PROGRESS IN INTERNATIONAL READING LITERACY STUDY

PIRLS

IEA PIRLS 2021

PIRLS 2021 Assessment Frameworks

Ina V.S. Mullis and Michael O. Martin, Editors

IEA
TIMSS & PIRLS
International Study Center
Lynch School of Education
BOSTON COLLEGE

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For more information about PIRLS contact:
TIMSS & PIRLS International Study Center
Lynch School of Education
Boston College
Chestnut Hill, MA 02467
United States

tel: +1-617-552-1600
fax: +1-617-552-1203
e-mail: pirls@bc.edu
pirls.bc.edu

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INTRODUCTION

PIRLS 2021—20 Years of Monitoring Trends in International Reading Achievement

Ina V.S. Mullis

IEA's PIRLS (Progress in International Reading Literacy Study) was inaugurated in 2001 as a follow-up to IEA's 1991 Reading Literacy Study. Conducted every five years, PIRLS assesses international trends in the reading comprehension of young students in their fourth year of schooling—an important transition point in children's development as readers. Typically, at this point in their schooling, students have learned how to read and are now reading to learn. PIRLS was designed to complement IEA's TIMSS assessments of mathematics and science at the fourth grade. PIRLS is directed by IEA's TIMSS & PIRLS International Study Center at Boston College, working in close cooperation with IEA Amsterdam and IEA Hamburg.

Because developing reading literacy is vital to every student's growth, education, and daily life, IEA (the International Association for the Evaluation of Educational Achievement) has been conducting regular international assessments of reading achievement and the contexts for learning to read for almost 60 years. IEA is an independent international cooperative of national research institutions and government agencies that pioneered international comparative assessments of educational achievement in the 1960s to gain a deeper understanding of policy effects across countries' different systems of education. Each successive PIRLS assessment has continued in this tradition, consisting of a state-of-the-art reading assessment measuring trends in reading achievement and accompanied by an extensive set of questionnaires for parents or caregivers, schools, teachers, countries, and the students themselves. The questionnaire data about students' contexts for learning to read and educational opportunities provide important information for interpreting the achievement results.

The first two chapters of the PIRLS 2021 Assessment Frameworks contain the PIRLS 2021 Reading Framework and PIRLS 2021 Context Questionnaire Framework, respectively. The reading framework provides guidelines for assessing reading comprehension at the fourth grade according to a matrix of two reading purposes—literary and informational—by four comprehension strategies (retrieval, inferencing, integrating, and evaluation). The context questionnaire framework describes the topics to be covered by the PIRLS 2021 questionnaires. The third chapter describes the assessment design for PIRLS 2021. Across the past 20 years, linking the PIRLS assessments of reading achievement to the rich array of PIRLS questionnaire data about the contexts in which students learn to read has provided researchers an important source of policy relevant information about how to improve reading education around the world.

History of PIRLS 2021

PIRLS 2021 is the fifth assessment in the current trend series, following PIRLS 2001, 2006, 2011, and 2016. The number of countries participating in PIRLS has grown with each assessment. Nearly 70 countries and sub-national benchmarking entities are participating in PIRLS 2021, including many that have participated in previous cycles since 2001. For countries with data since 2001, PIRLS 2021 will provide the fifth in a series of trend achievement measures collected over 20 years.

In 2001, countries that had participated in IEA's reading literacy assessments wanted to work with IEA and Boston College to build a new innovative reading assessment. This included a commitment to extend the information PIRLS collects about student educational contexts for learning to read. Since 2001, PIRLS has included the Learning to Read Survey completed by students' parents or caregivers as central to the questionnaires. There also is a PIRLS Encyclopedia produced as part of each assessment cycle, which contains comparative system-level information across countries and a chapter written by each participating country describing its own reading curriculum and instruction.

Since its creation in 2001, PIRLS has been a collaborative effort among the participating countries and IEA's TIMSS & PIRLS International Study Center. All the countries, institutions, and agencies involved in successive PIRLS assessments have worked to improve PIRLS and build the most comprehensive and innovative measure of reading comprehension possible. In 2006, PIRLS was expanded from 8 to 10 passages to enable reporting results by reading comprehension processes in addition to literary and informational purposes.

In 2011, the TIMSS and PIRLS assessment cycles came together, providing a unique opportunity for countries to collect reading, mathematics, and science achievement data on the same fourth grade students. Particular effort was expended on updating the questionnaires and coordinating them across PIRLS and TIMSS. Also, in 2011 IEA broadened the PIRLS assessment coverage to meet the needs of countries in which most children in the fourth grade are still developing fundamental reading skills.

