

Science & Literacy - Text Complexity

“Beyond the Land of Oz”



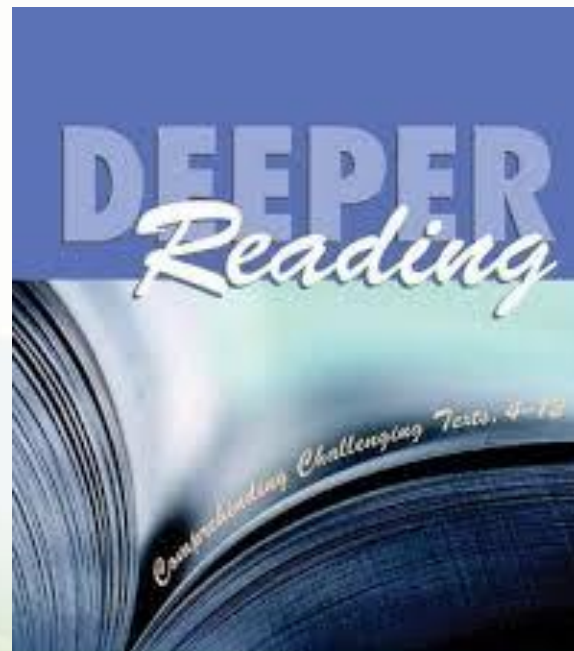
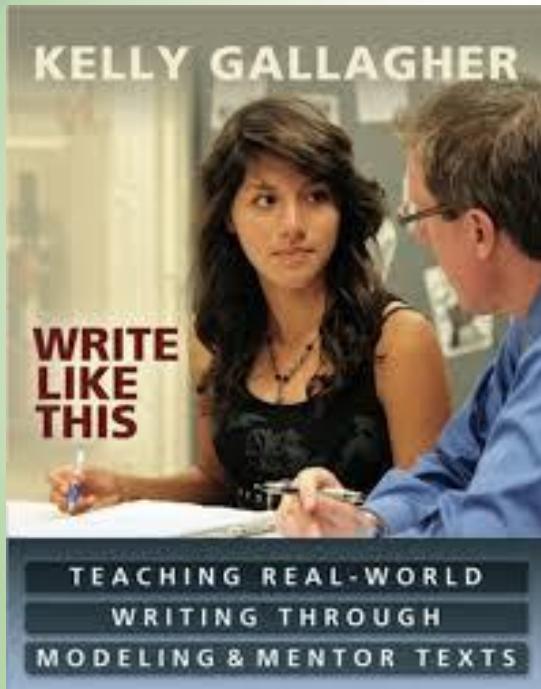
Sid Larson, Literacy Consultant
CESA2



Dr. Kevin Anderson



Kelly Gallagher



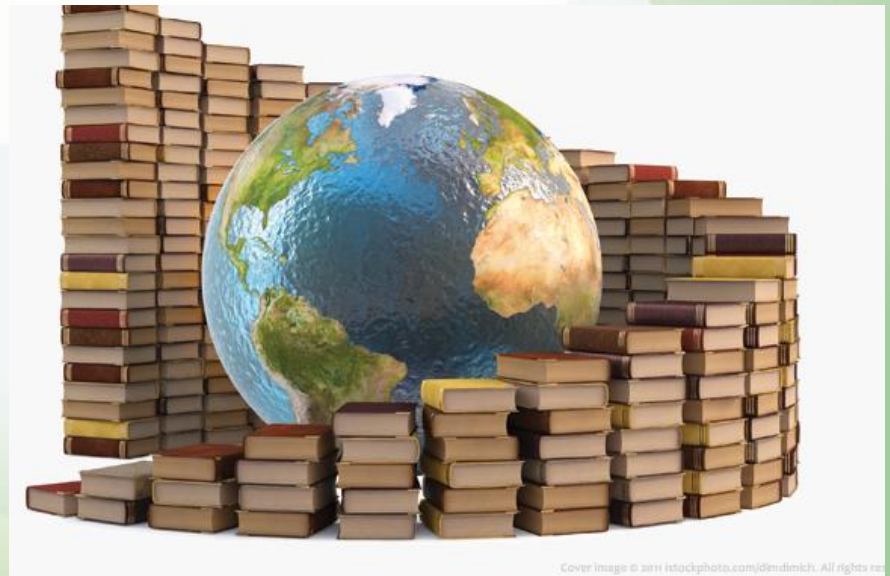
KELLY GALLAGHER



Text Complexity Staircase

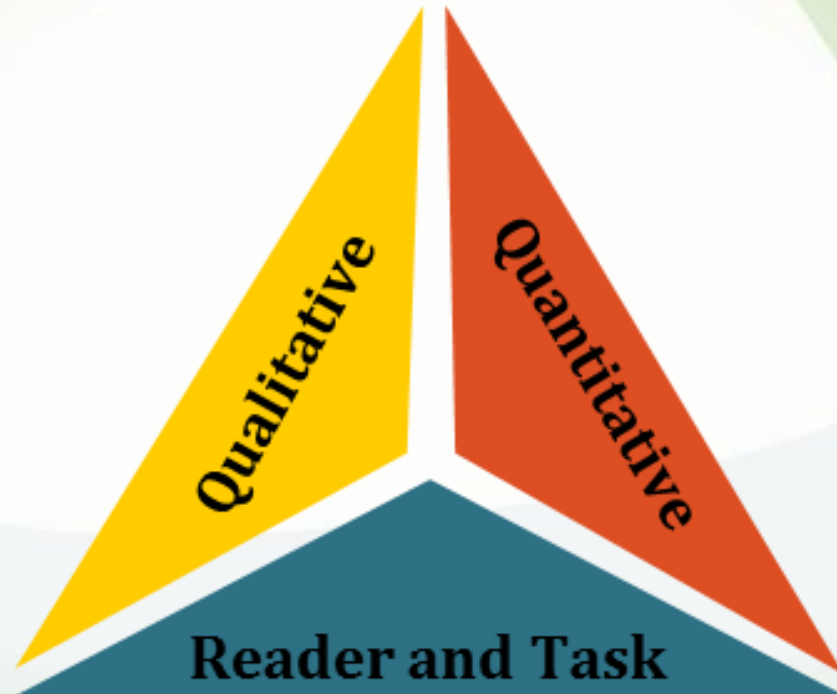
Reading Anchor Standard #10:

Read and comprehend complex literary and informational texts independently and proficiently.



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How Complex Are Your Science Texts?



Recommended Placement

Qualitative

Quantitative

Reader and Task



Wisconsin Department of Public Instruction
TEXT COMPLEXITY FOR LITERARY TEXT
P-1112 (Rev. 06-19)

INSTRUCTIONS: Complete and save for your use.

