# ATOS by Renaissance Learning

ATOS incorporates two formulas: ATOS for Text (which can be applied to virtually any text sample, including speeches, plays, and articles) and ATOS for Books. Both formulas take into account three variables: words per sentence, average grade level of words (established via the Graded Vocabulary List), and characters per word.

# Degrees of Reading Power®(DRP®) by Questar Assessment, Inc.

The DRP Analyzer employs a derivation of a Bormuth mean cloze readability formula based on three measureable features of text: word length, sentence length, and word familiarity. DRP text difficulty is expressed in DRP units on a continuous scale with a theoretical range from 0 to 100. In practice, commonly encountered English text ranges from about 25 to 85 DRP units, with higher values representing more difficult text.

readability of instructional materials are reported on the same DRP scale.

## Resch-Kincaid (public domain)

Like many of the non-proprietary formulas for measuring the readability of various types of texts, the widely used Resch-Kincaid Grade Level test considers two factors: words and sentences. In this case, Resch-Kincaid uses word and sentence length as proxies for semantic and syntactic complexity respectively (i.e., proxies for vocabulary difficulty and sentence structure).

## The Lexile®Framework For Reading by MetaMetrics

A Lexile measure represents both the complexity of a text, such as a book or article, and an Lexile®measures include the variables of word frequency and sentence

## length. Lexile®

which are then placed on the Lexile®scale for measuring reader ability and text complexity (ranging from below 200L for beginning readers and beginning-reader materials to above 1600L for advanced readers and materials).

## Reading Maturity by Pearson Education

The Pearson Reading Maturity Metric uses the computational language model Latent Semantic Analysis (LSA) to estimate how much language experience is required to achieve adult knowledge of the meaning of each word, sentence, and paragraph in a text. It combines the Word Maturity measure with other computational linguistic variables such as perplexity, sentence length, and semantic coherence metrics to determine the overall difficulty and complexity of the language used in the text.

## SourceRater by Educational Testing Service

SourceRater employs a variety of natural language processing techniques to extract evidence of text standing re[(wi)10(a)9(teJE E20.024c0.71997 refte)-3(r)10(e)] TJETsEaerpleewiateJ[(wBT/F4 11.04 Tf1 0 0 1)-53(tur)-

cross analysis. It analyzes the ease or difficulty of texts on five different dimensions: narrativity, syntactic simplicity, word concreteness, referential cohesion, and deep cohesion.<sup>3</sup> This measure was not included in the cross analysis because it does not generate a single quantitative determination of text complexity, but it does have use as a tool to help evaluate text systematically. The Coh-Metrix Easability Assessor creates a profile that offers information regarding the aforementioned features of a text and analyzes how challenging or supportive those features might be in student comprehension of the material.

The research that has yielded additional information and validated these text measurement tools was led by Jessica Nelson of Carnegie Mellon University, Charles Perfetti of University of Pittsburgh and David and Meredith Liben of Student Achievement Partners (in association with Susan Pimentel, lead author of the CCSS for ELA). It had two components: first, all the developers of quantitative tools agreed to compare the ability of each text analyzer to predict the difficulty of text passages as measured by student performances on standardized tests. Second, they agreed to test predict expert judgment regarding grade placement of texts and educator evaluations of text complexity by complexity readings for texts as students move through their K-12 school careers. This common scale is anchored by the complexity of texts representative of those required in typical first-year credit-bearing college courses and in workforce training programs. Each of the measures has realigned its ranges to of reading

comprehension development through the grades to indicate that all students should be reading at the college and career readiness level by no later than the end of high school.

7

- (1) Structure. Texts of low complexity tend to have simple, well-marked, and conventional structures, whereas texts of high complexity tend to have complex, implicit, and (in literary texts) unconventional structures. Smple literary texts tend to relate events in chronological order, while complex literary texts make more frequent use of flashbacks, flash-forwards, multiple points of view and other manipulations of time and sequence. Smple informational texts are likely not to deviate from the conventions of common genres and subgenres, while complex informational texts might if they are conforming to the norms and conventions of a specific discipline or if they contain a variety of structures (as an academic textbook or history book might). Graphics tend to be simple and either unnecessary or merely supplementary to the meaning of texts of low complexity, whereas texts of high complexity tend to have similarly complex graphics that provide an independent source of information and are essential to understanding a text. (Note that many books for the youngest students rely heavily on graphics to convey meaning and are an exception to the above generalization.)
- (2) Language Conventionality and Clarity. Texts that rely on literal, clear, contemporary, and conversational language tend to be easier to read than texts that rely on figurative, ironic, ambiguous, purposefully misleading, archaic, or otherwise unfamiliar language (such as general academic and domain-specific vocabulary).
- (3) Knowledge Demands. Texts that make few assumptions a and the depth of their cultural/literary and content/discipline knowledge are generally less complex than are texts that make many assumptions in one or more of those areas.
- (4) Levels of Meaning (literary texts) or Purpose (informational texts). Literary texts with a single level of meaning tend to be easier to read than literary texts with multiple levels of meaning (such as satires, derlying message).

Smilarly, informational texts with an explicitly stated purpose are generally easier to comprehend than informational texts with an implicit, hidden, or obscure purpose.

	Beginning of lower grade	End of lower grade	Beginning of higher grade	End of higher grade	

Structure (both story structure or form of piece)

While the research noted above impacts the quantitative and qualitative measures of text complexity, the third element of the three-part model for measuring text complexity reader and task considerations remains untouched. While the quantitative and qualitative measures focus on the inherent complexity of the text, they are balanced in the model by the expectation that educators will employ professional judgment to match texts to particular tasks or classes of students. Numerous considerations go into such matching. For example, harder texts may be appropriate for highly knowledgeable or skilled readers, who are often willing to put in the extra effort required to read harder texts that tell a story or contain complex information. Students who have a great deal of interest or motivation in the content are also likely to handle more complex texts.

The RAND Reading Study Group, identified in the 2002 report Reading for Understanding, also named important task-

to measure other important aspects of texts such as levels of meaning or purpose, structure, language conventionality and clarity, and knowledge demands to further locate a text at the high