



Module 2 of 5

What Are the Advantages and Disadvantages of Quantitative Measures of Text Complexity?

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Overview

Read and Learn

Activity 1

Read foundation material and complete the *Discussion Web: Advantages and Limitations of Quantitative Readability Measures*:

- *Readability and the Common Core's Staircase of Text Complexity*, Text Matters

Reflect and Respond

Activity 2

Discuss and write about the nature of changes which, when made to a classic text, move it from college-career level to first grade (*Wind in the Willows*)

Analyze and Apply

Activity 3

Make two types of changes to an excerpt from *Pride and Prejudice* and consider effects on readability: (a) syntax and (b) vocabulary

Activity 4

Working in small groups, answer questions about quantitative readability estimates

Background

Often in education, the form of measurement determines how teachers, students, and other stakeholders view the phenomenon being measured. This is particularly the case with text complexity. Common Core State Standards (CCSS, 2010) describes a three-part system for establishing text complexity: (a) qualitative dimensions of text complexity, (b) quantitative dimensions of text difficulty, and (c) reader and task variables which, according to the CCSS, are best evaluated by teachers employing their professional judgment, experience, knowledge of their students, and disciplinary content expertise (Hiebert & Grisham, 2012)



Over the last century, numerous measures have been devised to quantitatively estimate the difficulty of texts intended for student use. These include the Fry Readability Estimate, Flesch-Kincaid, and others (Klare, 1984). Each quantitative measure estimates readability based on syntactic and vocabulary factors such as word length or a count of words that are more or less frequent in the English language. The result is reported numerically.

Text complexity builds on notions of readability while adding additional dimensions. Later in this series of five modules, you will explore The Text Complexity Multi-Index (Hiebert, 2012) as one means of integrating the three dimensions of text complexity (quantitative measures, qualitative estimates, and reader/task considerations). Quantitative measures provide important and useful information that inform instructional practices when they are aligned with qualitative information and knowledge of reader (e.g., motivation, knowledge, and experiences) and task variables (e.g., purpose, complexity of the task assigned, and nature of questions). This module provides a foundation for understanding the strengths and limitations of the quantitative measures of readability.

The recommendations for quantitative guidelines in the CCSS are in the form of a staircase of text complexity that is given in Appendix A (CCSS Initiative, 2010, page 8). The staircase is presented in Figure 1. The old guidelines that the Lexile Framework used for a number of years are marked in gray and the new guidelines are marked in black.

Key Terms

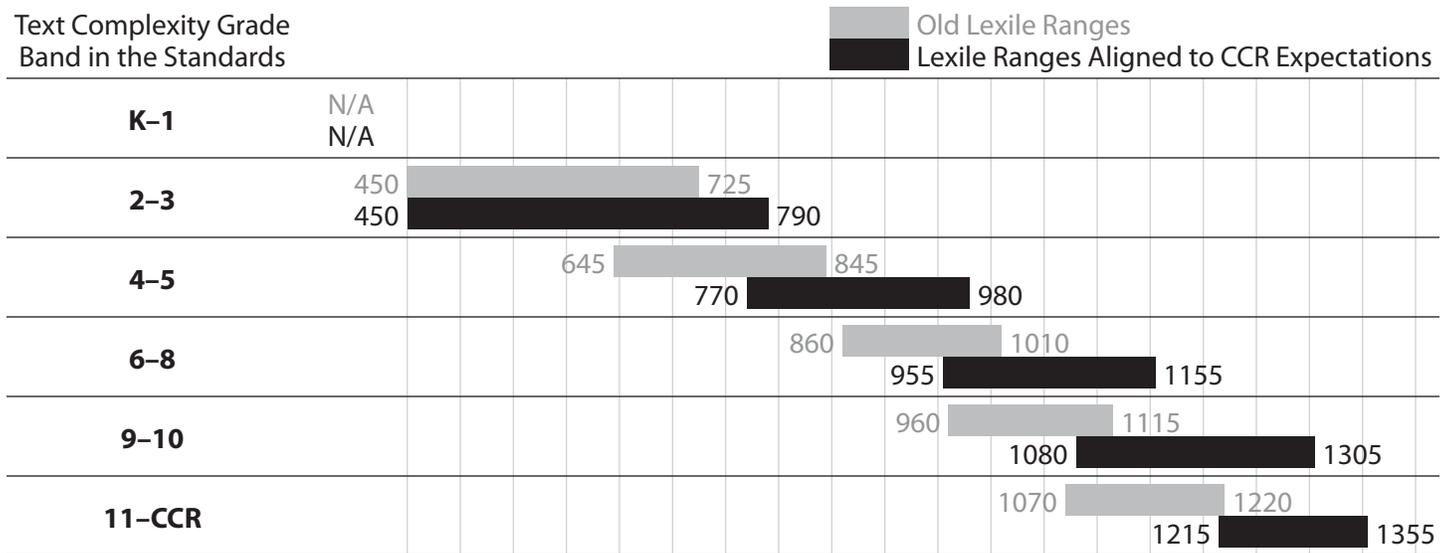
Abridge: An abridged text is one that has been shortened in some way while attempting to retain the key elements of the original work. Often, abridgements serve the purpose of making a text more accessible to a particular audience.