GENERAL INFORMATION	
Title	Author
Text Type	Genre
Topics	Notable Features
Author's Background	Protagonist's Background
Length of Text	Time period

QUALITATIVE MEASURES				
Literary Texts	Decodingly Complex	Very Complex	Moderately Complex	Slightly Complex
Meaning	<input type="checkbox"/> Meaning: Several levels and competing elements of meaning that are difficult to identify, separate, and integrate; theme is implicit or subtle; often ambiguous and revealed over the entirety of the text.	<input type="checkbox"/> Meaning: Several levels of meaning that may be difficult to identify or separate; theme is implicit or subtle and may be revealed over the entirety of the text.	<input type="checkbox"/> Meaning: More than one level of meaning; with levels clearly distinguished from each other; theme is clear but may be conveyed with some subtlety.	<input type="checkbox"/> Meaning: One level of meaning; theme is obvious and revealed early in the text.
Text Structure	<input type="checkbox"/> Organization: Organization is intricate with regard to elements such as narrative viewpoints, time shifts, multiple characters, storylines, and detail. <input type="checkbox"/> Use of Visual Features*: If used, essential integrated print and text features enhance meaning of text; provide information not otherwise conveyed through print alone.	<input type="checkbox"/> Organization: Organization may include subtlety, time shifts, and more complex characters. <input type="checkbox"/> Use of Visual Features*: If used, essential integrated print and text features enrich meaning of the text; may provide information not otherwise conveyed through print alone.	<input type="checkbox"/> Organization: Organization may have two or more storylines and occasionally difficult to predict. <input type="checkbox"/> Use of Visual Features*: If used, print and text features expand the meaning of the text; provide support and assist in locating information and integrating the text.	<input type="checkbox"/> Organization: Organization is clear, chronological, or easy to predict. <input type="checkbox"/> Use of Visual Features*: If used, print and text features represent the meaning of the text; provide support and assist in locating information and understanding the text.
Language Features	<input type="checkbox"/> Conventionality: Dense and complex; contains abstract, ironic, and/or figurative language. <input type="checkbox"/> Vocabulary: Generally unfamiliar, archaic, subject-specific, or overly academic language may be ambiguous or purposefully misleading. <input type="checkbox"/> Sentence Structure: Mainly complex sentences often containing multiple concepts.	<input type="checkbox"/> Conventionality: Complex; contains some abstract, ironic, and/or figurative language. <input type="checkbox"/> Vocabulary: Somewhat complex language that is sometimes unfamiliar, archaic, subject-specific, or overly academic. <input type="checkbox"/> Sentence Structure: Many complex sentences with several subordinate phrases or clauses and transition words.	<input type="checkbox"/> Conventionality: Largely explicit and easy to understand with some occasions for more complex meaning. <input type="checkbox"/> Vocabulary: Mostly contemporary, familiar, conversational; rarely unfamiliar or overly academic. <input type="checkbox"/> Sentence Structure: Simple and compound sentences, with some more complex constructions.	<input type="checkbox"/> Conventionality: Explicit (flat), straightforward, easy to understand. <input type="checkbox"/> Vocabulary: Contemporary, familiar, conversational language. <input type="checkbox"/> Sentence Structure: Mainly simple sentences.

*The descriptor has been modified to capture the complexity of visual features when print and text features are used together to enhance the meaning of the text.



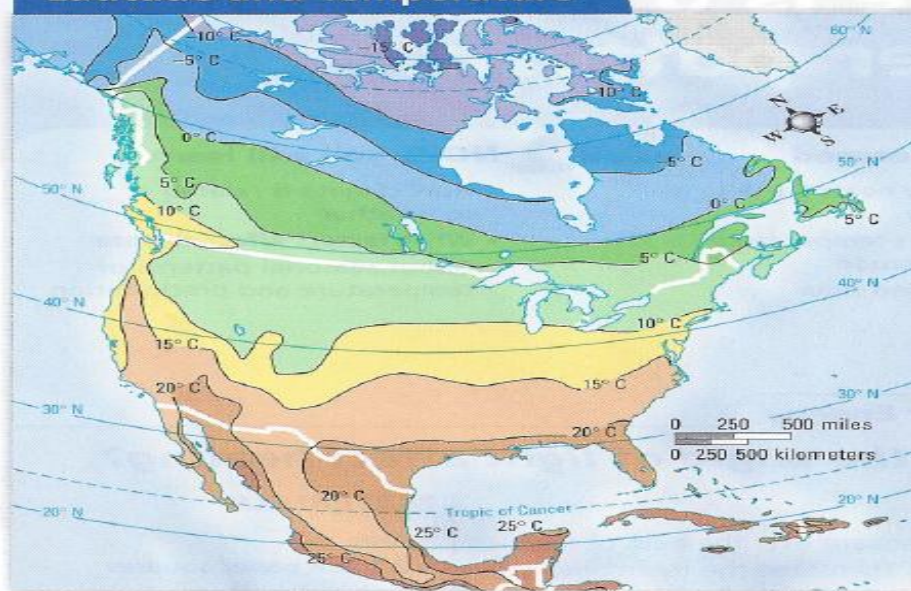
Wisconsin Department of Public Instruction
TEXT COMPLEXITY FOR INFORMATIONAL TEXT
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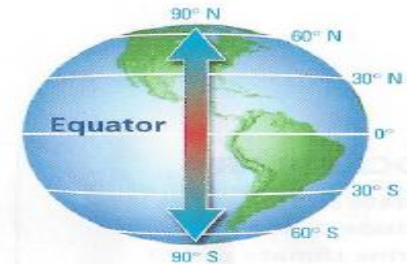
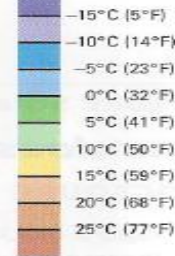
QUALITATIVE MEASURES				
Informational Texts	Decodingly Complex	Very Complex	Moderately Complex	Slightly Complex
Purpose	<input type="checkbox"/> Purpose: Subtle, implied, difficult to determine; intricate, theoretical elements.	<input type="checkbox"/> Purpose: Implied, but fairly easy to infer; more theoretical than concrete.	<input type="checkbox"/> Purpose: Implied, but easy to identify based upon context or source.	<input type="checkbox"/> Purpose: Explicitly stated; clear, concrete with a narrow focus.
Text Structure	<input type="checkbox"/> Organization: Organization is intricate with regard to elements such as narrative viewpoints, time shifts, multiple characters, storylines, and detail. <input type="checkbox"/> Use of Visual Features*: If used, essential integrated print and text features enhance meaning of text; provide information not otherwise conveyed through print alone.	<input type="checkbox"/> Organization: Organization may include subtlety, time shifts, and more complex characters. <input type="checkbox"/> Use of Visual Features*: If used, essential integrated print and text features enrich meaning of the text; may provide information not otherwise conveyed through print alone.	<input type="checkbox"/> Organization: Organization may have two or more storylines and occasionally difficult to predict. <input type="checkbox"/> Use of Visual Features*: If used, print and text features expand the meaning of the text; provide support and assist in locating information and understanding the text.	<input type="checkbox"/> Organization: Organization is clear, chronological, or easy to predict. <input type="checkbox"/> Use of Visual Features*: If used, print and text features represent the meaning of the text; provide support and assist in locating information and understanding the text.
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This map shows average annual temperatures in North America. Average temperatures generally decrease as you move away from the equator into higher latitudes.

