CHAPTER 1

PIRLS 2021
Reading Assessment Framework

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Overview

In 2021, IEA's PIRLS (Progress in International Reading Literacy study) conducts its fifth reading assessment, providing data on 20 years of trends in comparative reading achievement across countries. Reading literacy is the foundation for student academic success and personal growth, and PIRLS is a valuable vehicle for studying whether new or revised policies impact achievement. The *PIRLS 2021 Reading Assessment Framework* and the instruments developed to assess this framework reflect IEA's commitment to be forward thinking.

For 2021, PIRLS is focusing on converting to a digital format. Presenting PIRLS reading passages and items via computer will deliver an engaging and visually attractive experience that will motivate students and increase operational efficiency. Also, PIRLS 2021 can be administered in the same digitally based environment as ePIRLS 2021, the computer-based assessment of online reading in a simulated internet environment that was initiated in 2016.

PIRLS is based on a broad notion of what the ability to read means—a notion that includes reading for the pleasure it provides in allowing us to experience different worlds, other cultures, and a host of new ideas. It also encompasses reflecting on written texts and other sources of information as tools for attaining individual and societal goals, also known as "reading to do".[1] This view is increasingly relevant in today's society, where greater emphasis continues to be placed on students' ability to use the information they gain from reading.[2,3,4] Emphasis is shifting from demonstrating fluency and basic comprehension to demonstrating the ability to apply what is understood or comprehended to new situations or projects, see also *PIRLS 2016 Encyclopedia*.[5,6,7]

The PIRLS framework for assessing reading achievement was initially developed for the first assessment in 2001, using IEA's 1991 Reading Literacy Study[8,9,10] as the basis for the PIRLS definition of reading literacy and for establishing the aspects of reading comprehension to be assessed. Since then, the PIRLS assessment framework has been updated for each subsequent assessment cycle[11,12,13,14] and now for PIRLS 2021.

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A Definition of Reading Literacy

The PIRLS definition of reading literacy is grounded in IEA's 1991 study, in which reading literacy was defined as "the ability to understand and use those written language forms required by society and/or valued by the individual".[15]

With successive assessments, this definition has been elaborated so that it retains its applicability to readers of all ages and a broad range of written language forms, yet makes explicit reference to aspects of the reading experience of young students as they become proficient readers, highlights the widespread importance of reading in school and everyday life, and acknowledges the increasing variety of texts in today's technological world. Currently, the PIRLS definition of reading literacy is as follows:

> *Reading literacy is the ability to understand and use those written language forms required by society and/or valued by the individual. Readers can construct meaning from texts in a variety of forms. They read to learn, to participate in communities of readers in school and everyday life, and for enjoyment.*

Throughout the framework, various sources that have provided a research and scholarly basis for the framework are referenced. These references represent the volumes of literature and research that have informed the PIRLS framework, including considerable research by countries participating in PIRLS.

This view of reading reflects numerous theories of reading literacy as a constructive and interactive process.[16,17,18,19,20,21,22] Meaning is constructed through the interaction between reader and text in the context of a particular reading experience.[23,24] Readers are regarded as actively constructing meaning, reasoning with the text, and knowing effective reading strategies and how to reflect on reading.[25,26]

Before, during, and after reading, readers use a repertoire of linguistic skills, cognitive and metacognitive strategies, as well as background knowledge to construct meaning .[27,28,29,30,31,32] In addition, the context of the reading situation can support the construction of meaning by promoting engagement and motivation to read, but the context also can place specific demands that might not support the construction of meaning.[33,34,35,36]

In order to acquire knowledge of the world and themselves, readers can learn from a host of text types. Each text type follows conventional forms and rules which aid the reader's interpretation of the text.[37]

Any given text type can take many forms and combinations of forms. These include traditional written forms, such as books, magazines, documents, and newspapers, as well as digital forms that include the numerous ways of communicating via the internet and websites where text often is integrated with various multimedia formats.[38,39,40,41]

Increasingly, internet reading is a key component of school curricula and one of the central ways students acquire information.[42,43,44] New digital literacies are necessary for reading on the internet, where a successful reader is one that can meet his or her reading goals by efficiently finding and comprehending the target information.[45,46,47,48,49]

The internet is a nonlinear network of texts distributed across multiple websites and pages. Looking for and learning information from the internet involves comprehension of information arranged within this complex reading environment.[50,51,52,53] While traditional printed text usually is read in a linear fashion, online reading consists of searching through a network of multiple texts where readers are responsible for creating their own paths. Readers first must access the appropriate website, and then use navigation strategies (e.g., multiple navigation and sub-navigation menus, tabs, and links) to move efficiently within and across one webpage or site to the next.

Essentially, reading for informational purposes on the internet requires all of the reading comprehension skills and strategies necessary for reading traditional printed text, but in a different environment containing much more information.[54] Because of the complexity of the internet, online reading involves being able to use reading comprehension skills and strategies in contexts that are very different from those encountered in reading traditional printed materials.[55]

Whether reading online or printed text, discussing what they have read with different groups of individuals allows young students to construct text meaning in a variety of contexts.[56,57] Social interactions about reading in one or more communities of readers can be instrumental in helping young students gain an understanding and appreciation of texts and other sources of information.[58,59] Socially constructed environments in the classroom or school library can give young students formal and informal opportunities to broaden their perspectives and see reading as a shared experience with their classmates and teachers.[60,61] This can be extended to communities outside of school as young students talk with their families and friends about ideas and information acquired from reading.

The PIRLS Framework for Assessing Reading Achievement

Based on reading purposes and comprehension processes, the PIRLS 2021 framework provides the foundation for the PIRLS international assessments of students' reading achievement in their fourth year of schooling.

- PIRLS, now in its 20th year is well-established as the "de facto" worldwide standard for reading comprehension achievement at primary school level. PIRLS 2021 is transitioning to a digital format (but also will be offered in the traditional paper-and-pencil format).

- PIRLS 2021 includes passages that range in difficulty, but the assessment design enables the results to be reported on the same achievement scale.

- ePIRLS computer-based tasks extend PIRLS to assess how well students read, interpret, and critique online information in an environment that looks and feels like the internet.