PIRLS 2016 was further increased to 20 passages to include a second assessment option—PIRLS Literacy, a less difficult reading assessment which was equivalent in scope to PIRLS. Also, ePIRLS—an assessment of online reading—was introduced in 2016 as another option. ePIRLS addresses the ever increasing prevalence of online reading. The internet often is the primary way students acquire information and the central source for students to conduct research in their school subjects. ePIRLS uses an engaging simulated internet environment to present fourth grade students with school-like assignments involving science and social studies topics.

PIRLS 2021—digitalPIRLS Transitioning to the Future

Consistent with the drive to innovate with each successive PIRLS cycle, PIRLS 2021 is transitioning from paper-based booklets to a digital environment. About half the countries will deliver PIRLS 2021 via computers, using a streamlined, easy-to-use user interface that allows students to manage reading the passages and answering the questions together in one seamless process. The colorful passages are designed to be engaging, and there are new item types to facilitate computerized scoring.

digitalPIRLS 2021 is administered through an eAssessment system that brings efficiency to the operational aspects of PIRLS, including computerized delivery of assessment materials to students (no more printing and distributing booklets). This enables ePIRLS to be integrated with digitalPIRLS so that ePIRLS does not require an additional day of assessment.

digitalPIRLS 2021 also provides some scope to adjust the assessment design. The computerized digitalPIRLS 2021 can integrate the PIRLS passages and the less difficult PIRLS Literacy passages in flexible ways, making it possible to target the difficulty of the PIRLS 2021 assessment to the level of achievement of the student population in the participating countries. By capitalizing on the wide range in difficulty of the passages developed for PIRLS and PIRLS Literacy in 2016 and continuing to expand the difficulty range with the newly developed reading passages, one unified PIRLS 2021 assessment can better measure the range of high, medium, and low reading abilities found in each of the PIRLS participating countries.

Updating the PIRLS Frameworks for PIRLS 2021

Updating the PIRLS frameworks with each assessment cycle provides participating countries with opportunities to introduce fresh ideas and current information about curricula, standards, frameworks, and instruction. This keeps the frameworks educationally relevant, creates coherence from assessment to assessment, and permits the frameworks, instruments, and procedures to evolve gradually into the future.

For PIRLS 2021, the frameworks were updated using information provided through reviews by the National Research Coordinators (NRCs) from the participating countries and the descriptions of curriculum and instruction described in the PIRLS 2021 Encyclopedia. The PIRLS 2021 expert committees, the Reading Development Group (RDG) and the Questionnaire Development Group (QDG), also provided very important ideas and direction. There was an iterative process of the frameworks being reviewed and revised by the NRCs and expert committees prior to publication. IEA's TIMSS & PIRLS International Study Center gratefully acknowledges the many important contributions made throughout the process.

CHAPTER 1

PIRLS 2021 Reading Assessment Framework

Ina V.S. Mullis and Michael O. Martin

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.

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.

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.

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.

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CHAPTER 2

PIRLS 2021 Context Questionnaire Framework

Ina V.S. Mullis, Michael O. Martin, and Jenny Liu

Overview

In addition to measuring trends in students' achievement in reading comprehension, PIRLS has the important role of collecting information about students' home and school contexts for learning to read. Decades of educational research, including four assessment cycles of PIRLS, have found that the extent of students' opportunities to learn and the effectiveness of their learning environments substantially impact their reading achievement, with more opportunities and supportive environments associated with higher achievement.

In each PIRLS assessment to date (2001, 2006, 2011, and 2016), the high-quality measure of students' reading achievement together with extensive information about students' in- and out-of-school experiences while learning to read have provided an important resource for research into how to improve reading education. More recently, with trend data from the series of PIRLS assessments, relating changes in students' achievement to changes in educational policies or practices can be a powerful source of evidence for determining if the approaches are beneficial.

As with each previous assessment, the goal of PIRLS 2021 is to build on the existing research base and make PIRLS data even more useful in helping educational policymakers and practitioners raise students' levels of achievement. This involves assigning a high priority to continuing to collect some information to maintain and extend trends, but also means making sure to "keep up with the times" and address new areas of research and policy relevance.

The *PIRLS 2021 Context Questionnaire Framework* articulates the information to be collected via the PIRLS 2021 Questionnaires, providing brief rationales. The framework is organized according to five broad influences on students' reading development: home contexts, school contexts, classroom contexts, student attributes, and national contexts.