Average Annual Temperatures



Latitude

READING TIP

Notice on the globe in the illustration that latitude numbers get higher as you move away from the equator.

One factor that affects temperature is latitude. **Latitude** is the distance in degrees north or south of the equator, which is 0°. Each degree equals 1/360 of the distance around the world.

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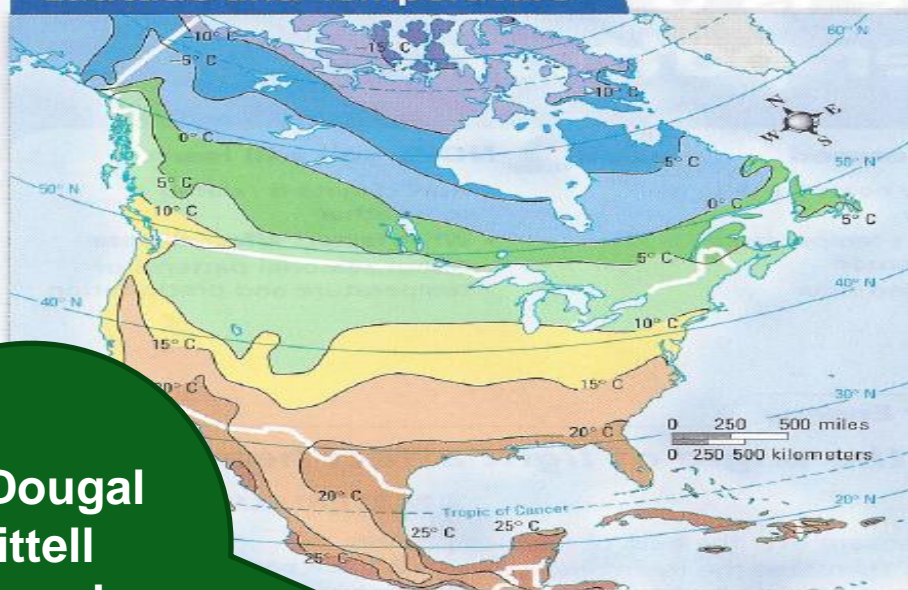
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CHECK YOUR READING

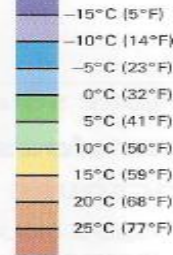
What is the connection between latitude and temperature?

McDougal
Littell
7th grade



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Average Annual Temperatures



How complex is this text?

TIP

Look on the globe in the illustration that latitude numbers get higher as you move away from the equator.

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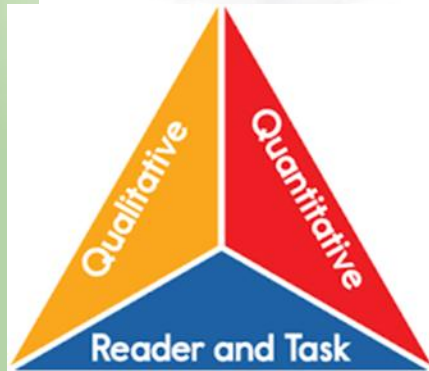
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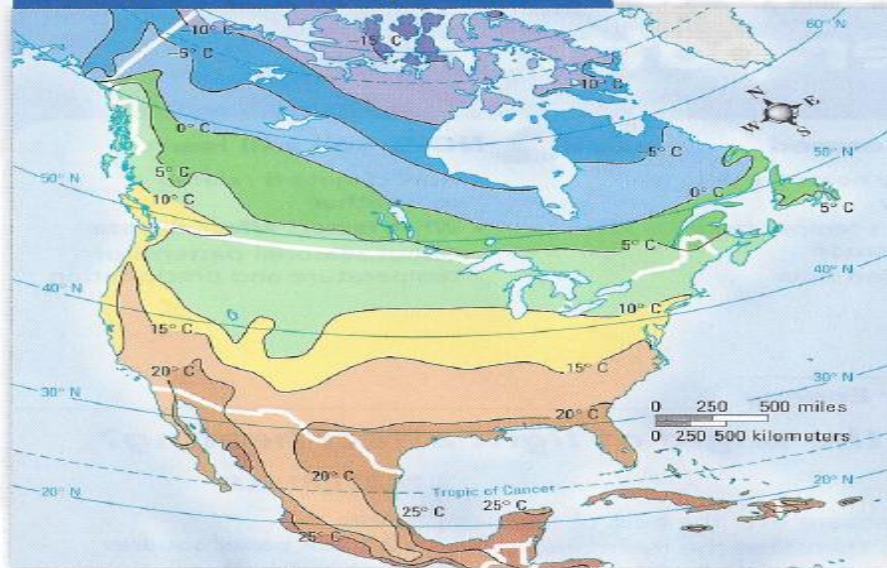
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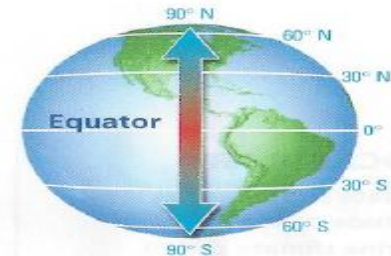
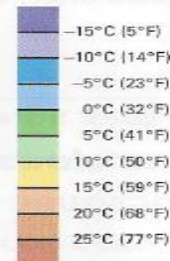
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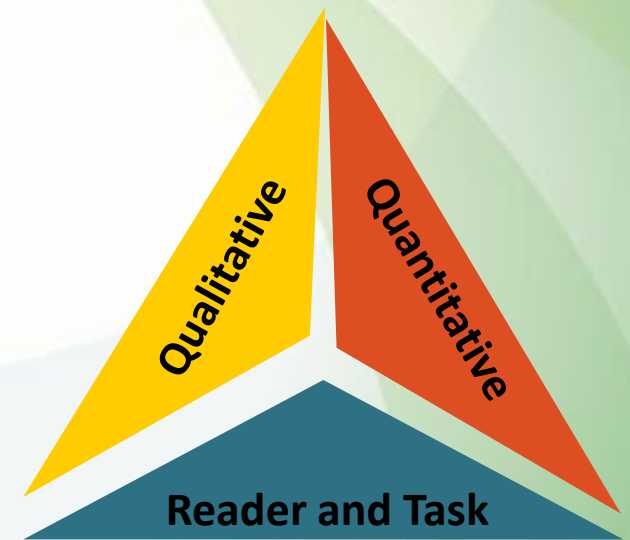
CHECK YOUR READING

What is the connection between latitude and temperature?