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As shown in Exhibit 1, the PIRLS framework focuses on the two overarching purposes for reading that account for most of the reading done by young students both in and out of school: for literary experience, and to acquire and use information. In addition, the PIRLS assessment integrates four broad-based comprehension processes within each of the two purposes for reading: focus on and retrieve explicitly stated information, make straightforward inferences, interpret and integrate ideas and information, and evaluate and critique content and textual elements. It should be acknowledged that the purposes for reading and the processes of comprehension do not function in isolation from one another or from the context in which students live and learn.

Exhibit 1: The PIRLS Reading Purposes and Comprehension Processes

Purposes for Reading
Literary Experience
Acquire and Use Information
Processes of Comprehension
Focus on and Retrieve Explicitly Stated Information
Make Straightforward Inferences
Interpret and Integrate Ideas and Information
Evaluate and Critique Content and Textual Elements

PIRLS Framework Emphases in PIRLS and ePIRLS

The two reading purposes and four comprehension processes form the basis for assessing PIRLS as well as ePIRLS online reading. Exhibit 2 presents the reading purposes and processes assessed by PIRLS and the percentages of the assessment devoted to each.

Exhibit 2: Percentages of the PIRLS and ePIRLS Reading Assessments Devoted to Each Reading Purpose and Comprehension Process

	PIRLS	ePIRLS
Purposes for Reading		
Literary Experience	50%	0%
Acquire and Use Information	50%	100%
Processes of Comprehension		
Focus on and Retrieve Explicitly Stated Information	20%	20%
Make Straightforward Inferences	30%	30%
Interpret and Integrate Ideas and Information	30%	30%
Evaluate and Critique Content and Textual Elements	20%	20%

Purposes for Reading

Throughout the world, reading literacy is directly related to the reasons people read; broadly, these reasons include reading for pleasure and personal interest, learning, and participation in society. The early reading of most young students often includes reading of narrative texts that tell a story (e.g., storybooks or picture books) or informational texts that tell students about the world around them and answer questions. As young students develop their literacy abilities and are increasingly required to read in order to learn across the curriculum, reading to acquire information from books and other print materials becomes more important.[62,63,64,65]

Aligned with these reading purposes, PIRLS assessments focus on reading for literary experience and reading to acquire and use information. Because both purposes for reading are important for young students, PIRLS contains an equal proportion of material assessing each purpose. However, because much online reading is done for the purpose of acquiring information, the ePIRLS tasks specifically focus on reading to acquire and use information.

The ePIRLS assessment tasks assess reading for information. The tasks simulate websites from the internet from which students gather information, using links and tabs to navigate through texts and graphics, to accomplish school-based research projects. The approach is based on using websites from the actual internet as the basis for creating a closed internet environment, through which fourth grade students can accomplish an online study of a science or social studies topic, similar to the types of projects or reports they might be asked to complete for school.

The PIRLS passages are classified by their primary purposes, and the accompanying questions address these purposes for reading. That is, passages classified as literary have questions addressing theme, plot events, characters, and setting, and those classified as informational are accompanied by questions about the information contained in the passages. Although the passages distinguish between purposes for reading, the comprehension processes readers use are more similar than different for both purposes; therefore, the comprehension processes are evaluated across all passages, including the ePIRLS internet-like tasks.

Each purpose for reading often is associated with certain types of texts. For example, reading for literary experience often is accomplished through reading fiction, while reading to acquire and use information generally is associated with informative articles and instructional texts. However, the purposes for reading do not align strictly with text types. For example, biographies or autobiographies can be primarily informational or literary, but include characteristics of both purposes.

Texts often differ in the way in which ideas are organized and presented, eliciting a variety of ways to construct meaning.[66,67] Text organization and format can vary to a great degree, ranging from sequential ordering of written material to snippets of words and phrases arranged with pictorial and tabular data. The content, organization, and style that may be typical of a particular text genre have implications for the reader's approach to understanding the text.[68,69,70,71,72,73]

As noted, it is in the interaction between reader and text that meanings are constructed and purposes are achieved. In selecting texts for the PIRLS assessments, the aim is to present a wide range of text types within each purpose for reading. The goal is to create a reading experience for students participating in each assessment that, as much as possible, is similar to authentic reading experiences they may have in and outside of school.

Reading for Literary Experience

In literary reading, readers engage with the text to become involved in events, settings, actions, consequences, characters, atmosphere, feelings, and ideas, and to enjoy language itself. In order to understand and appreciate literature, each reader must bring to the text his or her own experiences, feelings, appreciation of language, and knowledge of literary forms. For young readers, literature can offer the opportunity to explore situations and feelings they have not yet encountered.

Events, actions, and consequences depicted in narrative fiction allow readers to experience vicariously and reflect upon situations that, although they may be imagined, illuminate those of real life. The text may present the perspective of the narrator or a principal character, and a more complex text may even have several viewpoints. Information and ideas may be described directly or through dialogue and events. Short stories or novels sometimes narrate events chronologically, or sometimes make more complex use of time with flashbacks or time shifts.

The main form of literary texts used in PIRLS is narrative fiction. Given differences in curricula and cultures across the participating countries, it is difficult for PIRLS to include some forms of literary texts. For example, poetry is difficult to translate and is therefore avoided.

Reading to Acquire and Use Information

Informational texts are both read and written for a wide variety of functions. While the primary function of informational text is to provide information, writers often address their subject matter with different objectives. Many informational texts are straightforward presentations of facts, such as biographical details or steps to accomplish a task; however, some informational texts are subjective. For example, authors may elect to convey facts and explanations through an expository summary, a persuasive essay, or a balanced argument. A reader must bring a critical mind to these texts in order to form his or her own opinion.

In order to best address the various functions of texts, information can be presented differently, such as by varying the content, organization, and form. Young students may read informational texts that cover a range of content, including those that are scientific, historical, geographical, or social. These texts also may vary in the organization of the content conveyed. For example, historical facts may be organized chronologically, instructions or procedures sequenced step-by-step, and an argument presented logically (e.g., cause and effect, or compare and contrast).

Information can be presented in many different formats. Even informational pieces that are primarily presented via text may include a table to document facts or a picture to illustrate a description. Both print materials (e.g., manuals and newspapers) and websites present a considerable amount of information via lists, charts, graphs, and diagrams. In addition, words need not be in the form of continuous text, such as in advertisements or announcements, or in sidebars to the text that offer supplemental information such as definitions, lists, or timelines.