Three-part text complexity model: The CCSS describes a three-part system for establishing text complexity: (a) qualitative dimensions of text complexity which depend on human judgment and evaluation for analysis; (b) quantitative dimensions of text difficulty (e.g., word length or frequency, sentence length, and text cohesion); and (c) reader and task variables which are best evaluated by teachers employing their professional judgment, experience, knowledge of their students, and disciplinary content expertise. This module focuses on quantitative aspects of text complexity.

Quantitative: Quantitative measures and estimates based on such measures, report items that can be counted and statistically manipulated in some way. In this module, quantitative measures of readability count aspects of text and compare them to scales, grade-level correlations, and so on. Qualitative measures, by contrast, rely on such factors as teacher expertise, observation of student behaviors, etc. Module 5 will explore qualitative measures of text complexity.

Figure 1

The “Staircase”—Text Complexity Grade Bands and Associated Lexile Ranges (in Lexiles)



Source: *Common Core State Standards, Appendix A* (2010b), p. 8

The Activities

Read and Learn

Activity 1

In this module, you will learn how quantitative estimates of readability are commonly calculated and be able to describe the strengths and limitations of estimates. The essential purpose-setting question and one supplemental question will guide your work in this module:

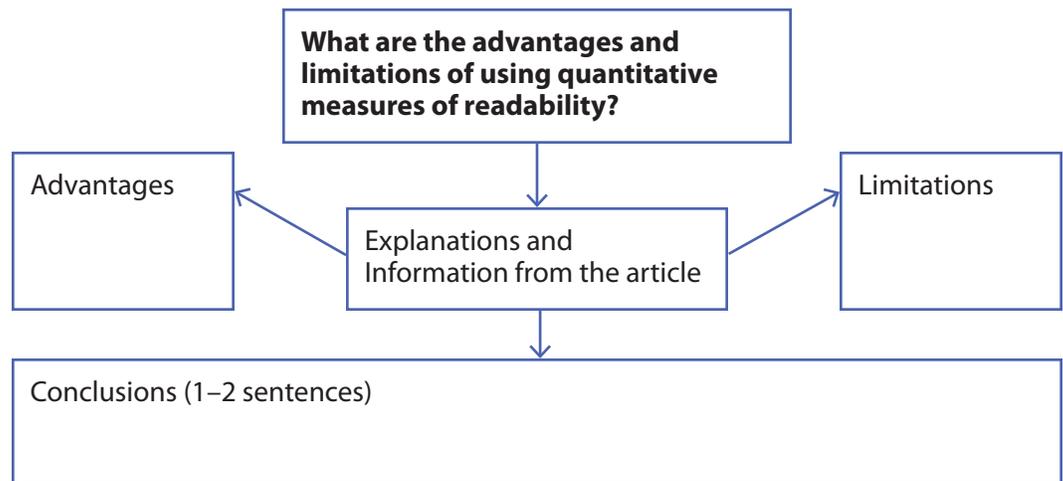
- ▶ What are the advantages and limitations of using quantitative measures of readability?
- ▶ How are quantitative readability estimates commonly calculated?