Overview of Text Complexity

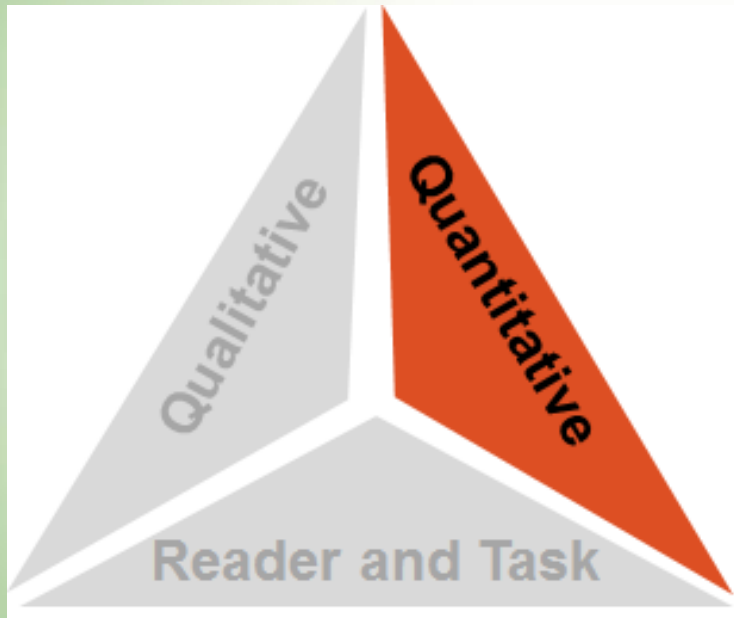
Text complexity is defined by:

1. **Quantitative measures** – readability and other scores of text complexity often best measured by computer software.
2. **Qualitative measures** – levels of meaning, structure, language conventionality and clarity, and knowledge demands often best measured by an attentive human reader.
3. **Reader and Task considerations** – background knowledge of reader, motivation, interests, and complexity generated by tasks assigned often best made by educators employing their professional judgment.



Source:

Step 1: Quantitative Measures



Measures such as:

- Word length
- Word frequency
- Word difficulty
- Sentence length
- Text length
- Text cohesion

atitude

Count the number of sentences= 8

One factor that affects temperature is latitude. **Latitude** is the distance in degrees north or south of the equator, which is 0° . Each degree equals $1/360$ of the distance around the world.

Syllables=166

As you read in Chapter 2, the Sun heats Earth's curved surface unevenly. Sunlight strikes Earth's surface directly near the equator. Near the poles, sunlight strikes the surface at a lower angle, so it is more spread out. In addition, the polar regions receive little or no solar energy during winter.

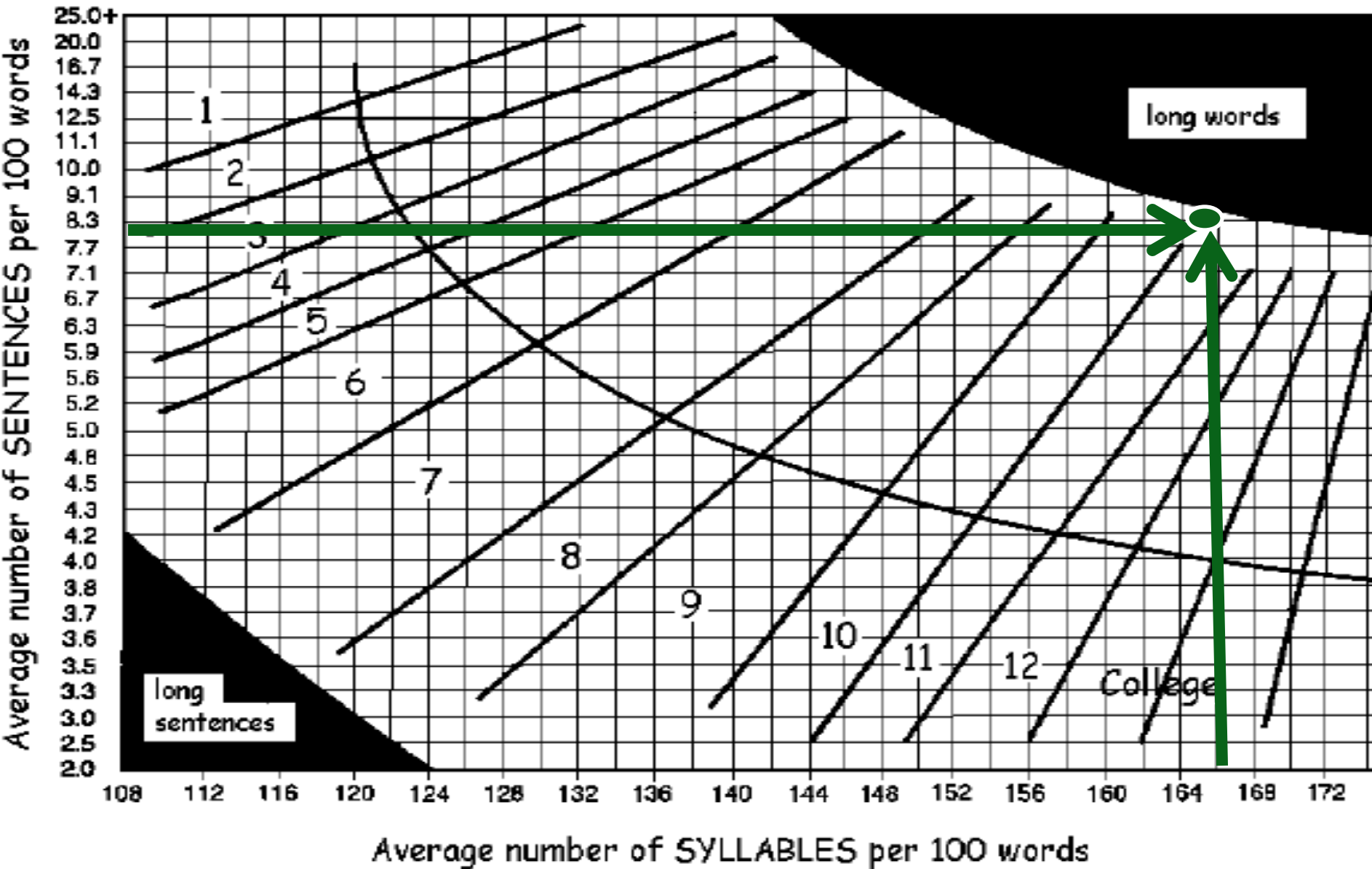
Count 100 words

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45°S . The first city is in the Northern Hemisphere, and the second is

Fry Graph for estimating Reading Ages (grade level)





About Lexile Measures	Using Lexile Measures	Common Core
Lexile® Measure	<h2>Lexile Analyzer: Results</h2> <p>These results are not saved in any retrievable way. You should print or record the results of your sample text. If you do not print or record the results, you will lose its Lexile measure.</p> <h3>Submit another file</h3> <p>File to Analyze: <input type="text"/> <input type="button" value="Browse..."/></p> <input type="button" value="Submit"/>	
1360L		
Mean Sentence Length		
21.71		
Mean Log Word Frequency		
3.23		
Word Count		
152		