Webpages tend to be multimodal in the ways they present information and contain interactive, experiential features that are not possible to reproduce in a print format. Multimodal texts utilize multiple communicative modes, which are then integrated by the reader in order to extract meaning from the text.[74] For example, online text presentations typically integrate the following dynamic elements for visual interest or illustration: videos and audio clips; animated graphics; pop-up windows with information that only appears by clicking, "hovering" above, or "rolling over" it; and a variety of code-based features, such as information that appears and disappears, revolves, or changes color. Print-based texts also are frequently multimodal, containing photographs, diagrams, charts, or other visual features alongside written text.[75]

Looking for and learning from information from the internet involves comprehension of information arranged within a complex reading environment. Effective learning when reading online, then, necessitates the integration of multiple texts, which may contain contradictory or incomplete information.[76] Textual elements and attributes, such as source information, relevance to the assigned task, and relationships to other sources must be recognized and evaluated in order to integrate texts successfully.[77,78,79]

A fundamental component of successful internet research and comprehension is the ability to locate information that meets one's needs. Readers need to be able to find and select the websites that will provide the target information, navigate to the relevant web pages, and follow links to new websites. Internet searches for information require the additional comprehension demands of inferring the potential usefulness of yet unseen texts (e.g., when evaluating search engine results or links). In order to begin the search for information, online readers must choose among websites to find the one most likely to contain the target information. Once on a given website or page, readers must continue to infer the relevance of the various types of information and texts presented, while ignoring a barrage of advertising. This may involve self-regulatory processes to maintain focus on the task at hand, so as not to be distracted by other interesting topics or advertising.

The informational texts used in the PIRLS assessments reflect students' authentic experiences with reading informational text in and out of school. Typically, these passages, as well as some of the ePIRLS websites, have been written by authors who understand writing for a young audience, and are provided by the participating countries as representative of the informational materials their students read.

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Processes of Comprehension

Different reading situations require readers to construct meaning in different ways. Therefore, PIRLS assesses four broad-based processes of comprehension typically used by fourth grade readers: focus on and retrieve explicitly stated information; make straightforward inferences; interpret and integrate ideas and information; and evaluate and critique content and textual elements. Transcending these processes are the metacognitive processes and strategies that allow readers to examine their understanding and adjust their approach.[80,81,82,83,84,85] In addition, the knowledge and background experiences that readers bring to reading equip them with an understanding of language, texts, and the world, through which they filter their comprehension of the material.[86,87,88,89,90,91]

Construction of meaning in online environments requires a blending of new digital literacies with the reading comprehension processes required for traditional offline (i.e., print) reading. ePIRLS assesses students' reading achievement when the conceptualization of the PIRLS passages is expanded to include a series of interconnected web pages with many different kinds of visual information, such as photos, graphs, charts, and maps, in addition to dynamic features such as videos, animations, and pop-up windows.

In PIRLS and ePIRLS, the four comprehension processes are used as a foundation for developing the comprehension questions which are based on each reading passage (or set of passages) or task. Across the passages, the variety of questions measuring the range of comprehension processes enables students to demonstrate a range of abilities and skills in constructing meaning from written texts.

In thinking about assessment questions, there is, of course, a substantial interaction between the length and complexity of the text and the sophistication of the comprehension processes required by the reading task. Initially, it may seem that locating and extracting explicitly stated information would be less difficult than, for example, making interpretations across an entire text and integrating those interpretations with external ideas and experiences. However, texts and tasks can vary with regard to length, syntactic complexity, abstractness of ideas, organizational structure, and cognitive demand. Thus, the nature of the text impacts the complexity of the questions asked, across and within the four types of comprehension processes.

Focus on and Retrieve Explicitly Stated Information

Readers vary the attention they give to explicitly stated information in the text.[92,93] Some ideas in the text may elicit particular focus and others may not. For example, readers may focus on ideas that confirm or contradict predictions they have made about the text's meaning or that relate to their general purpose for reading. In addition, readers often need to retrieve information explicitly stated in the text to answer a question they bring to the reading task, or to check their developing understanding of some aspect of the text's meaning.

As summarized from Kintsch and Kintsch,[94] retrieval results in a sequence of idea units that can be interrelated to form the microstructure of part or all of a text. In addition, there are relations among various sections of a text called the macrostructure. The microstructure and macrostructure form the textbase, which is very close to the text but an important foundation to developing real understanding. The ability to focus on and retrieve explicitly stated information is key to constructing the textbase (even though inferences often are necessary for coherence). Typically, this type of text processing requires the reader to focus on the text at the word, phrase, and sentence level in order to construct meaning.[95,96] Also, constructing the textbase macrostructure may require the reader to retrieve pieces of information from several pertinent locations in the text to construct the organizing feature of how information is being presented or the summary of a narrative.

Successful retrieval requires fairly immediate or automatic understanding of the words, phrases, or sentences,[97] in combination with the recognition that they are relevant to the information sought. Interestingly, printed texts are likely to be initially read and processed at micro-level, whereas online search strategies may benefit from initial macro-processing before the reader can focus on the sentence, phrase, or part of the graphic that has the information.[98,99]

In classifying items, it is essential to examine the item stem and correct response in relation to the text. If the item stem and the correct response both use exact words from the text and are located with a sentence or two of each other, the item is classified as "Focus and Retrieve." If some synonyms are used, the item still is "Focus and Retrieve."

Reading tasks that may exemplify this type of text processing include the following:

- Identifying and retrieving information that is relevant to the specific goal of reading;

- Looking for specific ideas;

- Searching for definitions of words or phrases;

- Identifying the setting of a story (e.g., time and place);

- Finding the topic sentence or main idea (when explicitly stated); and

- Identifying specific information in a graphic (e.g., graph, table, or map).

Make Straightforward Inferences

As readers construct meaning from text, they make inferences about ideas or information not explicitly stated.[100] Making inferences allows readers to move beyond the surface of texts and to resolve the gaps in meaning that often occur in texts. Some of these inferences are straightforward in that they are based primarily on information that is contained in one place in the text—readers may merely need to connect two or more ideas or pieces of information. The ideas themselves may be explicitly stated, but the connection between them is not, and thus must be inferred. Furthermore, despite the inference not being explicitly stated in the text, the meaning of the text remains relatively clear.

