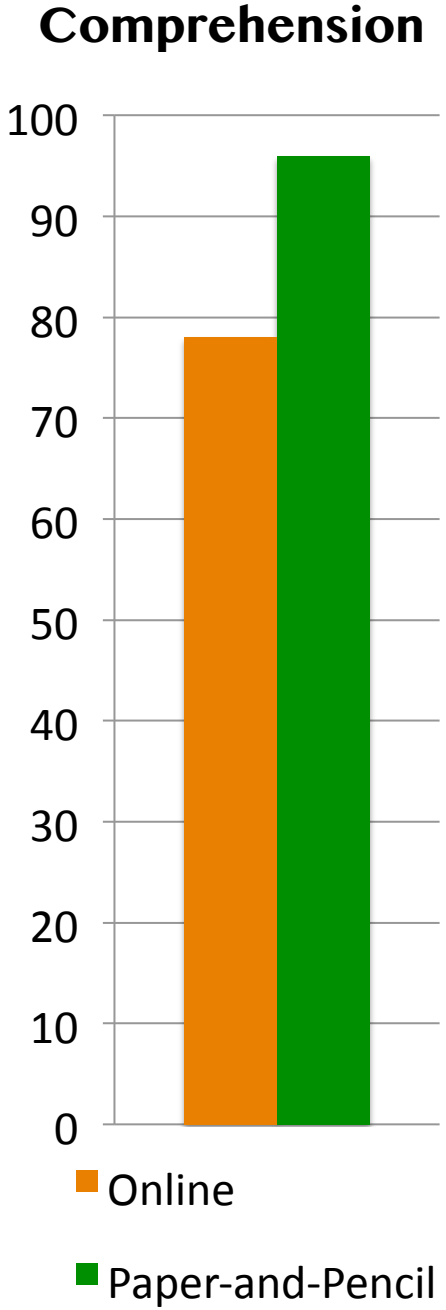
Comprehension of 6th Graders on a Silent Reading Fluency Assessment



Low/Moderate-Low Comprehenders: Silent Reading Tasks

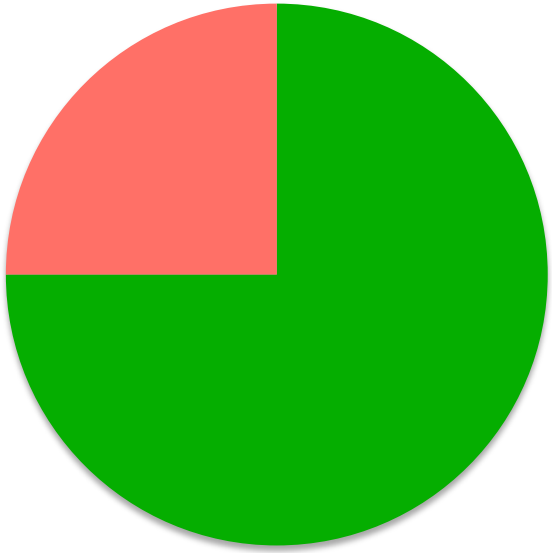






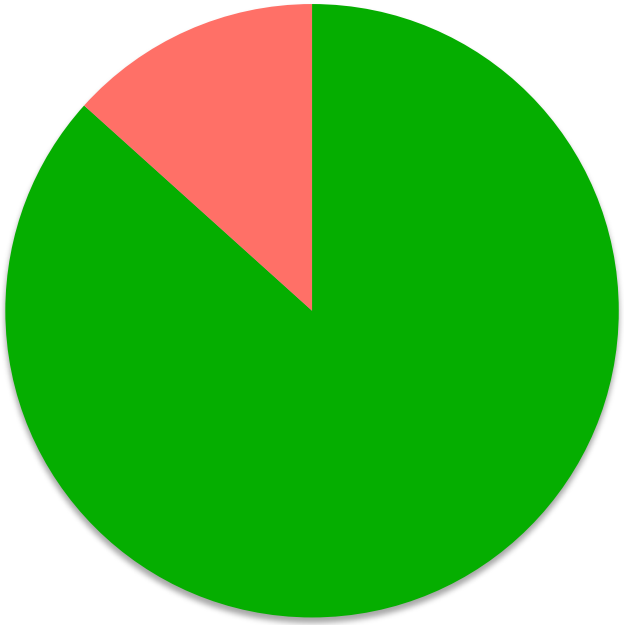
Time Spent in Reading Instruction & "Eyes on Text"

Reading Instruction (1970s to late 1980s)