Reading

For this activity, you will use the *Discussion Web: Advantages and Limitations of Quantitative Readability Measures* (based on Alvermann, 1991), illustrated in Figure 2 (next page), to help guide your reading. Read the foundation Text Matters article—*Readability and the Common Core’s Staircase of Text Complexity* (Hiebert, 2012b)— and focus on learning the key attributes of quantitative measures of readability. As you read, complete the discussion web and focus on the purpose-setting question in the center of the web, “What are the advantages and limitations of using quantitative measures of readability?” Use the close reading techniques you employed in Module 1 as you read the article. Your instructor may ask you to work in groups either online or face-to-face to complete the discussion web.

Figure 2

Discussion Web: Advantages and Limitations of Quantitative Readability Measures

*Reflect and Respond***Activity 2**

In this activity, you will identify the ways in which a text has been manipulated to attain a range of readability levels using quantitative estimates. The text we will use in this activity is an excerpt from a classic—*The Wind in the Willows* (Grahame, 1908). As you manipulate the text, you will notice how different aspects of written text affect readability estimates. In Table 1 (following pages), six versions of the passage have been created, including the original and five abridged versions. Each represents one of the readability bands given in Appendix A of the CCSS (2010b)

Your instructor will assign (or allow you to choose) three of the six passages. Working with a group assigned by the instructor, read the three target passages. Estimate the appropriate grade levels for each of the three texts. Please jot down your best guess as to the readability level of the three assigned passages.

In the next step, study the three texts to identify what was changed for each passage, starting with the most difficult passage and working to the most easily read based on your best guess.

Hint: Look carefully at the vocabulary.

When you finish your analysis with your group, choose a spokesperson (or online, a person who will record your findings) who will report your group's conclusions. What is your group's response to the question:

- How have the changes made the passage more comprehensible or accessible to struggling or beginning readers?