Skilled readers often make these kinds of inferences automatically.[101] They may immediately connect two or more pieces of information, recognizing a relationship even though it is not stated in the text. In many cases, the author has constructed a text to lead readers to an obvious or straightforward inference. For example, the action(s) of a character at a point in the story may clearly point to a particular character trait, and most readers would arrive at the same conclusion about that character's personality or viewpoint.

With this type of processing, readers typically focus on more than just word-, phrase-, or sentence-level meaning, but the focus is on local meaning residing within one part of the text. As noted above, there are some instances especially in online reading, when readers may need to use macro-processing and then micro-processing to find information across a website or a text. Using the processes together with success often involves making some inferences about the best approaches to use in searching for information.

Online reading requires a considerable amount of inferencing, beginning with identifying those websites and webpages most likely to contain the information of interest. Readers also may infer whether it is necessary or useful to follow a link to another page.

When classifying items, if the item stem and correct response use paraphrases of the original phrases or sentences in text then the item is classified as "Straightforward Inferencing." This can mean that new vocabulary is introduced in either the stem or multiple-choice responses, but the items still are considered inference items. Also, if the correct answers to the item are located in several places within the text but the item stem and the correct response both use exact words from the text, then the item is classified as inferencing.

Reading tasks that may exemplify this type of text processing include the following:

- Inferring that one event caused another event;

- Giving the reason for a character's action;

- Describing the relationship between two characters; and

- Identifying which section of the text or website would help for a particular purpose.

Interpret and Integrate Ideas and Information

As with the more straightforward inferences, readers who are engaged in interpreting and integrating ideas and information in text may focus on local or global meanings, or may relate details to overall themes and ideas. In any case, these readers are making sense of the author's intent and developing a more complete understanding of the entire text.

As readers interpret and integrate, they are attempting to construct a more specific or more complete understanding of the text by integrating personal knowledge and experience with meaning that resides within the text.[102] For example, readers may draw on experience to infer a character's

underlying motive or to construct a mental image of the information conveyed. They often need to draw on their understanding of the world, as well as their background knowledge and experiences, more than they do for straightforward inferences.

As readers engage in this interpretive process, they are making connections that are not only implicit, but that may be open to some interpretation based on their own perspective. Because of this, meaning that is constructed through interpreting and integrating ideas and information is likely to vary among readers, depending upon the experiences and knowledge they bring to the reading task.

Using the internet requires the ability to read and digest information from multiple online sources.[103] Integrating and synthesizing information across texts is very challenging, even offline, because readers need to comprehend not only one text, but consolidate information across two or more texts. In the internet environment, this includes information presented via animation and videos as well as in pop-up windows and rollover text and graphics.

Items classified as "Interpret and Integrate Ideas and Information," use concepts and generalizations not explicitly stated in the text. The new ideas or information may be included in the item stem, the acceptable response, or both. A full credit response requires comprehension of the entire text, or at least significant portions of it, as well as ideas or information that go beyond the text.

Reading tasks that may exemplify this type of text processing include the following:

- Discerning the overall message or theme of a text;

- Considering an alternative to actions of characters;

- Comparing and contrasting text information;

- Inferring a story's mood or tone;

- Interpreting a real-world application of text information; and

- Comparing and contrasting information presented within and across texts or websites.

Evaluate and Critique Content and Textual Elements

As readers evaluate the content and elements of a text, the focus shifts from constructing meaning to critically considering the text itself. Readers engaged in this process step back from a text in order to evaluate and critique it.

The text content, or meaning, may be evaluated and critiqued from a personal perspective or with an objective view. This process may require readers to make a justified judgment, drawing on their interpretations and weighing their understanding of the text against their understanding of the world—rejecting, accepting, or remaining neutral to the text's representation. For example, readers may counter or confirm claims made in the text or make comparisons with ideas and information found in other sources.

In evaluating and critiquing elements of text structure and language, readers draw upon their knowledge of language usage, presentational features, and general or genre-specific features of texts.[104] The text is considered as a way to convey ideas, feelings, and information.

Readers may reflect on the author's language choices and devices for conveying meaning and judge their adequacy. Relying on their understanding of language conventions, readers may find weaknesses in how the text was written or recognize the successful use of the author's craft. Further, readers may evaluate the mode used to impart information—both visual and textual features—and explain their functions (e.g., text boxes, pictures, or tables). In evaluating the organization of a text, readers draw upon their knowledge of text genre and structure. The extent of past reading experience and familiarity with the language are essential to each piece of this process.

For an item to be classified as "Evaluate and Critique," an acceptable response to that item involves a *judgement* about some aspect of the text. For example, the item stem can present more than one point view where it is possible for students to argue either point of view (or both) based on the text or the item stem can ask for a judgement and the evidence to support it.

Reading tasks that may exemplify this type of text processing include the following:

- Judging the completeness or clarity of information in the text;

- Evaluating the likelihood that the events described could really happen;

- Evaluating how likely an author's argument would be to change what people think and do;

- Judging how well the title of the text reflects the main theme;

- Describing the effect of language features, such as metaphors or tone;

- Describing the effect of the graphic elements in the text or website;

- Determining the point of view or bias of the text or website; and

- Determining an author's perspective on the central topic.

The skills required to evaluate and critique online texts are very similar to those required for printed text. However, because anyone can publish anything on the internet, readers also must make judgments about the credibility of the source of the information as well as determine the perspective, point of view, and bias in the text.[105,106] In addition, the visual and textual features on the internet tend to be much more varied than similar elements of printed text.

Online reading tasks that may exemplify this type of text processing include the following:

- Critiquing the ease of finding information on a website; and

- Judging the credibility of the information on the website.

Navigation in ePIRLS

In its simulated environment, ePIRLS incorporates a set of navigation skills and strategies specifically required to locate and use information on the internet. These include the following:

- Selecting websites that meet a particular information need; and

- Using online features to locate information within websites (e.g., content tabs, navigation bars, graphic icons, and links).

However, while ePIRLS is designed to simulate an authentic online reading experience, it is within a computer-based environment suitable to fourth grade reading levels and a timed assessment. In addition, although it is intended to reflect the types of online reading that students are asked to do as part of school-based projects, reports, and research assignments, the online environment of the ePIRLS assessment is necessarily very limited in comparison to the entire world of the internet.