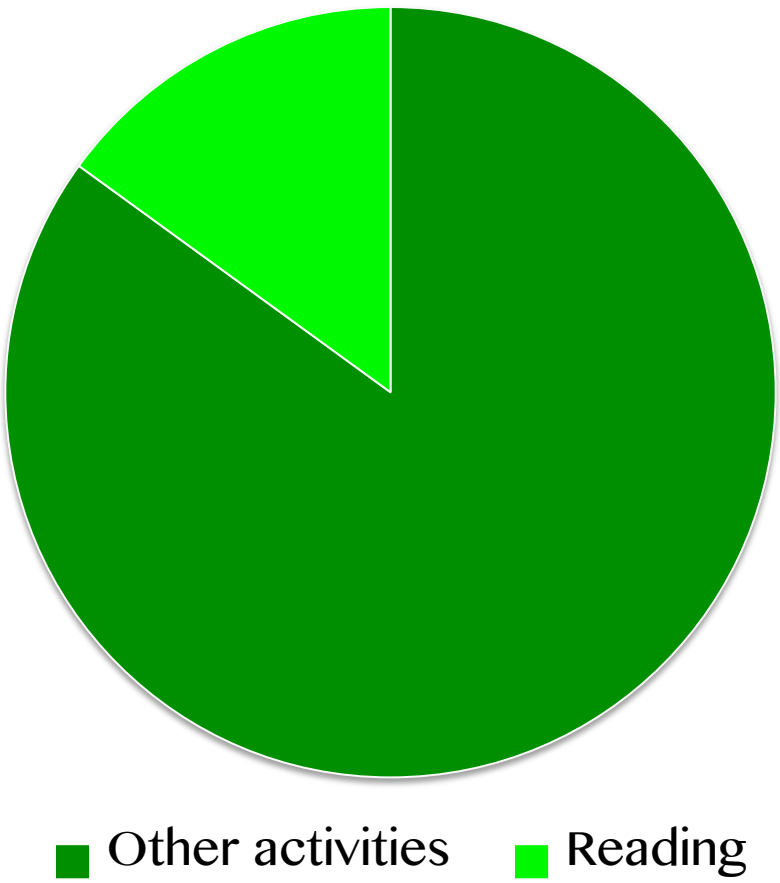


Instruction Time Spent reading

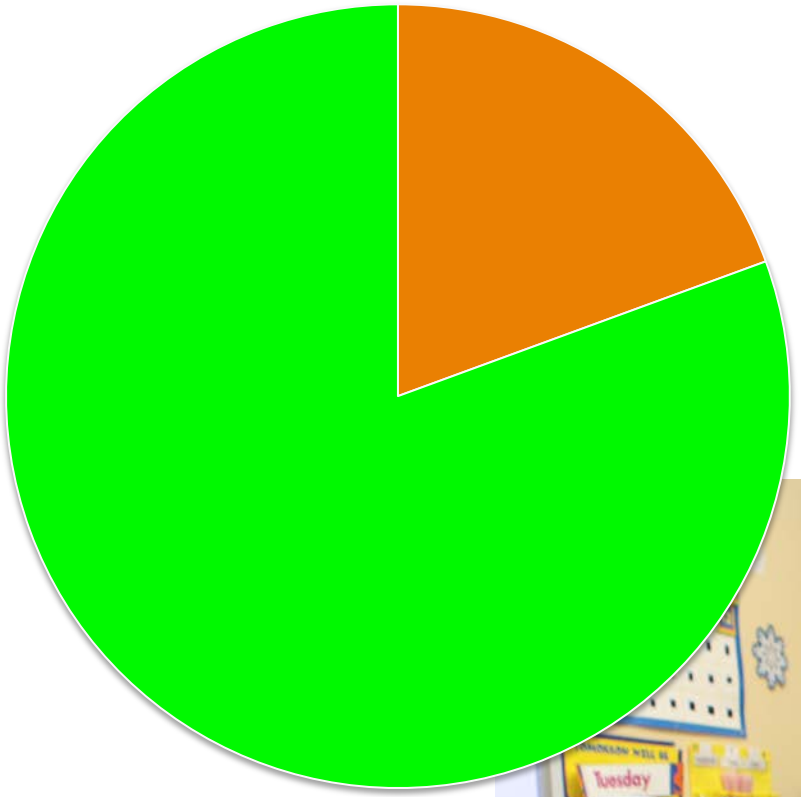
Reading Instruction (late 1990s -)