Table 1
Illustration of Readability Changes: Syntax Changes Only

	Passage from <i>Wind in the Willows</i> as Modified	Summary of Changes
<p>Grade Band: 11–CCRR</p> <p>Lexile: 1370</p> <p>Mean Sentence Length: 28</p> <p>Mean Word Frequency: 3.68</p> <p>Total Words: 224</p>	<p>The Mole had been working very hard all the morning, spring-cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a pail of whitewash; till he had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms. Spring was moving in the air above and in the earth below and around him, penetrating even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor, said “Bother!” and “O blow!” and also “Hang spring-cleaning!” and bolted out of the house without even waiting to put on his coat. Something up above was calling him imperiously, and he made for the steep little tunnel which answered in his case to the gaveled carriage-drive owned by animals whose residences are nearer to the sun and air. So he scraped and scratched and scrabbled and scooged and then he scooged again and scrabbled and scratched and scraped, working busily with his little paws and muttering to himself, “Up we go! Up, up we go” till at last, pop! his snout came popped out into the sunlight, and he found himself rolling in the warm grass of a great meadow.</p>	<p>Eliminate exclamation marks (combining sentences); eliminate <i>pop</i>; substitute <i>came</i> with <i>popped</i></p>
<p>Grade Band: 9–10 (Original Text)</p> <p>Lexile: 1200</p> <p>Mean Sentence Length: 22.5</p> <p>Mean Word Frequency: 3.71</p> <p>Total Words: 225</p>	<p>The Mole had been working very hard all the morning, spring-cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a pail of whitewash; till he had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms. Spring was moving in the air above and in the earth below and around him, penetrating even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor, said “Bother!” and “O blow!” and also “Hang spring-cleaning!” and bolted out of the house without even waiting to put on his coat. Something up above was calling him imperiously, and he made for the steep little tunnel which answered in his case to the gaveled carriage-drive owned by animals whose residences are nearer to the sun and air. So he scraped and scratched and scrabbled and scooged and then he scooged again and scrabbled and scratched and scraped, working busily with his little paws and muttering to himself, “Up we go! Up we go!” till at last, pop! his snout came out into the sunlight, and he found himself rolling in the warm grass of a great meadow.</p>	<p>Original text; no changes</p>
<p>Grade Band: 6–8</p> <p>Lexile: 1140</p> <p>Mean Sentence Length: 20.45</p> <p>Mean Word Frequency: 3.68</p> <p>Total Words: 226</p>	<p>The Mole had been working very hard all the morning, spring-cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a pail of whitewash; till he had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms. Spring was moving in the air above and in the earth below and around him, penetrating even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor. He said “Bother!” and “O blow!” and also “Hang spring-cleaning!” and bolted out of the house without even waiting to put on his coat. Something up above was calling him imperiously, and he made for the steep little tunnel which answered in his case to the gaveled carriage-drive owned by animals whose residences are nearer to the sun and air. So he scraped and scratched and scrabbled and scooged and then he scooged again and scrabbled and scratched and scraped, working busily with his little paws and muttering to himself, “Up we go! Up we go!” till at last, pop! his snout came out into the sunlight, and he found himself rolling in the warm grass of a great meadow.</p>	<p>Replace comma with period after <i>floor</i> and insert <i>He</i> (forming 2 sentences)</p>

(table continues on next page)

Table 1

Illustration of Readability Changes: Syntax Changes Only (continued from previous page)