While recognizing that being able to locate internet information underlies all of the reading processes, the emphasis in ePIRLS is on assessing reading comprehension rather than navigation skills. Because students have a range of internet experiences, ePIRLS begins with a brief set of directions that covers how to click on tabs and links as well as how to scroll, when necessary. Using the device of a teacher avatar, the ePIRLS assessment moves students through the web pages so that students have the opportunity to accomplish the reading tasks in the allotted assessment time. Also, throughout the assessment, the teacher avatar points students toward particular websites and provides additional assistance when students have difficulty locating particular web pages. Although the search process is recursive in real life, students that have difficulty finding the correct web pages are automatically moved along to the pages by the teacher avatar after a certain amount of time, and this information is tracked by the ePIRLS computer-based assessment.

Selecting PIRLS Passages and ePIRLS Online Texts

The PIRLS reading passages, as well as the ePIRLS online reading texts, undergo extensive review by the Reading Development Group and the National Research Coordinators. Considerable effort is expended to ensure that the texts and websites have the following characteristics:

- Clarity and coherence;

- Appropriate content across countries and cultures;

- Interesting, engaging content for a wide range of students; and

- Adequate basis for assessing the full range of comprehension processes.

In order to reflect the goal of approximating an authentic reading experience in the assessment, the reading passages—whether presented digitally or in printed formats as well as the simulated

online materials—must be typical of those read by students in their everyday experiences and reflect students' authentic reading experiences, in and outside of school. In order to help achieve this goal, the texts are typically provided and reviewed by the participating countries to be representative of the literary and informational materials their students read.

The time constraints of the assessment situation place some limits on the length of texts, because students need time to read the entire passage and answer comprehension questions. Consistent with the range in difficulty across PIRLS, the passage length generally averages from about 500 to 800 words. However, length will vary somewhat because other text characteristics also affect rate of reading.

With the transition to a digital environment, the aim is to increase the diversity of text types included in PIRLS 2021. For example, PIRLS could include texts from plays, magazines, and newspapers as well as traditional letters, emails, and short messages. Also, information can be presented in many different formats. Even informational pieces that are primarily presented via text may include a table to document facts or a picture to illustrate a description. Both print materials and websites present a considerable amount of information via lists, charts, graphs, and diagrams. Hybrid texts are not new, but there have been developments that have proliferated due to rapid changes in communication styles and modes brought about by new media and digital texts.

The ePIRLS online informational reading tasks in science or social studies are adapted from internet websites. Each task involves approximately three different websites totaling about five to ten web pages. Reflecting the fact that online reading often involves sorting through more information than is actually necessary to achieve one's goal, the texts contained in an ePIRLS assessment task average about 1000 words in total.

Clarity and coherence are essential criteria for PIRLS texts. Typically, the passages and websites have been written by successful authors who understand writing for a young audience, such that the texts have an appropriate level of linguistic features and density of information. In the context of an international study, attaining authenticity in assessment reading experience may be somewhat constrained by the need to translate the texts into numerous languages. Thus, care is taken to choose texts that can be translated without loss of clarity in meaning, or in potential for student engagement.

In selecting texts for use in an international reading assessment, it is crucial to pay close attention to the potential for cultural bias. Texts that depend heavily on culture-specific knowledge are automatically excluded. Text selection thus involves collecting and considering texts from as many of the participating countries as possible. The goal is for the texts to be universally applicable across cultures, and for the set of texts in the assessment to vary as widely as possible across nations and cultures, such that no country or culture is overrepresented in the assessment texts. The final selection of texts is based, in part, on the national and cultural representation of the entire set of assessment texts.

The appropriateness and readability of texts for the PIRLS assessment primarily is determined through iterative reviews by educators and curriculum specialists from countries participating in the assessments. Taking into account fairness and sensitivity to gender, racial, ethnic, and religious considerations, every effort is made to select texts that are topic and theme appropriate for the grade level and that elicit the full range of comprehension processes.

Finally, it is extremely important for the texts to be interesting to the greatest number of students. As part of the field test, students routinely are asked how well they like each of the texts, and a high level of positive response is fundamental for a text to be selected for the final set of assessment instruments.

References

1 Stiggins, R. (1982). An analysis of the dimensions of job-related reading. *Reading World*, *21*(3), 237–247.

2 Organisation for Economic Cooperation and Development. (1995). *Literacy, economy and society: Results of the first International Adult Literacy Survey*. Paris, France: Author.

3 Organisation for Economic Cooperation and Development, with Statistics Canada. (2005). *Learning a living: First results of the adult literacy and life skills survey*. Paris, France and Ottawa, Canada: Author/Statistics Canada.

4 Wineburg, S., McGrew, S., Breakstone, J., & Ortega, T. (2016). *Evaluating information: The cornerstone of civic online reasoning*. Stanford, CA: Stanford University. Retrieved from http://purl.stanford.edu/fv751yt5934

5 Coulombe, S., Tremblay, J.-F., & Marchand, S. (2004). *Literacy scores, human capital and growth across fourteen OECD countries*. Ottawa, Canada: Statistics Canada.

6 Smith, M.C., Mikulecky, L. Kibby, M.W., & Dreher, M.J. (2000). What will be the demands of literacy in the workplace in the next millennium? *Reading Research Quarterly*, *35*(3), 378–383.

7 Mullis, I.V.S., Martin, M.O., Goh, S., & Prendergast, C. (Eds.). (2017). *PIRLS 2016 encyclopedia: Education policy and curriculum in reading*. Retrieved from http://timssandpirls.bc.edu/pirls2016/encyclopedia/

8 Elley, W.B. (1992). *How in the world do students read? IEA study of reading literacy*. The Hague, Netherlands: International Association for the Evaluation of Educational Achievement (IEA).

9 Elley, W.B. (Ed.). (1994). *The IEA study of reading literacy: Achievement and instruction in thirty-two school systems*. Oxford, England: Elsevier Science Ltd.

10 Wolf, R. (Ed.). (1995). *The IEA reading literacy study: Technical report*. The Hague, Netherlands: International Association for the Evaluation of Educational Achievement (IEA).

