

1350L | Lexile: Matching readers to text



THE LEXILE FRAMEWORK AS AN APPROACH FOR READING MEASUREMENT AND SUCCESS

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Overview

The Lexile Framework® for Reading is an innovative approach to reading comprehension that can be implemented by educators, parents and readers of all ages. Lexile® measures, as components of the Lexile scale, are the result of more than 20 years of ongoing research based on two well-established predictors of how difficult a text is to comprehend. By measuring both text difficulty and reader ability on the same scale, readers can be appropriately matched with books that will be both engaging and challenging.

Lexile measures are the most widely adopted reading measures in use today. Tens of thousands of books and tens of millions of newspaper and magazine articles have Lexile measures — more than 450 publishers Lexile their titles. In addition, all major standardized reading tests and many popular instructional reading programs can report student reading scores in Lexiles. Implementation of the Lexile Framework has led to reading success and improved reading enjoyment at all levels of proficiency.

The Lexile Framework for Reading

The Lexile Framework for Reading is a scientific, proven approach to reading and text measurement. The Lexile Framework consists of two main components: a Lexile measure and the Lexile scale. A Lexile measure is the numeric representation of a reader's ability or a text's difficulty, both followed by an "L" (for Lexile). The Lexile scale is a developmental scale for reading ranging from 200L for beginning readers to above 1700L for advanced text. All Lexile Framework products, tools and services rely on the Lexile measure and scale to identify the Lexile levels of both reader and text. When reader and text are appropriately matched, a reader can enjoy a comprehension rate of about 75 percent. The 75-percent comprehension level corresponds to that balance of skill and difficulty that allows reading be a positive but adequately challenging experience, and encourages the reader to grow in proficiency and motivation.

A unique feature of the Lexile Framework is that both student ability and text difficulty are measured on the same scale, in the same units, which are called Lexiles. The Lexile Framework provides a distinctive approach for matching readers with texts based on the following assumptions:

- Texts can be ordered according to the difficulty each presents for a reader.
- Readers can be assessed according to the success each will have with any particular text.

The Lexile Framework is used to determine a Lexile measure for the student and compare it with the Lexile measure of the reading material being considered for selection. After this basic comparison, it is possible to adjust the reader's expected comprehension of the reading material, taking other factors into account, such as the particular reader, text and context. By putting readers and texts on the same scale, Lexiles allow readers to make consistent and highly accurate book selection judgments. It assures that every reader will be able to select books that are not too difficult, paving the way for many successful individualized reading experiences.

Determining Lexile Measures

Lexile measures are based on two factors: Word frequency and sentence length, which are more formally called *semantic difficulty* and *syntactic complexity*. Both of these factors, over decades of research, have been shown to be excellent predictors of how difficult a text is to comprehend. The relationship of these two factors within a text contributes to a single Lexile measure for that text.

Semantic Difficulty

For the developing reader, new words are difficult when first encountered in print. But as the reader encounters the same word again and again, that word becomes more familiar. Early reading researchers determined that the difficulty of words is a continuum based on exposure, with frequently encountered words being the easiest and rare words the most difficult.

Researchers at MetaMetrics® Inc. analyzed more than 50 semantic variables to determine which were the most valid indicators of text difficulty. The mean log word frequency, which is the logarithm of the number of times a word appears in each 5-million words of a corpus of nearly 600-million words, had the highest correlation with text difficulty ($r = -0.779$). This is the measurement used to determine the semantic difficulty of text in the Lexile system. It should be noted that word frequency is not the number of times a word appears in a specific passage, but the frequency of the word in the corpus of nearly 600-million words that is employed by the Lexile Analyzer® (see “Measuring Text,” page 5, for an explanation of the Lexile Analyzer).

Syntactic Complexity

Reading researchers have found that the best predictor of the difficulty of a sentence is its length. Long sentences are likely to contain more clauses, and therefore communicate not only more information and ideas, but also an interrelationship between them. Researchers also speculate that longer sentences require the reader to retain more information in short-term memory. Sentence length is a powerful indicator of the syntactic complexity of a passage.