Instruction Time Spent reading



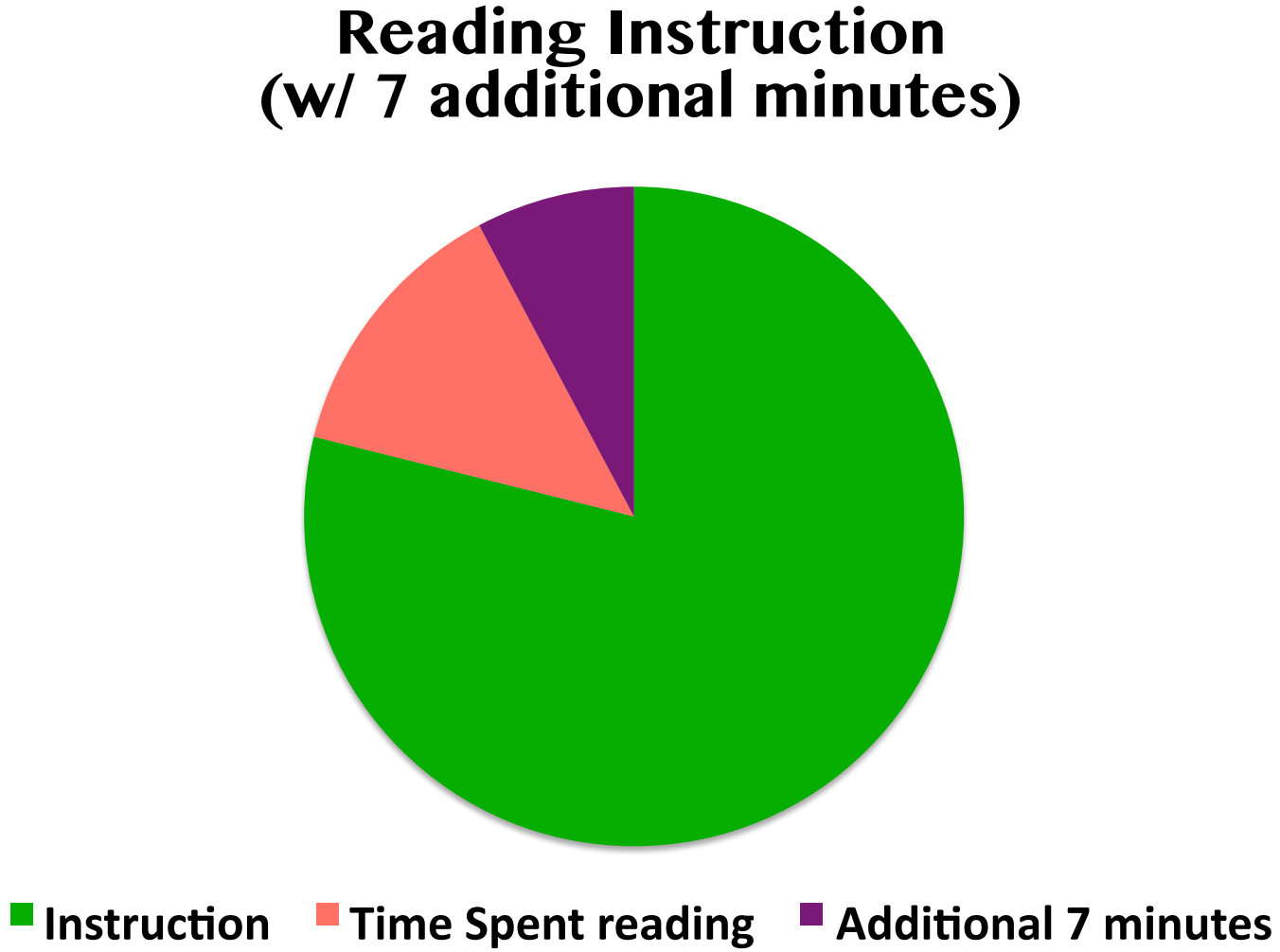
Swanson, Wanzek, McCulley, Stillman-Spisask, Vaughn, Simmons, Fogarty, & Hairrell, 2015.



- Silent Reading
- Listening, Following Along to Oral Reading

Actions for #2: "Students can read… but don't do it much."

2.1. Increase the amount of "responsible reading"



2.2. Have Students set Goals

Goal: Increase amount of reading each trimester of the school year.

Step 1: Get baseline data:

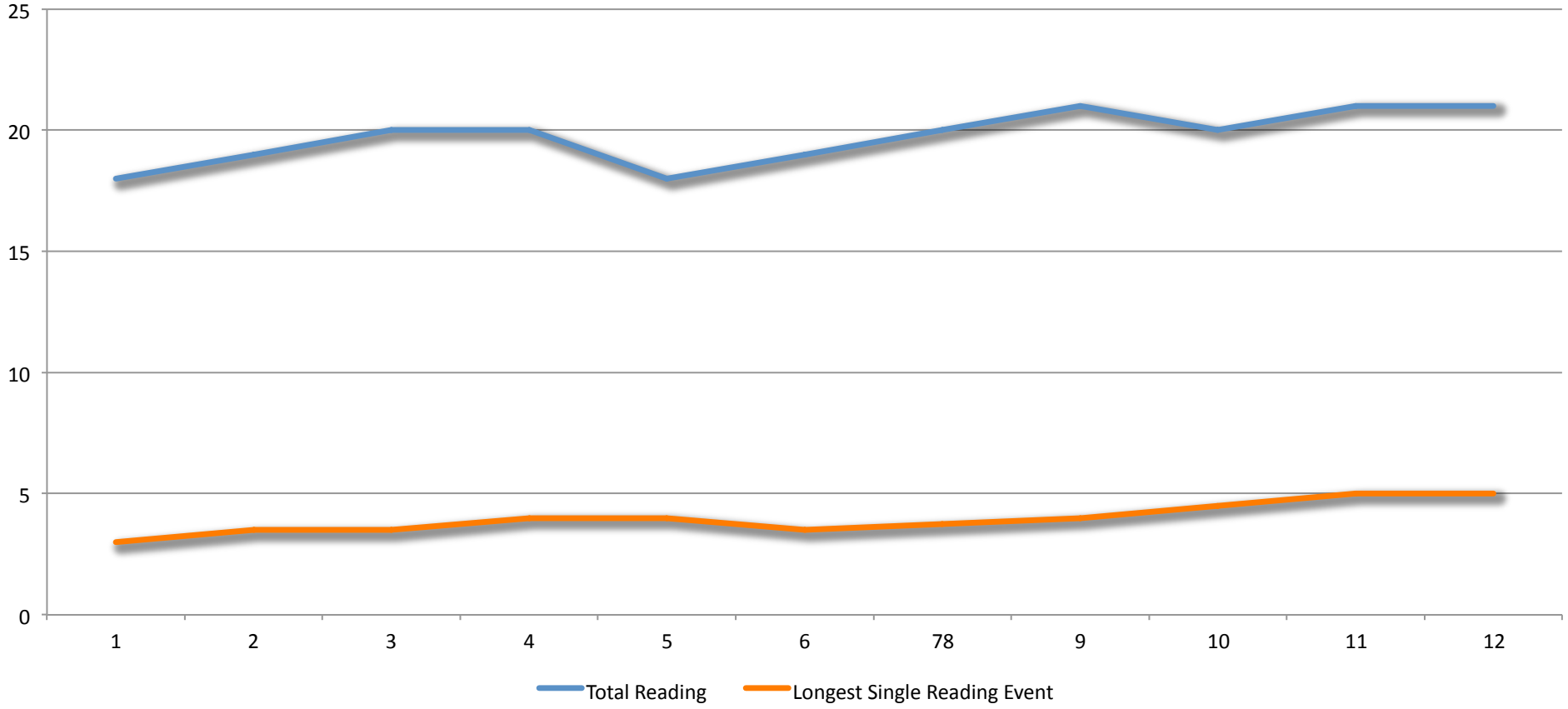
- Establish length of time spent reading
- Establish length of typical reading event