11 Campbell, J.R., Kelly, D.L., Mullis, I.V.S., Martin, M.O., & Sainsbury, M. (2001). *Framework and specifications for PIRLS assessment 2001, second edition*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

12 Mullis, I.V.S., Kennedy, A.M., Martin, M.O., & Sainsbury, M. (2006). *PIRLS 2006 assessment framework and specifications, second edition*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

13 Mullis, I.V.S., Martin, M.O., Kennedy, A.M., Trong, K.L., & Sainsbury, M. (2009). *PIRLS 2011 assessment framework*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

14 Mullis, I. V. S., & Martin, M. O. (Eds.). (2015). *PIRLS 2016 assessment framework* (2nd ed.). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

15 Elley, W.B. (1992). *How in the world do students read? IEA study of reading literacy*. The Hague, Netherlands: International Association for the Evaluation of Educational Achievement (IEA).

16 Anderson, R.C., & Pearson, P.D. (1984). A schema-theoretic view of basic processes in reading comprehension. In P.D. Pearson (Ed*.), Handbook of reading research* (pp. 255–291). White Plains, NY: Longman.

17 Chall, J.S. (1983). *Stages of reading development*. New York, NY: McGraw-Hill.

18 Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. New York, NY: Cambridge University Press.

19 Kintsch, W. (2012). Psychological models of reading comprehension and their implications for assessment. In J.P. Sabatini, E.R. Albro, & T. O'Reilly (Eds.), *Measuring up: Advances in how to assess reading ability* (pp. 21–37). Lanham, MD: Rowman & Littlefield Publishers.

20   Kintsch, W. (2013). Revisiting the construction-integration model of text comprehension and its implications for instruction. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 807–839). Newark, DE: International Reading Association.

21   Ruddell, R. & Unrau, N.J. (Eds.). (2004). Reading as a meaning-construction process: The reader, the text, and the teacher. In R.B. Ruddell & N.J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1462–1521). Newark, DE: International Reading Association.

22   Rumelhart, D. (1985). Toward an interactive model of reading. In H. Singer & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (3rd ed., pp. 722–750). Newark, DE: International Reading Association.

23   Britt, M.A., Goldman, S.R., & Rouet, J.-F. (Eds.). (2012). *Reading—From words to multiple texts*. New York, NY: Routledge.

24   Snow, C. (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. Santa Monica, CA: RAND Corporation.

25   Afflerbach, P., & Cho, B.-Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 69–90). New York, NY: Routledge.

26   Langer, J. (2011). *Envisioning literature: Literary understanding and literature instruction* (2nd ed.). Newark, DE: International Reading Association.

27   Baker, L., & Beall, L.C. (2009). Metacognitive processes and reading comprehension. In S.E Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 373–388). New York, NY: Routledge.

28   Derewianka, B. (2003). Trends and issues in genre-based approaches. *RELC Journal, 34*(2), 133–154.

29   Kintsch, W. (2012). Psychological models of reading comprehension and their implications for assessment. In J.P. Sabatini, E.R. Albro, & T. O'Reilly (Eds.), *Measuring up: Advances in how to assess reading ability* (pp. 21–37). Lanham, MD: Rowman & Littlefield Publishers.

30   Kintsch, W. (2013). Revisiting the construction-integration model of text comprehension and its implications for instruction. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 807–839). Newark, DE: International Reading Association.

31   Pressley, M., & Gaskins, I.W. (2006). Metacognitively competent reading comprehension is constructively responsive reading: How can such reading be developed in students? *Metacognition and Learning, 1*(1), 99–113.

32   Rapp, D.N., & van den Broek, P. (2005). Dynamic text comprehension: An integrative view of reading. *Current Directions in Psychological Science, 14*(5), 276–279.

33   Christianson, K., & Luke, S.G. (2011). Context strengthens initial misinterpretations of text. *Scientific Studies of Reading, 15*(2), 136–166.

34   Lorch, R., Lemarié, J., & Grant, R. (2011). Signaling hierarchical and sequential organization in expository text. *Scientific Studies of Reading, 15*(3), 267–284.

35   Miller, S.D., & Faircloth, B.S. (2009). Motivation and reading comprehension. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 307–322). New York, NY: Routledge.

36   Taboada, A., Tonks, S.M., Wigfield, A., & Guthrie, J.T. (2009). Effects of motivational and cognitive variables on reading comprehension. *Reading and Writing: An Interdisciplinary Journal, 22*(1), 85–106.

37   Miller, C.R. (1994). Genre as social action. In A. Freedman & P. Medway (Eds.)., *Genre and the new rhetoric* (pp. 23–42). Bristol, PA: Taylor & Francis.

38   Leu, D.J., Jr., Kinzer, C.K., Coiro, J.L., & Cammack, D.W. (2004). Toward a theory of new literacies emerging from the internet and other information and communication technologies. In R.B. Ruddell & N.J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570–1613). Newark, DE: International Reading Association.

39   Leu, D., Kinzer, C., Coiro, J., Castek, J., & Henry, L. (2013). New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1150–1181). Newark, DE: International Reading Association.

40   Rowsell, J., & Pahl, K. (2011). The material and the situated: What multimodality and new literacy studies do for literacy research. In D. Lapp & D. Fisher (Eds.), *Handbook of research on teaching the English language arts* (3rd ed., pp. 175–181). Newark, DE: International Reading Association.

41   Rueda, R. (2013). 21st-century skills: Cultural, linguistic, and motivational perspectives. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1241–1268). Newark, DE: International Reading Association.

42   Leu, D.J., O'Byrne, W.I., Zawilinski, L., McVerry, J.G., & Everett-Cacopardo, H. (2009). Comments on Greenhow, Robelia, and Hughes: Expanding the new literacies conversation. *Educational Researcher*, *38*(4), 264–269.

43   Purcell, K., Rainie, L., Heaps, A., Buchanan, J., Friedrich, L., Jacklin, A., Chen, C., & Zickuhr, K. (2012). *How teens do research in the digital world*. Washington, DC: Author.

44   Tondeur, J., van Braak, J., & Valcke, M. (2007). Towards a typology of computer use in primary education. *Journal of Computer Assisted Learning*, *23*(3), 197–206.

45   Afflerbach, P., & Cho, B.-Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 69–90). New York, NY: Routledge.

46   Alexander, P.A., & The Disciplined Reading and Learning Research Laboratory. (2012). Reading into the future: Competence for the 21st century. *Educational Psychologist*, *47*(4), 259–280.