The Lexile Framework works by combining into an algebraic equation the measurements of word frequency and sentence length for any passage. This equation is called the Lexile equation, and reflects both the semantic and syntactic difficulty of that passage. This equation can also be used to place reading comprehension test items on the same measurement scale, so that texts and reading test scores can be reported in Lexiles as well.

Measuring Text

The Lexile Analyzer is the engine that powers the Lexile Framework. It is a software program designed to evaluate the reading demand, or *readability*, of books and test items. This process is referred to as measuring, and the result is a text measure that represents the difficulty of analyzed text. The Lexile Analyzer measures text by breaking down the entire piece and studying its characteristics, such as sentence length and word frequency, which represent the syntactic and semantic challenges that a text presents to a reader. The outcome is the reading difficulty, expressed as a Lexile, along with information on the word count, mean sentence length and mean log frequency.

Table 1. *Example of the output generated by the Lexile Analyzer*

Title	Author	Lexile Code	Lexile Level	Word Count	MSL	MLF
Harry Potter and the Sorcerer's Stone	Rowling, J.K.		880	76896	11.94	3.25185

Lexile Analyzer output for "Harry Potter and the Sorcerer's Stone." MSL represents Mean Sentence Length and MLF represents Mean Log word Frequency.

Longer sentence lengths and words of lower frequency lead to higher Lexile measures; shorter sentence lengths and words of higher frequency lead to lower Lexile measures. Text such as lists, recipes, poetry and song lyrics are not analyzed because they lack conventional punctuation. The Lexile Analyzer will "read" a section of unpunctuated text as one long sentence, which could, depending on the overall length of the text, profoundly affect the accuracy of the Lexile measure of the entire piece.

During the calibration process, the Lexile Analyzer extracts *slices* from the text. A slice is a piece of text containing a minimum of 125 words. If the 125th word falls within a sentence, the Lexile Analyzer continues adding words until it finds the sentence-ending punctuation (i.e., period, question mark, exclamation mark or semicolon). A slice is used when analyzing books, periodicals, textbooks and other large bodies of text.

Consider a piece of text that is 250 words long. The first 125 words consist of five long sentences of 25 words each. The second 125 words consist of 25 short sentences of five words each. If this text were analyzed as a whole, the first 125 words would have an impact of five times the second 125 words in estimating the mean sentence length for the text. Analyzed separately, the first set of 125 words is recognized for its long sentence length, and generates a high Lexile measure. The second set of 125 words is recognized for its short sentences, and receives a low Lexile measure. When these two slices are averaged, their Lexile calibration is much higher than if the full 250 words were analyzed together. Thus, breaking the text into slices allows for the most accurate Lexile measure of a complete body of text.

Special Text Measurement Cases

Lexile text measures above 200L are based solely on semantic difficulty and syntactic complexity. When determining the Lexile measure of a text that was designed for emergent, early and transitional readers (generally below 200L), other characteristics of the text must also be considered.

Fiction Picture Books

The reading process for young readers is often *scaffolded* to enhance comprehension of more difficult material. Scaffolding allows less-able readers to read more difficult text. One method of scaffolding is to include illustrations that support the text in telling the story. Since the reader has two modes of receiving the information — text and illustration — students may be able to read more difficult books that provide the scaffolding necessary to overcome the difficult text. Therefore, when calibrating the Lexile measure of a fiction picture book, 120L is subtracted from the initial Lexile measure of the text based on the semantic and syntactic features of the text. The final Lexile measure of a text reflects any modifications made for special text cases.

Nonfiction Books with Less than 500 Words

Books with less than 500 words are designed for emergent readers. These books are often written in a style that is not found elsewhere — considerable repetition of words and/or phrases, long sentences that include definitions (almost a dictionary format), and pronunciation cues of new and/or difficult vocabulary. When calibrating the Lexile measure of a nonfiction book with less than 500 words, 120L is subtracted from the initial Lexile measure of the text based on the semantic and syntactic features of the text. The final Lexile measure of a text reflects any modifications made for special text cases.