Step 2: Set the goal (students in charge in Grades 3+; students guided in Grades 2-)

Example: Goal for trimester: 22 min. daily, with at least one event for 5 min.

Step 3: *Always* keep a record of what you've learned from reading

Illustration of Student Goal Setting:



Record of what I learned from reading:

- Fibonacci patterns (I read *Blockhead*; *Patterns of Nature*):
- Musicians (*John's Secret Dreams*; *Lives of the Musicians*): Some people like John Lennon use music to deal with hard things in their lives. Often, musicians need to make many sacrifices to do what they do.

3. CONTENT MATTERS IN ENGAGING STUDENTS IN READING.

Correlation between Background Knowledge & Comprehension = .94

Reading for Understanding Network Study of Comprehension in Grades 7-12

Slide is from the presentation of David Francis (April 19, 2013). CCSS Assessments and Students with Disabilities and English Language Learners. Plenary session at Institute on Assessment in the Era of the Common Core State Standards, International Reading Association.

Deep knowledge of some topics

Broad Knowledge Of Many Topics

Grade	Topic of Passage
3	•Nar: Student knows more about computers than teacher •Ex: How microchips help owners get lost pets back •Ex: How a bakery empire began with loves of good bread •Ex: The origins of Teddy bears
5	•Nar/Ex: Lewis and Clark expedition from vantage point of Lewis's dog, Seaman •Ex: Cherry-spitting contest in Eau Claire, WI •Poem: Eating cherries •Ex: Biography of WBA player who had a moderate hearing loss •Ex: Description that does tasks to help astronauts •Ex: History and production of Louisville Slugger
7	•Play: A girl's attempt to cut her friend's hair is disastrous •Poem: Descriptions of poplar as lonely, slender, restless •Ex: Actions taken to preserve the Leaning Tower of Pisa Ex: Restoration of the Cutty Sark •Nar: How a teenager's obsession with protons began •Ex: How seeds are being stored in a vault close to the Arctic Circle


Actions for #3:
Content and tasks
matter.

3.1. Students' text diets need to include substantial amounts of informational articles.

volume 3
issue 15
FYI for Kids!

Kites: Dancers in the Wind

You're on a beach, and the wind is blowing off the ocean. Your kite floats and swirls, dancing in the wind.

Kites were invented in China more than 2,000 years ago. They were first used by the Chinese military, but about 1,000 years ago, people started flying kites for fun. Since then, kites have been used for celebrations, in competitions, and for science. In addition, kite festivals show off the many shapes and colors of kites. These festivals are held in Japan, Pakistan, and many other countries.

The first kites were made of silk. After paper was invented, around the year 100 AD, people used it to make kites. Today, most kites are made of paper or cloth, with sticks to hold them in shape and string to hold onto them. However, there are also kites for skiing or for moving a buggy on a beach.

In ancient times, kites carried lines across rivers. These lines helped build bridges. In the 1880s, kites were first used to take photographs. In the early 1900s, the United States Weather Bureau used kites to help with weather prediction. The kites measured winds and temperatures.

The word kite is from an Old English word that means "a kind of hawk." Kites were probably given this name because of the way they look when they fly.

To fly a kite, find a large open area, such as a park or a beach. Make sure there are no trees or power lines the kite can get caught on. Then hold the kite's string up and run. The kite will lift when it catches the wind. Guide your kite by pulling the string. Make sure you look around when you're running so you don't run into anything.

As you watch the kite, notice how it moves. If the wind is just right, your kite will dance, too, swirling as the wind takes it high up into the sky.

volume 3
issue 2

Putting Two Words Together

A lot of sports that people play use balls. In basketball, players try to get a ball through a hoop. In baseball, players use a bat to hit a ball. In football, players throw a ball to get it close to the goal.

There are other words with "ball" that describe things that are round. But they are not balls with which you play a game. Meatballs are not used in any sport. But they are great with spaghetti.