47   Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, Policies and Practices* (pp. 17–32). New York, NY: Peter Lang Publishing, Inc.

48   Coiro, J., & Kennedy, C. (2011). *The Online Reading Comprehension Assessment (ORCA) project: Preparing students for Common Core standards and 21st century literacies*. Unpublished manuscript. Kingston, RI: University of Rhode Island. Retrieved from http://www.orca.uconn.edu/orca/assets/File/Research%20Reports/PROJECT%20 REPORT%20%231.pdf

49   Leu, D., Kinzer, C., Coiro, J., Castek, J., & Henry, L. (2013). New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1150–1181). Newark, DE: International Reading Association.

50   Goldman, S.R. (2014). Reading and the web: Broadening the need for complex comprehension. In R.J. Spiro, M. DeSchryver, P. Morsink, M.S. Hagerman, & P. Thompson (Eds.), *Reading at a crossroads? Disjunctures and continuities in current conceptions and practices*. New York, NY: Routledge.

51   Goldman, S. R., Lawless, K. A., & Manning, F. (2013). Research and development of multiple source comprehension assessment. In M.A. Britt, S.R. Goldman, and J.-F. Rouet (Eds.), *Reading—From words to multiple texts* (pp. 180–199). New York, NY: Routledge, Taylor & Francis Group.

52   Singer, L.M., & Alexander, P.A. (2017). Reading on paper and digitally: What the past decades of empirical research reveal. *Review of Educational Research*, *87*(6), 1007–1041.

53   Strømsø, H.I. (2017). Multiple models of multiple-text comprehension: A commentary. *Educational Psychologist*, *52*(3), 216–224.

54 Goldman, S.R. (2014). Reading and the web: Broadening the need for complex comprehension. In R.J. Spiro, M. DeSchryver, P. Morsink, M.S. Hagerman, & P. Thompson (Eds.), *Reading at a crossroads? Disjunctures and continuities in current conceptions and practices*. New York, NY: Routledge.

55 Leu, D., Kinzer, C., Coiro, J., Castek, J., & Henry, L. (2013). New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1150–1181). Newark, DE: International Reading Association.

56 Almasi, J.F., & Garas-York, K. (2009). Comprehension and discussion of text. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 470–493). New York, NY: Routledge.

57 Murphy, P.K., Wilkinson, I.A.G., Soter, A.O., Hennessey, M.N., & Alexander, J.F. (2009). Examining the effects of classroom discussion on students' comprehension of text: A meta-analysis. *Journal of Educational Psychology*, *101*(3), 740–764.

58 Galda, L., & Beach, R. (2001). Response to literature as a cultural activity. *Reading Research Quarterly*, *36*(1), 64–73.

59 Kucer, S.B. (2005). *Dimensions of literacy: A conceptual base for teaching reading and writing in school settings, second edition*. Mahwah, NJ: Lawrence Erlbaum Associates.

60 Alvermann, D., & Moje, E. (2013). Adolescent literacy instruction and the discourse of "every teacher a teacher of reading." In D. Alvermann, N. Unrau, & R. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 1072–1103). Newark, DE: International Reading Association.

61 Guthrie, J. (1996). Educational contexts for engagement in literacy. *The Reading Teacher*, *49*(6), 432–445.

62 Duke, N.K. (2004). The case for informational text. *Educational Leadership*, *61*(6), 40–44.

63 Duke. N., & Carlisle, J. (2011). The development of comprehension. In M.L. Kamil, P.D. Pearson, E.B. Moje, & P. Afflerbach (Eds.), *Handbook of reading research* (Vol. 4, pp. 199–228). New York, NY: Routledge.

64 Palincsar, A.S., & Duke, N.K. (2004). The role of text and text-reader interactions in young children's reading development and achievement. *The Elementary School Journal*, *105*(2), 183–197.

65 Wharton-McDonald, R., & Swiger, S. (2009). Developing higher order comprehension in the middle grades. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 510–530). New York, NY: Routledge.

66 Goldman, S.R., & Rakestraw, J.A. Jr. (2000). Structural aspects of constructing meaning from text. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 311–335). Mahwah, NJ: Lawrence Erlbaum Associates.

67 Kobayashi, M. (2002). Method effects on reading comprehension test performance: Text organization and response format. *Language Testing*, *19*(2), 193–220.

68 Alexander, P.A., & Jetton, T.L. (2000). Learning from text: A multidimensional and developmental perspective. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 285–310). Mahwah, NJ: Lawrence Erlbaum Associates.

69 Alexander, P.A., & The Disciplined Reading and Learning Research Laboratory. (2012). Reading into the future: Competence for the 21st century. *Educational Psychologist*, *47*(4), 259–280.

70 Derewianka, B. (2003). Trends and issues in genre-based approaches. *RELC Journal*, *34*(2), 133–154.

71 Graesser, A., Golding, J.M., & Long, D.L. (1996). Narrative representation and comprehension. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 171–205). Mahwah, NJ: Lawrence Erlbaum Associates.

72   Lorch, R., Lemarié, J., & Grant, R. (2011). Signaling hierarchical and sequential organization in expository text. *Scientific Studies of Reading*, *15*(3), 267–284.

73   Weaver, C.A., III, & Kintsch, W. (1996). Expository text. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 230–245). Mahwah, NJ: Lawrence Erlbaum Associates.

74   Kress, G., & Jewitt, C. (2003). Introduction. In C. Jewitt & G. Kress (Eds.), *Multimodal literacy* (pp. 1–18). New York, NY: Peter Lang Publishing.

75   Moss, G. (2003). Putting the text back into practice: Junior-age non-fiction as objects of design. In C. Jewitt & G. Kress (Eds.), *Multimodal literacy* (pp. 72-87). New York, NY: Peter Lang Publishing.

76   Strømsø, H.I. (2017). Multiple models of multiple-text comprehension: A commentary. *Educational Psychologist*, *52*(3), 216–224.

77   Britt, M.A. & Rouet, J.-F. (2012). Learning with multiple documents: Component skills and their acquisition. In J.R. Kirby & M.J. Lawson (Eds.), *Enhancing the quality of learning: Dispositions, instruction, and learning processes* (pp. 276–314). New York, NY: Cambridge University Press.