Measuring Readers

There are a number of ways to determine a Lexile measure for a reader. All major standardized reading tests used in schools report their results in Lexiles. Many schools now have computerized reading-assessment tools that can also be used to determine student Lexile measures.

One example is the Scholastic Reading Inventory, or SRI (Scholastic Inc., 1999), a standardized assessment designed to measure how well students read literature and expository texts of varying difficulties. SRI began as a targeted-level pencil-and-paper test, but is now available in a computer-adaptive test format. Each item consists of a passage that is response-illustrated (a statement is added at the end of the passage with a missing word or phrase followed by four options, or distractors).

Following is an example of an SRI reading assessment question, along with the set of data that exists for that question. The data provide information on:

- Each item's theoretical difficulty (how difficult it is expected to be)
- Each item's observed difficulty (how difficult the item actually was when administered to students)
- The quality of the item (expressed as the point biserial, or a percent of one)
- What percent of the students chose the correct answer (P-value)
- Grade in which the question was administered
- Total number of students who responded to the question
- Number of students who chose each of the four distractors

Table 2. Example of an SRI reading assessment question

“The First Men in the Moon,” by H. G. Wells

In addition to my belief in my powers as a business man, I had always in those days had an idea that I was equal to writing a very good play. It is not, I believe, a very uncommon persuasion. I knew there is nothing a man can do outside legitimate business transactions that has such opulent possibilities, and very probably that biased my opinion. I had, indeed, got into the habit of regarding this unwritten drama as a convenient little reserve put by for a rainy day. That rainy day had come. **I wanted to be a(n) _____.**

A. author
B. doctor
C. actor
D. singer

Item Statistics for “The First Men in the Moon,” by H. G. Wells	
Theoretical Calibration	1110L
Observed Difficulty	1134L
Point biserial	0.43
P-Value	0.76
Grade Administered	8
N	18,808
Responses Distractor A	14,272
Responses Distractor B	703
Responses Distractor C	3403
Responses Distractor D	430

Excerpt from “The First Men in the Moon” by H. G. Wells.
 Scholastic Reading Inventory, Copyright (c) Scholastic Inc. All rights reserved.

A student takes a test of about 50 of these items. Using a *psychometric model* (a scientific model that helps measure psychological factors that can’t be observed directly, only indirectly based on a student’s responses) called the Rasch model, a correspondence table of the number of items the student got correct, or raw score, is generated for each test. This score can then be converted into Lexiles.

The Rasch model is a conjoint measurement model, which means two elements can be measured on the same scale, in the same units. In the case of the Lexile Framework, these elements are text difficulty and reader ability. The reported Lexile measure is an estimate of the student’s true reading ability. Variability in measures can occur over time from various factors, such as the student’s health and well being, or the conditions in which the test is taken. The typical amount of

variability, or what psychometricians call ‘error,’ is about 70L for any given test administration. Multiple measures will reduce this error, and are encouraged for more precise measurement.

If none of the formal test methods is available, it is possible to get a very good estimate of a reader’s Lexile measure by having him or her read a passage from a book that has been assigned a Lexile measure. By paying careful attention to how well the reader negotiates the text, a determination of whether the book is too easy, too hard or appropriate for the reader can be made.

The student Lexile measure marks the level of text a student can read with 75 percent anticipated comprehension. In other words, if a student with a Lexile measure of 1000L reads a text with a Lexile measure of 1000L, the student should comprehend approximately three-quarters of the material. This 75-percent rule corresponds to the student’s instructional reading level, or the level at which the student can successfully negotiate the material with the use of context clues and other comprehension strategies to fill in the gaps.

The student’s Lexile measure establishes a range of readability levels, which extends about 50L above and 100L below the student’s measure on the Lexile scale. Considering the 1000L student as an example, he or she would have a reading range of between 900L and 1050L. If the student attempts material above 1050L, the level of challenge is likely to be too great for the student to be able to construct very much meaning from the text. Likewise, material below 900L will provide that student with little comprehension challenge. Teachers can guide students to reading materials within this range, adjusting difficulty to compensate for the challenges or opportunities the particular reading opportunity provides.