Eyeballs help in playing sports. But there isn't a sport called eyeball where teams throw and catch eyeballs. You wouldn't want to be in a game that uses fireballs. If you would ever see a fireball, you should get as far away as fast as you can. Then call 911 right away. You should also watch out if a cannonball is going to be fired. It is round but you don't want to play with a cannonball. You especially do not want to catch a cannonball!

There are some words, though, that have ball in them but it has nothing to do with round. Ballpoint pens make writing a lot easier. It's easy to see how the "point" got into ballpoint pen. But why the ball? That part is in the name because of the tip of a pen is round. There are also rooms that are called ballrooms. People hold balls in ballrooms but they aren't the round kind.

Other words with ball have nothing to do with round. In these words, the "ball" part of the word is not even said the same as ball in baseball or meatball. Ballerina is not ball with "erina." Ballerinas are dancers and the word has nothing to do with ball. A ballot is used by people to vote but it is not round. You don't even say "ball" when you say the word ballot.

Whenever you see ball as part of a word, look carefully. Usually, the word has something to do with games and sports. But remember eyeballs, fireballs, and cannonballs. These balls may be round but they aren't used in sports! Ballerina and ballot show that some words with "ball" have nothing to do with being round.

volume 5
issue 1

A Birthday Wish: Rachel Beckwith

In the summer of 2011, Rachel Beckwith had just finished third grade. She was looking forward to riding her bike and playing games like jump rope with her friends. Rachel also liked dancing.

Then she heard someone say that there were children in Africa who did not have clean water to drink. The person was from an organization called charitywater.org, a charity that builds wells for towns in Africa. The wells provide people with clean water. Without wells, people often have to walk many miles to find water, then carry it home in buckets. Often, the water is not clean.

Instead of presents for her ninth birthday, Rachel asked her family and friends to donate $9 for clean water in Africa to charitywater.org. If she could raise $300, 15 people could get clean drinking water.

By the time her birthday came, Rachel had raised $220. That meant that 11 people could get clean water. She told her mom that she would try harder the next year to raise more money for the charity.

A month later, Rachel was critically injured in a car accident. On July 23, 2011, she was taken off life support. She died soon after.

When the news about Rachel's story and her birthday wish spread, people all around the world began to donate money in her name. Some gave $9, some $19, some more. A month later, 30,000 people had given more than $1.2 million. Because of Rachel Beckwith, 60,000 people in more than 100 villages now have clean water to drink.

In her honor, one village put up a sign that reads, "Rachel's great dream, kindness, and vision of a better world will live with and among us forever." Clearly, one person, even a child, can make a difference.

Readworks.org
4,000+ articles with vocabulary & comprehension activities

Architecture
The Parthenon

Architecture, like painting, literature, and other forms of art, reflects the ideals of the people who build it. The Parthenon is the best example of ancient Greek architecture. The structure, created between 447 B.C.E. and 432 B.C.E., tells us a lot about the Greek way of thinking.

In Greece, balance and order were important **principles**[1]. The Greeks believed that everything around them happened for a reason. They wanted to find out this reason and discover the order of the world around them. Their buildings were beautiful, but they do not overflow with **frivolity**[2] or emotion. Instead, Greek buildings define order.

Columns are one **hallmark**[3] of classical structure that we associate with Greece and Rome. The Parthenon was built with eight columns on the front and 17 on each side. The building is symmetrical and balanced. Mathematical principles make the design stable. Almost the entire structure is made of marble.

Architecture
The Duomo

The Duomo
Florence, Italy

One building, more than any other, marks the arrival of the Renaissance to Europe. Did you know that "naissance" means "birth" in French and that the Renaissance was the rebirth of classical learning in Italy? Art and architecture took off during the Renaissance. Many new ideas influenced design. The Duomo, with its grand dome, is a perfect example of new ideas and **innovation.**

Work on the Duomo cathedral, in Florence, Italy, actually started before the Renaissance, in 1296. But the building took 140 years to complete. The **plague**[2] and many wars prevented construction from continuing on the building as planned. By 1420, the building was almost finished, but there was one serious problem. The plans for the building called for a huge cupola, or dome—bigger than anything built up to that point. No one knew how to build such a dome.

The Influence of the Arch

By ReadWorks

The lasting influence of ancient Rome is apparent in many areas of our contemporary society. Sophisticated elements of law, engineering, literature, philosophy, architecture, and art can all be traced back to the Roman Empire. But perhaps one of the most lasting contributions from Roman civilization is something we see nearly every day: the Roman arch.

An arch is a curved structure designed to support or strengthen a building. Arches are traditionally made of stone, brick, or concrete; some modern arches are made of steel or laminated wood. The wedge-shaped blocks that form the sides of an arch are called voussoirs, and the top center stone, called the keystone, is the last block to be inserted. During construction, the arch is supported from below before the keystone is put in. The curve of an arch may take different shapes, but it is often a rounded or pointed semicircle.