Lexile Measure Example

980L

Mean Sentence Length 13.60

Mean Log Word Frequency 3.33

Word Count 136

Figure 3: Text Complexity Grade Bands and Associated Lexile Ranges (in Lexiles)

Text Complexity Grade Band in the Standards	Old Lexile Ranges	Lexile Ranges Aligned to CCR expectations
K-1	N/A	N/A
2-3	450-725	450-790
4-5	645-845	770-980
6-8	860-1010	955-1155
9-10	960-1115	1080-1305
11-CCR	1070-1220	1215-1355

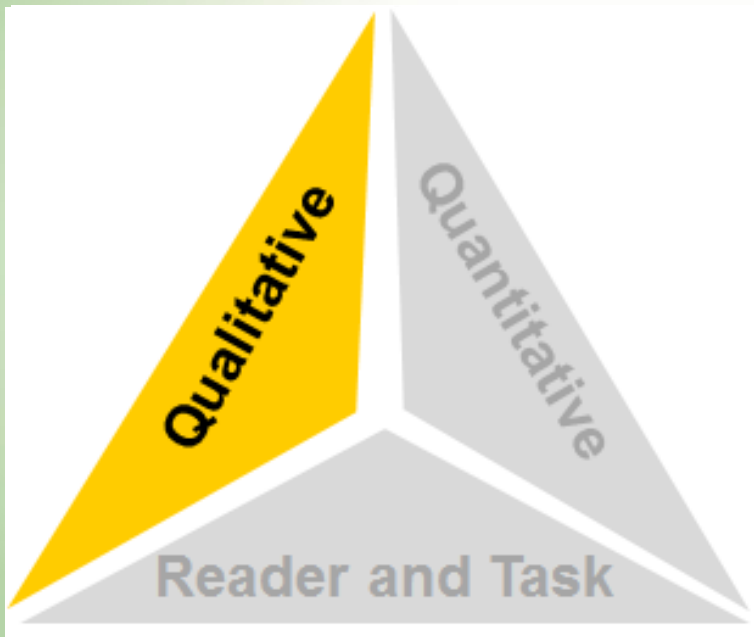
Reading Levels?

- So Lexile has this page matched to the 6-8 grade band of the CCSS.
- Fry places the page around 10th grade.
- Matching text to student strictly by a readability score is not an exact science.
- Convenience versus professional judgment.

Step 2: Qualitative Measures

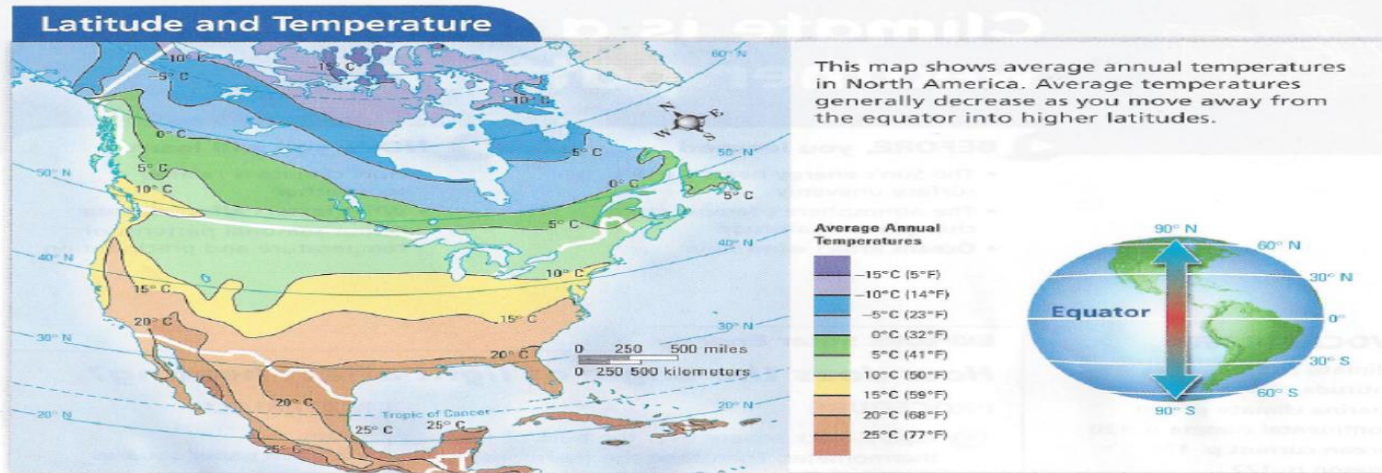
Measures such as:

- Levels of meaning
- Levels of purpose
- Structure
- Organization
- Language conventionality
- Language clarity
- Prior knowledge demands



<http://www.livebinders.com/play/play?id=813039#anchor>

Let's Analyze the Qualitative Features of the Science Text!



READING TIP

Notice on the globe in the illustration that latitude numbers get higher as you move away from the equator.

Latitude

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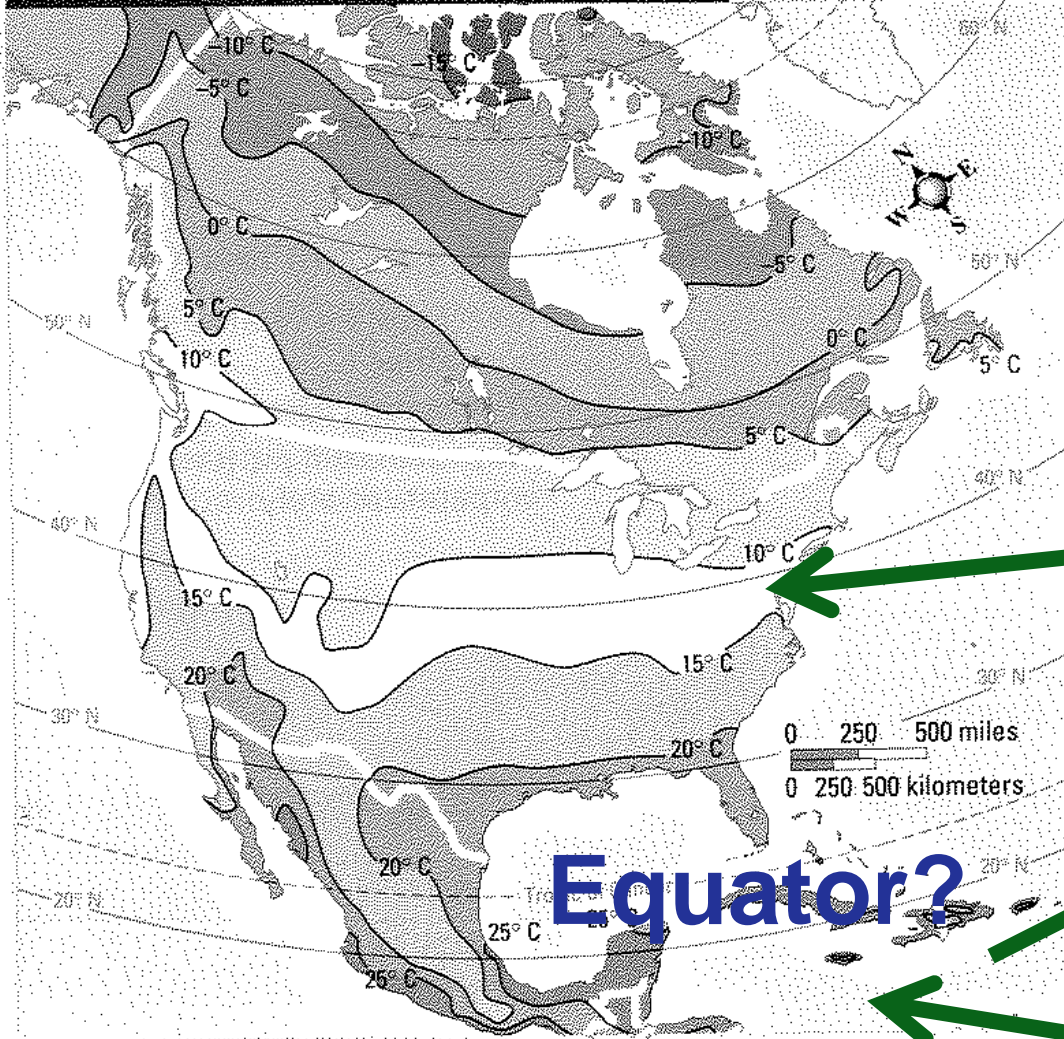
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CHECK YOUR READING

