Science & Literacy - Text Complexity
“Beyond the Land of Oz”

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CESA2

Dr. Kevin Anderson
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Text Complexity Staircase

Reading Anchor Standard #10:
Read and comprehend complex literary and informational texts independently and proficiently.
How Complex Are Your Science Texts?
Recommended Placement

Qualitative
Quantitative
Reader and Task
Latitude

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Because of this pattern of uneven heating, average annual temperatures generally decrease as you move closer to the poles. For example, Belém, Brazil, which is almost on the equator, has an average temperature of about 26°C (79°F). Qaanaaq, Greenland, located close to the North Pole, has an average temperature of only −11°C (12°F).

Latitude has the same effect on temperature in both hemispheres. Suppose one city is located at 45° N and another city is located at 45° S. The first city is in the Northern Hemisphere, and the second is in the Southern Hemisphere. However, they are both nearly 5000 kilometers (3100 mi) from the equator, so they would receive about the same amount of sunlight over a year.

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**Latitude and Temperature**

This map shows average annual temperatures in North America. Average temperatures generally decrease as you move away from the equator into higher latitudes.

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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.
Step 1: Quantitative Measures

Measures such as:

- Word length
- Word frequency
- Word difficulty
- Sentence length
- Text length
- Text cohesion
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Lexile Analyzer: Results

These results are not saved in any retrievable way. You should print or record the results, if you do not print or record the results, you will receive no Lexile measures.

Submit another file

File to Analyze: 
Browse... 
Submit.
Lexile Measure Example

980L
Mean Sentence Length 13.60
Mean Log Word Frequency 3.33
Word Count 136

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

Latitude and Temperature

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

-15°C (5°F)
-10°C (14°F)
-5°C (23°F)
0°C (32°F)
5°C (41°F)
10°C (50°F)
15°C (59°F)
20°C (68°F)
25°C (77°F)

Equator

Latitude

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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?
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
• 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
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

<table>
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<th>Supportive Joint Practice (Scaffolding)</th>
<th>Student-Regulated</th>
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<td>Directed reading and thinking activity</td>
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<tr>
<td>Teacher modeling</td>
<td>Teacher symbolic story representation</td>
<td></td>
</tr>
<tr>
<td>Explicit instruction</td>
<td>Shared reading with teacher</td>
<td></td>
</tr>
<tr>
<td>Teacher chooses material for teaching purposes</td>
<td>Reading material negotiated and matched to student needs</td>
<td></td>
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**Teacher-Regulated:**
- Reading to student
- Read aloud
- Teacher protocols
- Teacher modeling
- Explicit instruction

**Supportive Joint Practice (Scaffolding):**
- Read around Reciprocal reading
- Directed reading and thinking activity
- Teacher symbolic story representation
- Shared reading with teacher
- Literature circles

**Student-Regulated:**
- Students use strategy on own in context of Inquiry Project
- Independent reading internalization of process
- Student chooses reading material

**Teacher's Role:**
- **I DO**
- **YOU WATCH**

**Student's Role:**
- **YOU HELP**
- **I HELP**
- **YOU DO**
- **I WATCH**
Access Point #3: Collaborative Conversations

1. Is a critical linchpin in the process of assessing complex texts
2. Supports student learning in the absence of the teacher
3. Provides opportunities for students to apply skills and strategies
4. Allows for authentic practice of academic language
Access Point #4: An Independent Reading Staircase
Classroom Libraries
What is so complex about text complexity?

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

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sid.larson@cesa2.org