The Party's Over

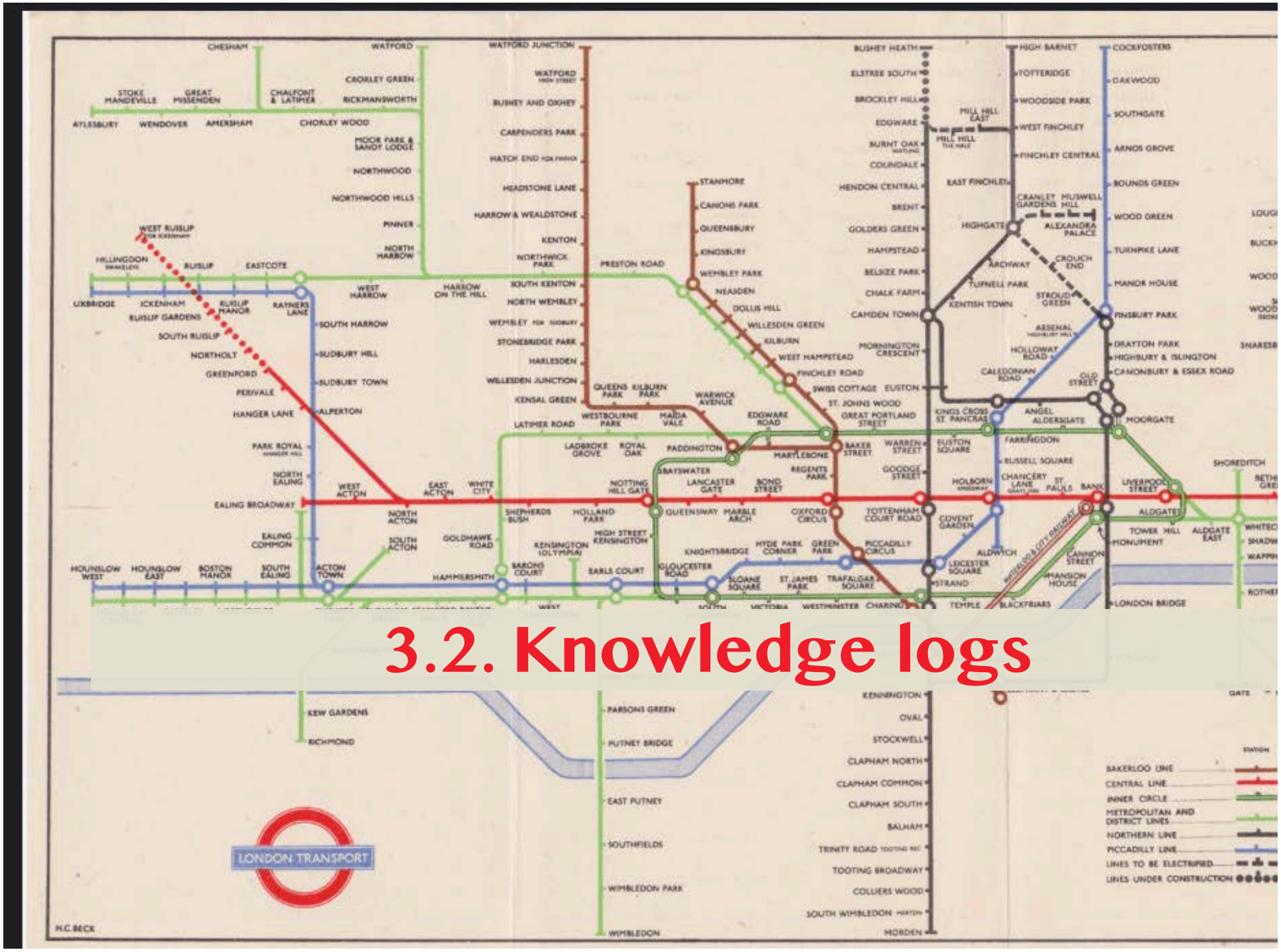
Parties and **stunts** at the Great Wall of China are now against the law. A stunt is a dangerous or an unusual act that is done for attention.

Leigh Haeger

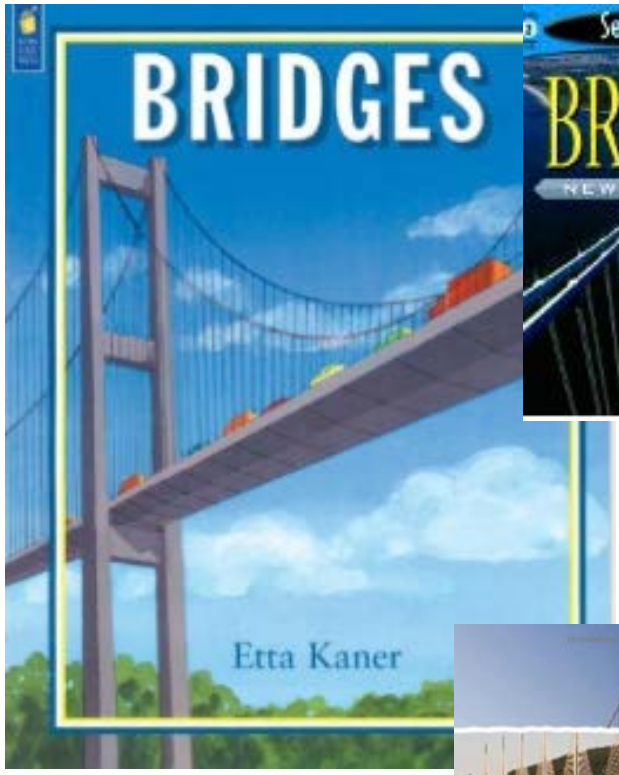
In 2005, Danny Way became the first person to jump over the Great Wall on a skateboard. Over the years, many tourists have climbed the famous wall. Others have jumped over the wall on motorcycles.