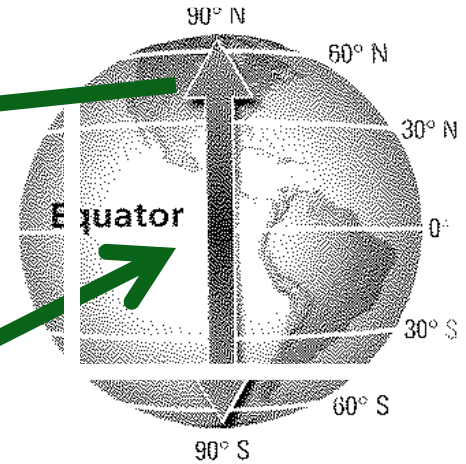
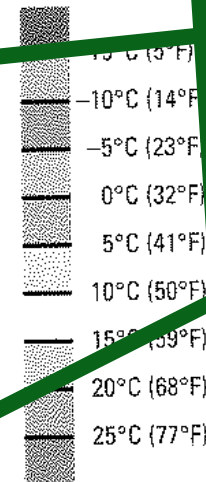
What is the connection between latitude and temperature?

Latitude and Temperature



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Average Annual Temperatures



Equator?

Math

Vocab

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Geography
Vocab

2 Meanings

Notice the number
of dependent
clauses!

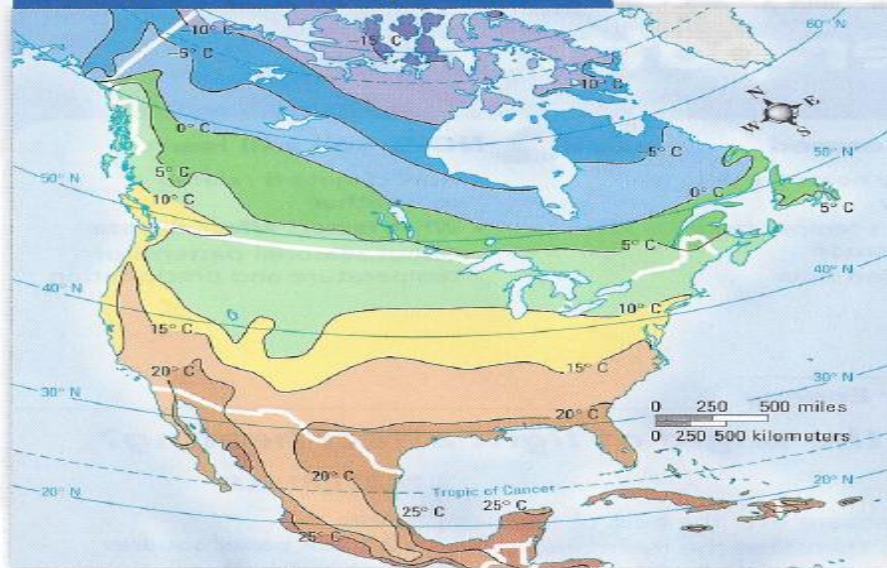
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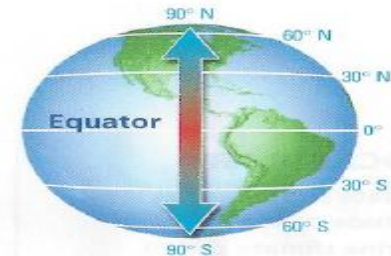
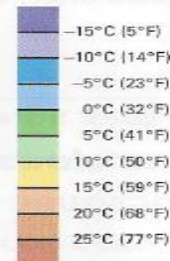
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CHECK YOUR READING

What is the connection between latitude and temperature?

Text Structures

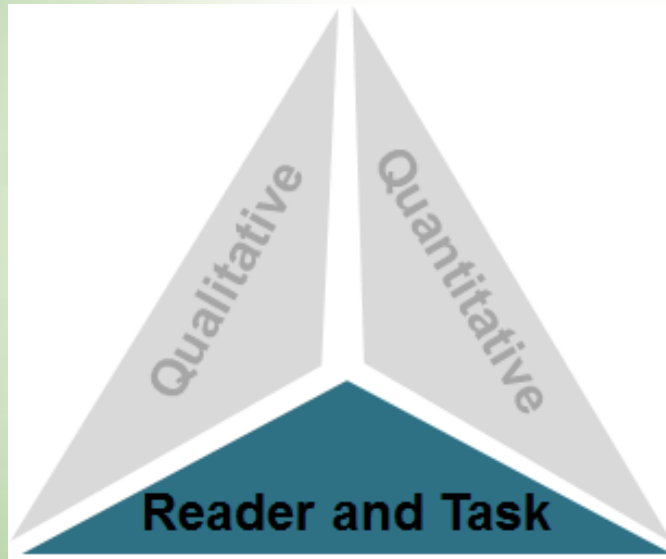
Latitude affects temperature

The key concept.
Notice “Check Your Reading” at the very bottom of the page!
Also the thesis of the page.
Notice the 1st sentence although “affects” is used not “effect”.



Text structures - the way that authors organize information - help students focus attention on key concepts and relationships, anticipate what's to come, and monitor their comprehension as they read.