	Passage from <i>Wind in the Willows</i> as Modified	Summary of Changes
<p>Grade Band: 4–5</p> <p>Lexile: 920</p> <p>Mean Sentence Length: 15.13</p> <p>Mean Word Frequency: 3.68</p> <p>Total Words: 226</p>	<p>The Mole had been working very hard all the morning, spring-cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a pail of whitewash till he. He had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms. Spring was moving in the air above and in the earth below and around him; penetrating. It penetrated even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor. He said “Bother!” and “O blow!” and also “Hang spring-cleaning!” and bolted out of the house without even waiting to put on his coat. Something up above was calling him imperiously, and he. He made for the steep little tunnel which answered in his case to the gaveled carriage drive owned by animals whose residences are nearer to the sun and air. So he scraped and scratched and scabbled and scrooged and then. Then he scrooged again and scabbled and scratched and scraped working. He worked busily with his little paws and muttering to himself, “Up we go! Up we go!” till at last, pop! his snout came out into the sunlight, and he found himself rolling in the warm grass of a great meadow.</p>	<p>Same as for grade band 6–8 plus: Eliminate <i>till</i> (forming 2 sentences); Insert <i>It</i> (forming 2 sentences); Eliminate <i>and</i> (forming 2 sentences); Eliminate <i>and</i> (forming 2 sentences); Change <i>working</i> to <i>He worked</i> (forming 2 sentences)</p>
<p>Grade Band: 2–3</p> <p>Lexile: 740</p> <p>Mean Sentence Length: 12</p> <p>Mean Word Frequency: 3.70</p> <p>Total Words: 227</p>	<p>The Mole had been working very hard all the morning. He was spring cleaning his little home. First with brooms, then with dusters; then on ladders and steps and chairs, with a brush and a pail of whitewash. He had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms. Spring was moving in the air above and in the earth below and around him. It penetrated even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor. He said “Bother!” and “O blow!” and also “Hang spring-cleaning!” and Then he bolted out of the house without even waiting to put on his coat. Something up above was calling him imperiously. He made for the steep little tunnel which answered in his case to the gaveled carriage-drive owned by animals whose residences are nearer to the sun and air. So he scraped and scratched and scabbled and scrooged. Then he scrooged again and scabbled and scratched and scraped. He worked busily with his little paws and muttering to himself, “Up we go! Up we go!” At last, pop! His snout came out into the sunlight and he. He found himself rolling in the warm grass of a great meadow.</p>	<p>Same as for grade band 4–5 plus: Insert <i>He was</i> (forming 2 sentences); Replace <i>and</i> with <i>Then he</i> (forming 2 sentences); Eliminate <i>and</i> (forming 2 sentences)</p>
<p>Middle to End of Grade 1</p> <p>Lexile: 360</p> <p>Mean Sentence Length: 7.13</p> <p>Mean Word Frequency: 3.70</p> <p>Total Words: 232</p>	<p>The Mole had been working very hard all the morning. He was spring cleaning his little home. First with brooms, then with he used brooms and dusters, then. Then he got on ladders and steps and chairs, with a brush and a pail of whitewash. He had dust in his throat and eyes and. He had splashes of whitewash all over his black fur and. He had an aching back and weary arms. Spring was moving in the air above and. It was moving in the earth below and around him. It penetrated even his dark and lowly little house with its spirit of divine discontent and longing. It was small wonder, then, that he suddenly flung down his brush on the floor. He said “Bother!” and “O blow!” and also “Hang spring-cleaning!” Then he bolted out of the house without even waiting. He did not even wait to put on his coat. Something up above was calling him imperiously. He made for the steep little tunnel which. It answered in his case to the gaveled carriage-drive owned by animals whose residences are nearer to the sun and air. So he He scraped and scratched and. He scabbled and scrooged; Then he. He scrooged again and. He scabbled and. He scratched and scraped. He worked busily with his little paws and muttering. As he worked, he muttered to himself, “Up we go! Up we go!” At last, pop! His snout came out into the sunlight. He found himself rolling in the warm grass of a great meadow.</p>	<p>Same as for grade band 2–3 plus: 20 sentences made out of 10 by adding pronouns, simple verbs (<i>used, had, got, moving, did not, have</i>) and phrase <i>As he worked</i></p>

Analyze and Apply

Activity 3 Option 1

In this activity, you will be able to choose whether to find an online text or work with passages from Jane Austen's *Pride and Prejudice* (Austen, 1813). Many texts are available online, and some are included in the social bookmarking site at: <http://delicious.com/tdwolsey/online-library>. You (and your group if the instructor assigns it) may find several digital tools for readability analysis and explanatory articles at <http://delicious.com/tdwolsey/readability>

Step One: Choose an online text that is challenging for you as a reader. You may use some of those in the Delicious link above or choose one from a complex disciplinary text with which you are already familiar and that you would use in your PK–12 classroom. Depending on the directions from your instructor, select three different online readability instruments and analyze a passage of about 500 words from your selected online text. Note your findings.

Step Two: Copy a passage of about 500 words into a new word processing document (hint: Word can count words for you). Find approximately 12 places where you can either combine sentences into more complex versions or divide sentences from more complex versions into simple sentences. Try to make only one type (simple-to-complex or complex-to-simple) to your passage.

For example, to combine sentences into more complex versions, take these two sentences from *Wind in the Willows*: “The Mole had been working very hard all the morning. He was spring cleaning his little home.” They may be recombined into one more complex sentence: “The Mole had been working very hard all the morning because he was spring cleaning his little home.”

The reverse is also possible. One complex sentence from *Wind in the Willows* is: “He had dust in his throat and eyes, and splashes of whitewash all over his black fur, and an aching back and weary arms.” This single, complex sentence can be rewritten into three simple sentences: “He had dust in his throat and eyes. There were splashes of whitewash all over his black fur. His back ached and his arms were weary.”