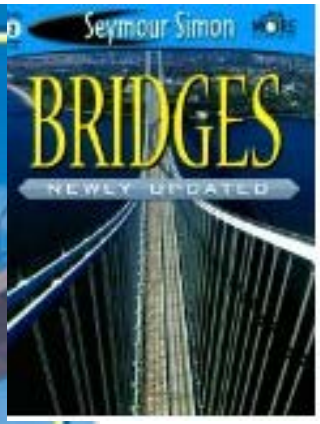
Parties and stunts have caused serious damage to the Great Wall, say officials. The Chinese government has now issued new rules to protect the famous landmark.

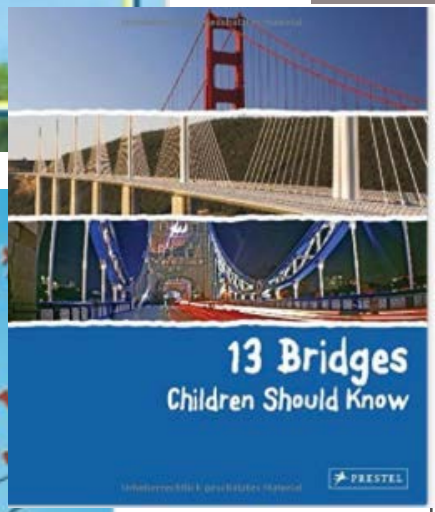
The Great Wall is the longest structure ever built. It twists and turns for more than 4,000 miles through China. Parts of the wall are more than 2,000 years old.

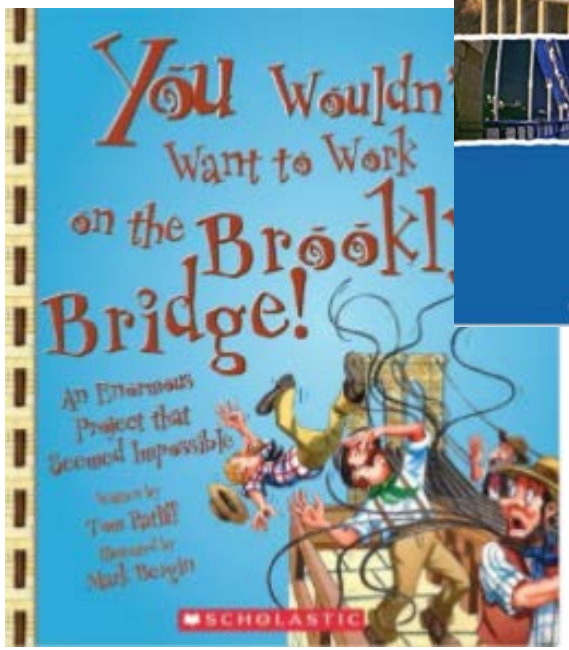


3.2. Knowledge logs









BRIDGES

FEATURES OF SITES:
•bedrock
•tides
•currents

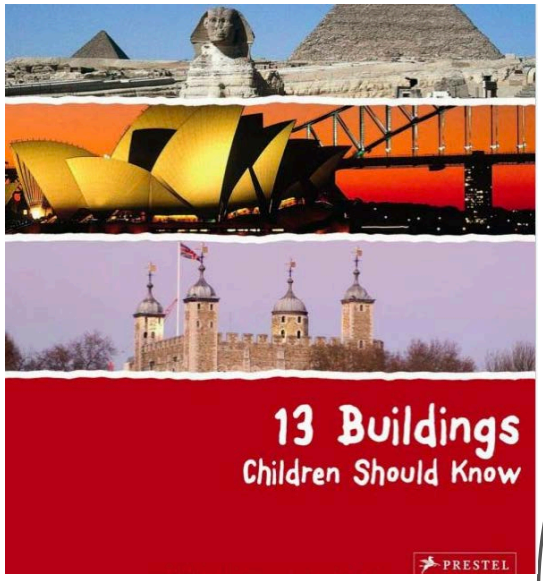
KINDS:
•beam
•arch
•suspension

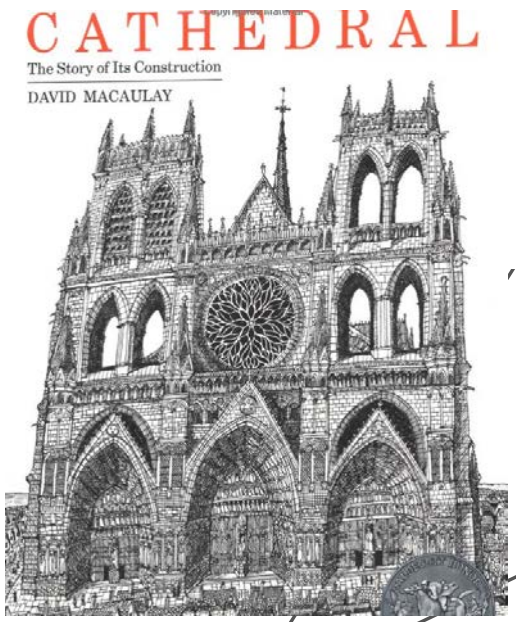
SPANS:
*simple
•continuous
•cantilevered