Using Lexile Measures to Manage Comprehension

A student’s Lexile measure is a benchmark that can be considered near the high end of that student’s reading, or Lexile, range, from books that pose little readability challenge to those which require scaffolding for the student to comprehend fully. Targeting the reader requires understanding of this range, specifically, what students can achieve under different circumstances. The Lexile Framework incorporates various products and strategies to facilitate successful reader targeting.

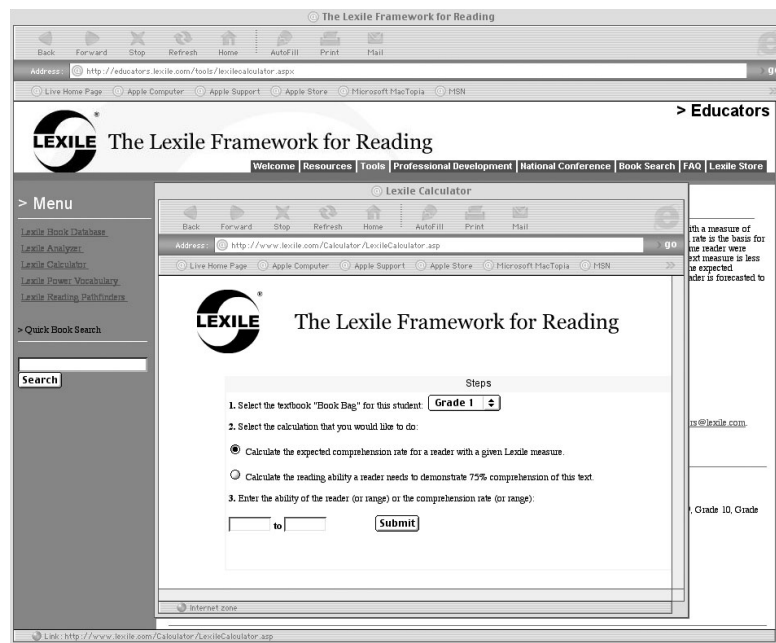
The Lexile Map

The Lexile Map (www.Lexile.com) contains an extensive list of criterion texts, from novels and nonfiction books to newspapers and magazines, at various levels on the Lexile scale. The Lexile Map is available as an annotated, poster-sized graphic, making it easy to “see” how reading develops and to help guide students to select reading materials as they progress.

The Lexile Calculator

The Lexile Calculator (at www.Lexile.com) is a utility designed to forecast a reader's expected comprehension of a specific text or text collection. The 75-percent comprehension rate is the basis for selecting text that is targeted to a reader's reading ability, but what exactly does it mean? What would the comprehension rate be if a 600L reader were given a text measured at 350L or one at 850L? The Lexile Calculator allows the user to select the grade level of texts (or "book bag"), and then calculate either the expected comprehension rate for a reader with a given Lexile measure or the reading ability a reader needs in order to achieve 75-percent comprehension of the text.

Table 4. *Screen display of the Web-based Lexile Calculator*



The Lexile Calculator is a free, Web-based tool used to calculate the expected comprehension of a measured text.

This is a valuable tool for teachers who can then determine which students may need extra help with a lesson, which ones will understand the material on their own and which ones should be able to handle even more advanced lessons on their own.

Adjustments for the Reader

The Lexile Framework gives teachers a quick and accurate way to determine which texts are likely to be within a student's basic range of comprehension, and allows them to adjust for the interests, experience and background of the student. Teachers can use Lexiles to guide a struggling student toward texts at the lower end of the student's Lexile range. Similarly, advanced students can be adequately challenged by reading texts at the midpoint of their Lexile range, or slightly above. Challenging new topics or genres may be approached in the same manner.

Reader-focused adjustment also relates to the student's motivation and purpose. If a student is highly-motivated for a particular reading task (e.g., self-selected free reading), the teacher may suggest books higher in the student's Lexile range. If the student is less motivated or intimidated by a reading task, material at the lower end of his or her Lexile range can provide the basic comprehension support to keep the student from feeling overwhelmed.