Step 3: Reader and Task



Considerations such as:

- Motivation
- Knowledge and experience
- Purpose for reading
- Complexity of task assigned regarding text
- Complexity of questions asked regarding text

Reader and Task Considerations



Will the complexity of any before, during, and after reading tasks or the complexity of any questions asked about the text interfere with the reading experience?

What aspects of the text will likely pose the most challenge for my students?

- What are natural areas of focus for this text?
- With what standards do my students need the most practice?

What supports do I need to provide so all of my students (even those who are struggling readers) can access the text?

Reader & Task

- What purpose does the reader have? Answer questions at the end of section? Teacher discussion? Quiz?
- The author of this science text page assumes many things about the students who will read :
 - Working knowledge of tier 2 math & geography vocab
 - Complex grammatical structures
 - The strategy of moving across 3 separate texts
 - Background knowledge of geography including map reading skills
 - Background knowledge of Earth's orbit

Analysis

- Little on this page would prevent a 7th grader from fluently reading the text...“word calling”.
- However, the complexity of the text could prevent **access to comprehension**.
- “I read it, but I don’t get it” may be the truthful response of students lacking scaffolds and strategies to unlock what this text says.

How has Complex Text been handled in the Disciplines?

- ❑ **“Expectation condition”** – students are expected to comprehend such texts without instruction and scaffolding
- ❑ **“Dependence condition”** – students are assigned to read such texts but do not need to reach satisfactory comprehension as they can depend on being told what they need to know
- ❑ **“Bypass condition”** – students are not even assigned to read such texts and operate in a “print free” environment where virtually all they need to know will be delivered through telling, showing, and interactive or “hands-on” activities

Our Role as Mentors (A “New” Condition)

- The person in your room most skilled as a reader of science is **YOU!** In comparison, your students are apprentices.
- **“Mentoring condition”** – students are mentored to comprehend such texts and are provided instruction and scaffolding

Frontloading Decisions

How do you decide if your text will require frontloading?

- What is “below” the surface of the text, unstated but necessary for comprehension?
- What does the author assume the reader already knows? (Hidden Knowledge)

vocabulary

concepts

text structure

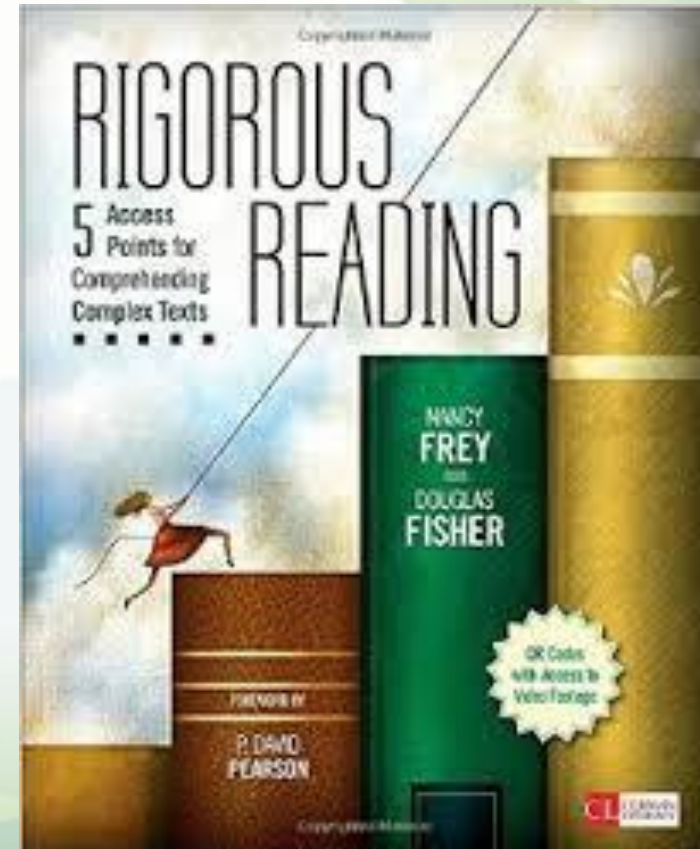
- From a reader and task perspective, do you need to activate prior knowledge or do you need to build background knowledge? What do you want students to know and do?



“Points of Entry” Nov. 2013 *Rigorous Reading, 2013*



by Doug Fisher &
Nancy Frey



Access Point One: *Purpose and Modeling*

Access Point Two: *Close and Scaffolded Reading Instruction*

Access Point Three: *Collaborative Conversations*

Access Point Four: *An Independent Reading Staircase*

Access Point Five: *Demonstrating Understanding and Assessing Performance*

Access Point #1: Purpose

- Tell students what they will be learning
- What they will do with what they learn
- How they will interact with others as they learn
- A number of studies have found that when the teacher states objectives and provides feedback, student learning increases.(Dean, Stone, Hubbell, & Pitlet, 2012)
- Students benefit from having a clearly established purpose for learning, which alerts them to what is expected and draws their attention to salient points of instruction.(Marzano, 2009)

Modeling for Access

- Model That Which is Difficult for Students
- Model Ways to Resolve Problems
 - Structural Analysis: Looking Inside Words
 - Context Clues: Looking Outside Words
 - Using Resources: Looking Further Outside Words
- Model How You Interact With Texts(Annotations)
- Model Through Think-Alouds
- Model Through Interactive Shared readings