VARIATIONS:
•truss
•bascule/swing
•semicircular
•segmental arch

COMPONENTS:
•pier
•tower
•pylon
•cables
•girder

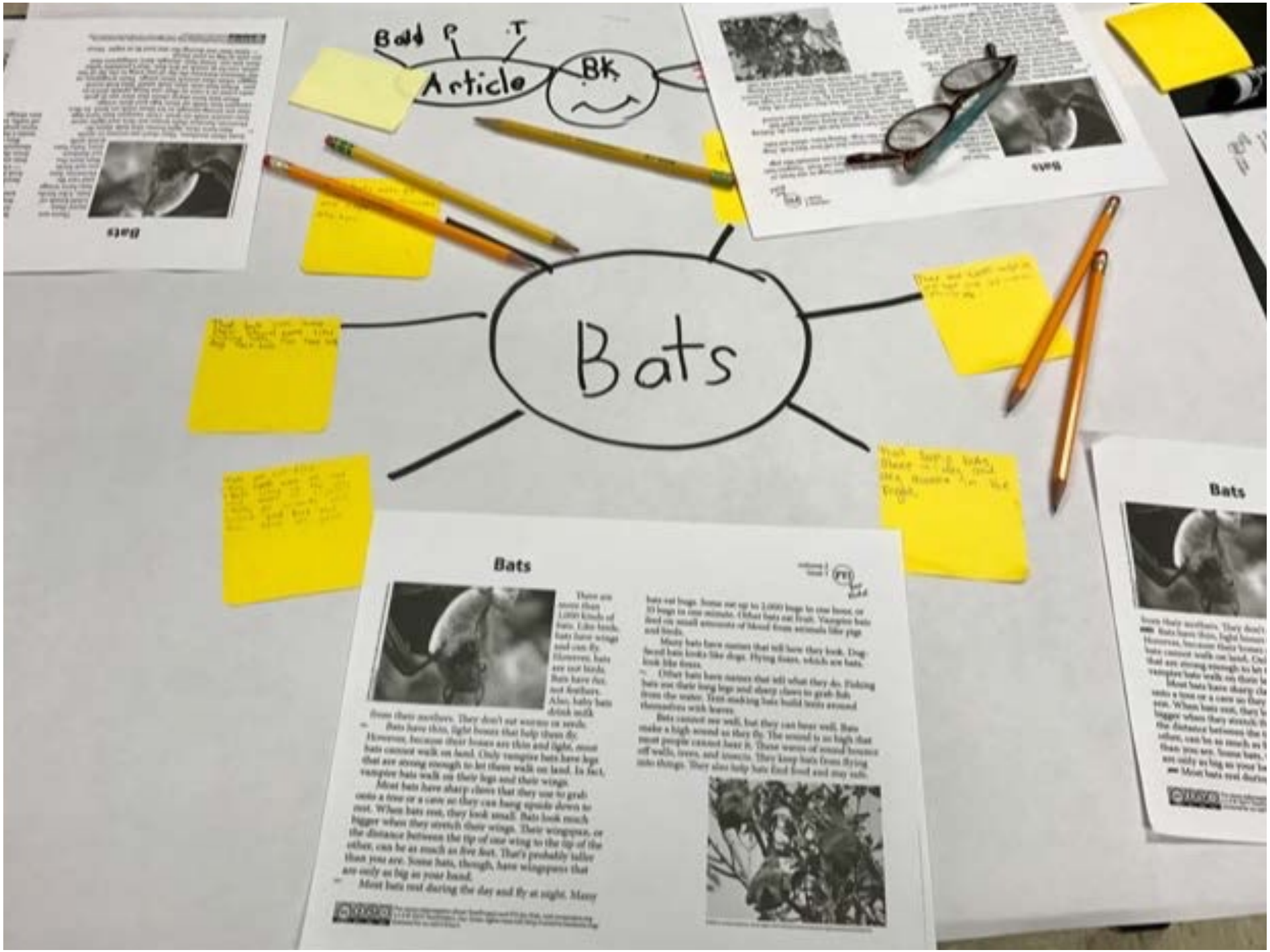
LOADS & FORCES:
•compression
•tension
•torsion
•shear forces





BUILDINGS

- Famous Buildings in the World
- Famous Constructions in the World (e.g., bridges, canals, dams)
- Building and Nature
- How do buildings differ in different climates?
- Changes in building over time
- Stories about Obstacles & Challenges in building and constructing
- How are architecture, construction, and engineering different? How do people from these areas work together?
- Steps in Designing and constructing
  - What's architecture?
  - What's construction?
  - What's engineering?


Bats
Bats
Bats
Bats

Idea	Action	Open-Access Resource
1. A small group of words does the heavy lifting in English.	1. Hold conversations about how English works	1. Talking Points for Teachers; English pyramid
2. ALMOST all students can recognize almost all words. BUT…. They haven't read a lot and their reading is slow & tedious.	2. Increase reading volume	2. Students' Goal-Setting Chart
3. Teach vocabulary in the service of developing bodies of knowledge.	3. Increase the number of informational articles students read & summarize information in Knowledge Logs	3. ReadWorks & FYI for Kids