Adjustments for the Text

The Lexile Framework provides teachers a way to use their awareness of the challenges and fears that the new reader faces to adjust the difficulty of assigned texts. When students confront new kinds of texts, the introduction can be softened and made less intimidating by guiding the student to easier reading. On the other hand, students who are comfortable with a particular genre or format can be challenged with more difficult readability levels, which will prevent boredom and promote the greatest rate of vocabulary and comprehension skills.

Adjustments for Context

Similarly, the Lexile Framework can be used to adjust difficulty levels for challenges provided by environmental pressures, such as the varying expectations of free, storybook reading versus reading done for study or research purposes. Reading required for a major assignment or to pass an important exam can also be adjusted for.

One important way that Lexiles enhance the educational environment is by allowing a student's Lexile range to be communicated without the stigma often attached to grade-level assessments. Teachers and students can set goals for reading achievement using numbers that apply equally well to the student and the text; and parents can receive reading lists and other support materials that help them encourage their children's development.

How the Lexile Framework is Different

The Lexile Framework differs from other methods of measuring reader ability and text difficulty, as well as managing reading comprehension in the following ways:

- Lexiles are instrument independent. This means that any standardized test could potentially report reading scores in Lexiles, and in fact, many already do. A student who takes the Harcourt Assessment Metropolitan Achievement Test (MAT-8) one year could take The Iowa Test (published by The Riverside Publishing Company) the following year in a different state and still receive an accurate Lexile score that reflects his reading-comprehension change over the year. In addition to tests, a wide variety of instructional software and book and

article publishers have adopted Lexile measures. States and districts are not limited to a single provider of tests or instructional materials.

- The Lexile Framework is unique in matching reader ability to text difficulty on the same scale using the same method, ensuring accuracy and allowing for individualized monitoring of progress.
- A student’s Lexile measure is more than a test score. It applies to books and articles that a student encounters daily — at school, home and in the library — creating a strong school-home connection.

Conclusion

By providing a common metric that can be applied to both text difficulty and reading ability — a common metric that has more precision and less potential stigma than grade-equivalent leveling — the Lexile Framework offers educators a flexible and easy-to-use tool to help target students with texts that present the appropriate degree of reading challenge. In addition, the accuracy and flexibility of the Lexile Framework makes it an excellent way to communicate reading goals and achievements with students, families and other educators.

About the Authors

Colleen Lennon joined MetaMetrics in 2003. She is heavily involved in researching, writing, and editing items for tests and instructional tools such as Lexile Reader/Writer® and Lexile Power Vocabulary™ and in developing documentation for Lexile products such as the Lexile Analyzer®. Lennon has been an editor of test items, a copy editor, and writer and editor of professional and scholarly documents released by the company. Lennon completed her master’s degree in English from North Carolina State University after earning dual bachelor’s degrees in psychology and English, both also from North Carolina State University.

Hal Burdick has been with MetaMetrics since 1994 as a programmer, a psychometrician and currently as a senior product manager. His skills and knowledge give him a unique understanding of the Lexile Framework from the perspective of both a researcher and a product developer. He continues to work to improve the Lexile Framework, develop The Quantile Framework™ for Mathematics, and build new product lines such as Lexile Reader/Writer® and the Lexile LingosSM computer-adaptive assessment. Burdick has a master’s degree in psychometrics from the University of Chicago, and a bachelor’s degree in mathematics from Duke University.

About The Lexile Framework for Reading

The Lexile Framework for Reading (www.Lexile.com) provides a common scale for matching reader ability and text difficulty, allowing easy monitoring of progress. Lexile measures give teachers and parents the confidence to choose materials that will improve student reading skills across the curriculum and at home. Tens of thousands of books and tens of millions of articles have Lexile measures, and all major standardized tests can report student reading scores in Lexiles. As the most widely adopted reading measure in use today, Lexiles are part of reading and testing programs at district, state and federal levels. The Lexile Framework was developed by MetaMetrics, an independent education company based in Durham, N.C., after 15 years of research funded by the National Institutes of Health.

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