78   Goldman, S. R., Lawless, K. A., & Manning, F. (2013). Research and development of multiple source comprehension assessment. In M.A. Britt, S.R. Goldman, and J.-F. Rouet (Eds.), *Reading—From words to multiple texts* (pp. 180–199). New York, NY: Routledge, Taylor & Francis Group.

79   Wineburg, S., McGrew, S., Breakstone, J., & Ortega, T. (2016). *Evaluating information: The cornerstone of civic online reasoning*. Stanford, CA: Stanford University. Retrieved from http://purl.stanford.edu/fv751yt5934

80   Baker, L., & Beall, L.C. (2009). Metacognitive processes and reading comprehension. In S.E Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 373–388). New York, NY: Routledge.

81   Kintsch, W., & Kintsch, E. (2005). Comprehension. In S.G. Paris & S.A. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 71–92). Mahwah, NJ: Lawrence Erlbaum Associates.

82   Paris, S.G., Wasik, B.A., & Turner, J.C. (1996). The development of strategic readers. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 609– 640). Mahwah, NJ: Lawrence Erlbaum Associates.

83   Perfitti, C.A., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skill. In M.J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 227–247). Malden, MA: Blackwell Publishing.

84   Pressley, M. (2002). Metacognition and self-regulated comprehension. In A.E. Farstrup & S.J. Samuels (Eds.), *What research has to say about reading instruction* (3rd ed., pp. 291–309). Newark, DE: International Reading Association.

85   Van Dijk, T., & Kintsch, W. (1983). *Strategies of discourse comprehension*. New York: Academic Press.

86   Alexander, P.A., & Jetton, T.L. (2000). Learning from text: A multidimensional and developmental perspective. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 285–310). Mahwah, NJ: Lawrence Erlbaum Associates.

87   Beach, R., & Hynds, S. (1996). Research on response to literature. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 453–489). Mahwah, NJ: Lawrence Erlbaum Associates.

88   Galda, L., & Beach, R. (2001). Response to literature as a cultural activity. *Reading Research Quarterly*, *36*(1), 64–73.

89   Kintsch, W. (2012). Psychological models of reading comprehension and their implications for assessment. In J.P. Sabatini, E.R. Albro, & T. O'Reilly (Eds.), *Measuring up: Advances in how to assess reading ability* (pp. 21–37). Lanham, MD: Rowman & Littlefield Publishers.

90 Kintsch, W. (2013). Revisiting the construction-integration model of text comprehension and its implications for instruction. In D.E. Alvermann, N.J. Unrau, & R.B. Ruddell (Eds.), *Theoretical models and processes of reading* (6th ed., pp. 807–839). Newark, DE: International Reading Association.

91 Wolfe, M.B.W., & Goldman, S.R. (2005). Relations between adolescents' text processing and reasoning. *Cognition and Instruction*, *23*(4), 467–502.

92 Flavell, J.H., & Wellman, H.M. (Eds.). (1977). Metamemory. In R.V. Kail, Jr. & J.W. Hagen (Eds.), *Perspectives on the development of memory and cognition*. Hillsdale, NJ: Lawrence Erlbaum Associates.

93 Schneider, W., & Pressley, M. (1997). *Memory development between two and twenty* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

94 Kintsch, W., & Kintsch, E. (2005). Comprehension. In S.G. Paris & S.A. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 71–92). Mahwah, NJ: Lawrence Erlbaum Associates.

95 Perfetti, C. (2007). Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading*, *11*(4), 357–383.

96 Perfetti, C., & Adlof, S. (2012). Reading comprehension: A conceptual framework from word meaning to text meaning. In J.P Sabatini, E. Albro, & T. O'Reilly (Eds.), *Measuring up: Advances in how to assess reading ability* (pp. 3–20). Lanham, MD: Rowman & Littlefield Publishers.

97 West, R.F., & Stanovich, K.E. (2000). Automatic contextual facilitation in readers of three ages. In K.E. Stanovich (Ed.), *Progress in understanding reading: Scientific foundations and new frontiers* (pp. 13–20). New York, NY: Guilford.

98 Afflerbach, P., & Cho, B.-Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In S.E. Israel & G.G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 69–90). New York, NY: Routledge.

99 Alexander, P.A., Kulikowich, J.M., & Jetton, T.L. (1994). The role of subject-matter knowledge and interest in the processing of linear and nonlinear texts. *Review of Educational Research*, *64*(2), 201–252.

100 Zwaan, R.A., & Singer, M. (2003). Text comprehension. In A.C. Graesser, M.A. Gernsbacher, & S.R. Goldman (Eds.), *Handbook of discourse processes* (pp. 83–122). Mahwah, NJ: Lawrence Erlbaum Associates.

101 West, R.F., & Stanovich, K.E. (2000). Automatic contextual facilitation in readers of three ages. In K.E. Stanovich (Ed.), *Progress in understanding reading: Scientific foundations and new frontiers* (pp. 13–20). New York, NY: Guilford.

102 Van Dijk, T., & Kintsch, W. (1983). *Strategies of discourse comprehension*. New York: Academic Press.

103 Britt, M.A. & Rouet, J.-F. (2012). Learning with multiple documents: Component skills and their acquisition. In J.R. Kirby & M.J. Lawson (Eds.), *Enhancing the quality of learning: Dispositions, instruction, and learning processes* (pp. 276–314). New York, NY: Cambridge University Press.

104 Derewianka, B. (2003). Trends and issues in genre-based approaches. *RELC Journal*, *34*(2), 133–154.

105 Britt, M.A. & Rouet, J.-F. (2012). Learning with multiple documents: Component skills and their acquisition. In J.R. Kirby & M.J. Lawson (Eds.), *Enhancing the quality of learning: Dispositions, instruction, and learning processes* (pp. 276–314). New York, NY: Cambridge University Press.

106 Goldman, S. R., Lawless, K. A., & Manning, F. (2013). Research and development of multiple source comprehension assessment. In M.A. Britt, S.R. Goldman, and J.-F. Rouet (Eds.), *Reading—From words to multiple texts* (pp. 180–99). New York, NY: Routledge, Taylor & Francis Group.
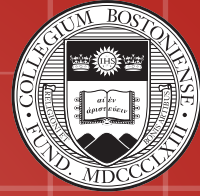
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