Make the changes; then use the same online readability estimates you selected before to reanalyze the passage. Note the results. Read one other group member's revised products with the guiding question in mind: “How much easier or harder has the reading become because of the two types of changes made to the texts?”

Step Three: Identify 12 words that appear in the list of 4,000 simple word families (Hiebert, 2012c) provided with the resources for this module. Replace these 12 words with a synonym using an online thesaurus such as <http://thesaurus.com/>

Step Four: Working with your discussion group, consider and prepare to report to the class or in your online discussion group using the results of your readability analyses:

(continues on page 8)

- How do changes in the two texts affect suggested ranges for texts on the staircase of text complexity from Appendix A in the Common Core (CCSS, 2010)?
- What are the preliminary conclusions of your group about the strengths and limitations of readability estimates and the instruments from which they are derived?

Activity 3 Option 2

Provided with this module is a text with two sets of suggestions on how to transform it. As with the other texts that we have used in these modules, the text is one available in the public domain: Jane Austen's *Pride and Prejudice*. This text is a particularly good one to analyze because Austen used conventions of grammar that were peculiar to her historical period and to her writing style. As you work with Austen's words, you will grapple with the degree to which changes in syntax typical of the 21st century increase or decrease the complexity for readers.

Step One: Compare changes in punctuation with changes in vocabulary. One of Austen's techniques that is unusual according to current journalistic guidelines is the use of substantial numbers of semi-colons. For this activity, please find 12 places in the text where semi-colons could be changed to periods with appropriate capitalization after the period. The new sentence formed by doing this may require a transitional word, although it should be noted that writing experts allow that some sentences can begin with *and* (Merriam-Webster, 1989).

Step Two: In the next part of the activity, find alternative words for the following 12 words in the text and substitute words from the 4,000 simple word families: *impertinent, superciliousness, composure, conversing, disposition, tolerably, impose, cheerfulness, intolerable, endeavor, conceal, partial*. Write or type your revised version.

Hint: Use the provided PDF of the original passage and copy and paste your revision into a new Word document. Search for the 12 words and retype your substituted words in their places.

Read one other group member's version with the guiding question in mind:

- How much easier or harder has the reading become because of the two types of changes made to the texts?

Step Three: Examine Table 2 which summarizes the changes in the Lexiles (Meta-Metrics, 2012) (a readability estimate—see Module 1) as a result of 12 changes to syntax and 12 changes to vocabulary. Working with your discussion group, consider:

- How do changes in the two texts affect suggested ranges for texts on the staircase of text complexity from Appendix A in the Common Core?
- What are the preliminary conclusions of your group about the strengths and limitations of readability estimates and the instruments from which they are derived?

Table 2

Changes in Lexile based on Manipulations of Sentence Length and Word Frequency

Version	Lexile	Mean Sentence Length	Mean Word Frequency
Original <i>Pride and Prejudice</i> excerpt	1140	19.07	3.55
Syntax Changed Version	950	16.00	3.55
Vocabulary Changed Version	1130	18.93	3.56

Activity 4

Working again in small groups, choose at least two roles. Online, choose a synthesizer who will put together all the contributions of the group, and a reporter who will construct a concise statement to each of the questions. For face-to-face groups, choose a synthesizer, a note-taker, and a reporter who will relay findings to the rest of the class or large group. Please formulate tentative responses to the questions:

- How are quantitative readability estimates commonly calculated?
- What useful information do quantitative measures of readability tell teachers about the texts their students read for instruction?
- What are some limitations of quantitative measures of readability?

Finally, your instructor will ask you to return to the discussion web from Activity 1 and write a conclusion to the question:

- What are the advantages and challenges of using quantitative measures of readability?

Looking Ahead

In Module 3, you will be asked to consider the needs of beginning and struggling readers. Keep in mind what you have learned about quantitative readability estimates and how that knowledge will be used as you scaffold reading tasks for readers who may be learning reading basics or who struggle with increasingly complex texts.

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