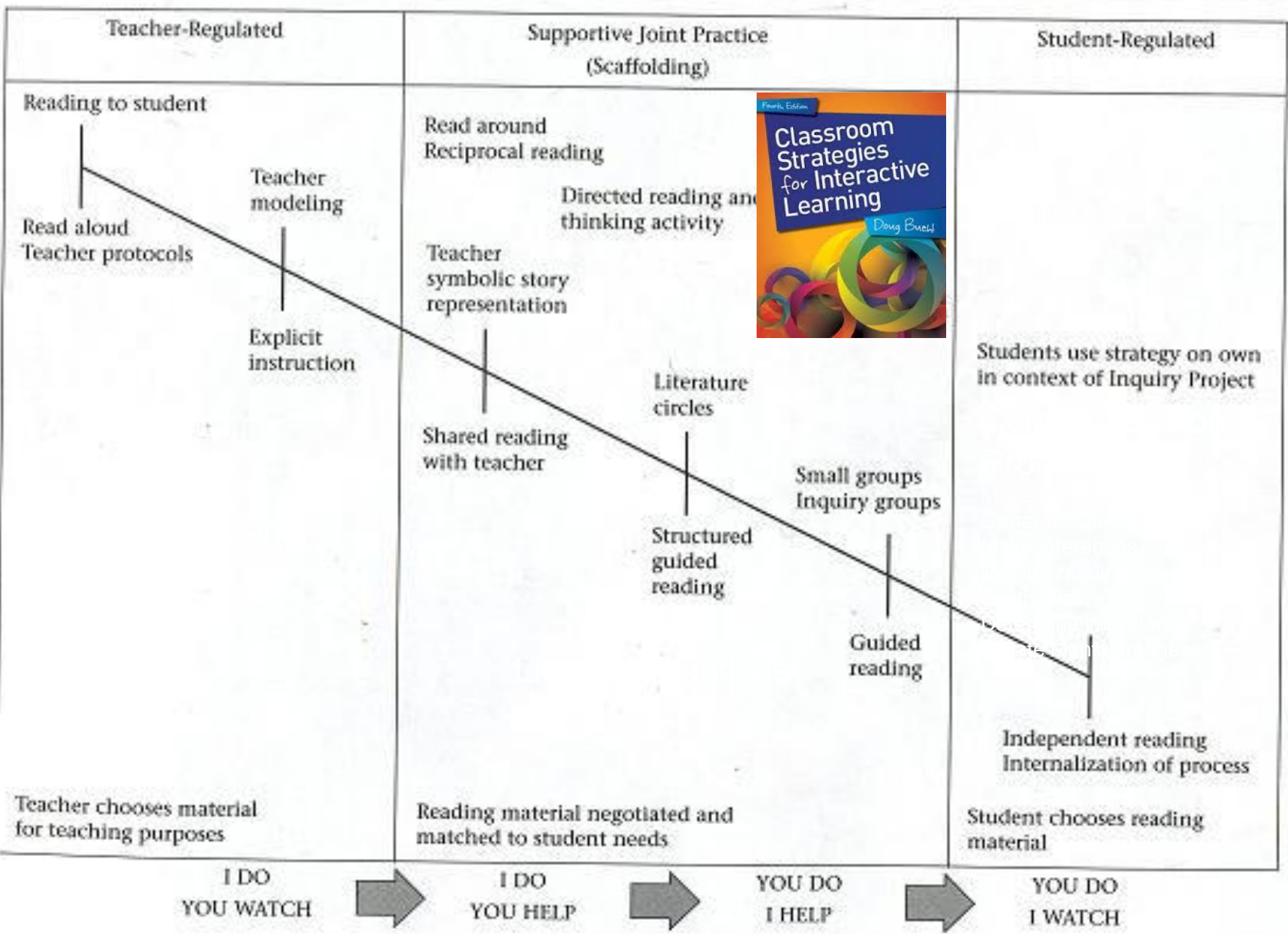
Access Point #2: Close and Scaffolded Reading Instruction

This means...asking students to “work” the text through text-dependent questions which require students to find the evidence of their answers in the text.

As the teacher you use questions differently. They are not meant to interrogate the class to see who read the assignment and who did not.

FIGURE 2.2

WAYS OF ASSISTING READERS THROUGH THEIR ZONES OF PROXIMAL DEVELOPMENT: MODES OF SCAFFOLDING



Access Point #3: Collaborative Conversations



Is a critical linchpin in the process of assessing complex texts

Supports student learning in the absence of the teacher



Provides opportunities for students to apply skills and strategies

Allows for authentic practice of academic language



Collaborative Learning

Access Point #4: An Independent Reading Staircase



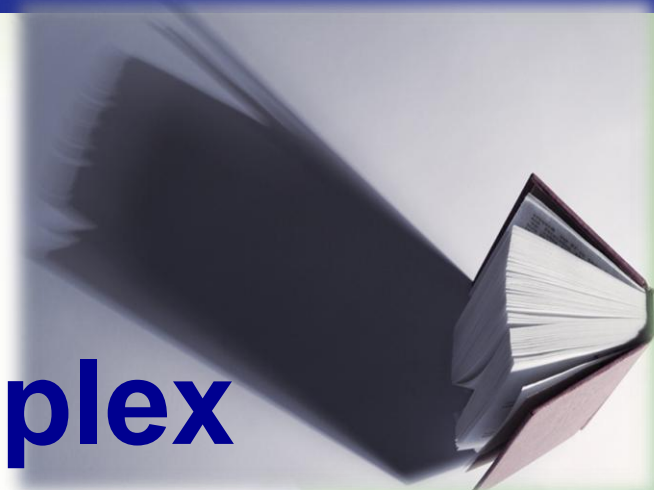
Classroom Libraries

locate scientific read information
new peer-reviewed inform access
journals reports research
articles latest collaborate literature
databases
find



Building Collections of Appropriately Complex Texts in All Disciplines

**What is so complex
about text
complexity?**



<http://www.livebinders.com/media/get/NDQ4Nzg3Mg==>

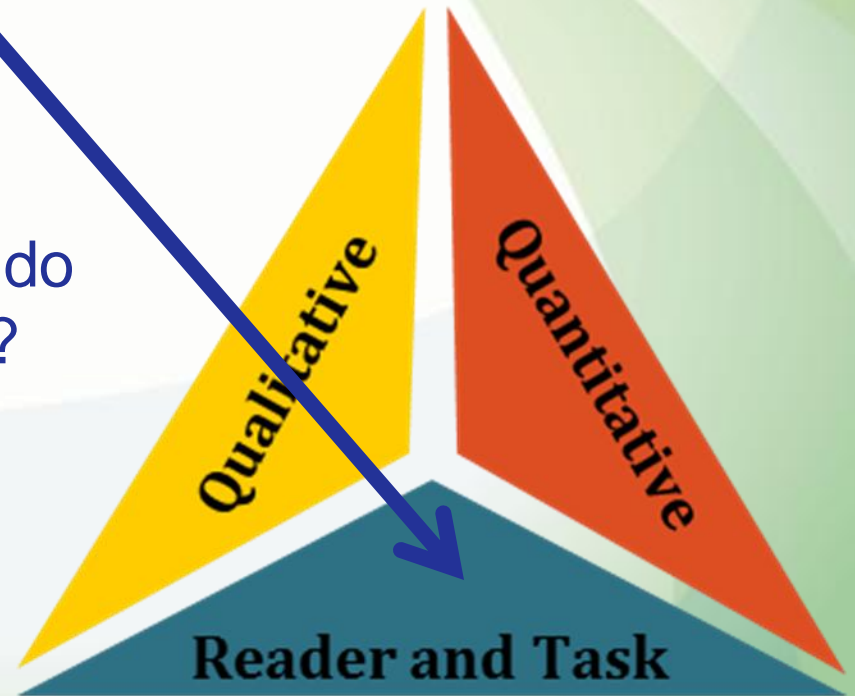
Access Point #5: Demonstrating Understanding and Assessing Performance

Deeper comprehension is not the ultimate goal.

What can students be asked to do with that deeper understanding?

To **KNOW** ...AND ...

Be able to **DO!**



In Conclusion

Science literacy begins with each science teacher being aware of the unique demands of science text.

Lessons need to be strategic and purposeful and involve the same reading, writing, speaking & listening that real scientists use.

In Conclusion

Use the support available in your district such as a literacy coach.

Contact your CESA for workshops and additional support.

Contact Dr. Kevin Anderson

kevin.anderson@dpi.gov

Contact Sid Larson , Literacy Consultant

sid.larson@cesa2.org