The Data Collection Instruments

Consistent with prior assessments, PIRLS 2021 collects the data about students' contexts for learning to read through questionnaires administered to various participants in the education process, including the students' parents and caregivers, the principals of the students' schools, and their reading teachers. The students themselves also complete a questionnaire. Taken together, the information from these four questionnaires provides the data for learning about students' home, school, and classroom experiences. For national contexts, PIRLS 2021 will update the PIRLS encyclopedia that is published with each assessment to describe each country's approach to reading education. As with previous assessments, representatives from each participating country provide the contents of the *PIRLS 2021 Encyclopedia*. They complete a questionnaire about reading education policies at the national level and contribute a chapter to the encyclopedia describing the country's reading curriculum and instructional practices.

The four PIRLS 2021 questionnaires that provide data that can link to each student's reading achievement are described below.

- The Home Questionnaire, entitled the Learning to Read Survey, is addressed to the parents or primary caregivers of each student taking part in the PIRLS 2021 data collection. This short 10-to-15-minute questionnaire solicits information on the home context, such as languages spoken in the home, parents' reading activities and attitudes toward reading, and parents' education and occupation. The questionnaire also collects data on the students' early childhood education, early literacy and numeracy activities, and the child's reading readiness at the beginning of primary school.
- The Teacher Questionnaire, completed by students' reading teachers, gathers information about classroom contexts for reading instruction, such as characteristics of the class, reading instructional time, and instructional approaches. The questionnaire also asks about teacher characteristics, such as their career satisfaction, education, and recent professional development activities. This questionnaire requires about 35 minutes to complete.
- The School Questionnaire, completed by the principal of each participating school, asks about school characteristics, such as student demographics, the school environment, and the availability of school resources and technology. It is designed to take about 30 minutes.
- The Student Questionnaire, given to all students once they have completed the reading assessment, collects information on students' home environment, such as books in the home and other home resources for learning; student experiences in school, including feelings of school belonging and whether they are victims of bullying; and students' reading instruction. Students also are asked about their out-of-school reading habits and attitudes toward reading. The student questionnaire requires up to 30 minutes to complete.

The Development Process

In characterizing students' educational contexts for learning to read, PIRLS focuses on policy relevant and malleable attributes of the home and school that can be used to help interpret differing levels of reading achievement across countries as well as trends from assessment to assessment.

To summarize questionnaire data more reliably, PIRLS has the practice of developing sets of questions related to a topic of interest and combining the results into scales rather than reporting the results of the questions one by one. This practice has evolved from the early assessments and PIRLS 2011 introduced using item response theory (IRT) methods to construct the scales.[1] A number of the PIRLS scales measure constructs that are positively related to student achievement, such as parents' attention to early literacy activities and school safety. First in PIRLS 2016, and now in PIRLS 2021, work continues on improving the content and measurement properties of the context questionnaire scales.

The TIMSS & PIRLS International Study Center works with the PIRLS Questionnaire Development Group (QDG) and National Research Coordinators (NRCs) from the participating countries to update the context questionnaire framework and the questionnaires for each successive PIRLS assessment. This includes addressing new topics, refining scales, and deleting topics that are no longer useful. Development for PIRLS 2021 began in February 2018, when the PIRLS 2021 NRCs from the participating countries made suggestions for updating the questionnaires. Staff at the TIMSS & PIRLS International Study Center drafted an updated context questionnaire framework and updated the home, school, teacher, and student questionnaires based on the NRCs' recommendations. The PIRLS 2021 QDG reviewed the updated framework and questionnaires at its first meeting in February 2019. Subsequently, the TIMSS & PIRLS International Study Center staff revised the framework for online review by the NRCs prior to publication. The questionnaires were revised and reviewed by the NRCs prior to field testing at their third meeting in June 2019. After the field test, the QDG and the NRCs will review and finalize the questionnaires for the PIRLS 2021 data collection.

The remaining sections of the chapter provide the specifications for the PIRLS 2021 context questionnaire data collection.

Home Contexts

PIRLS has repeatedly shown the importance of home contexts for fostering children's reading achievement. PIRLS 2021 focuses on two major aspects of the home that have been found to be of particular importance: the environment for learning and the emphasis on children's literacy skills.

Environment for Learning

Home Resources for Learning

In educational research, the factors related to parents' or caregivers' socioeconomic status are consistently related to students' achievement.[2,3,4,5,6] Socioeconomic status is often indicated through proxy variables such as parental level of education, income, and occupational class. Since the first PIRLS cycle in 2001, PIRLS has reported data on socioeconomic status indicators. In 2011, PIRLS developed the *Home Resources for Learning* scale based on parent and student responses to items focusing on parental education and occupation as well as home resources (e.g., books in the home, children's books in the home, and home study supports). The *Home Resources for Learning* scale expands the classic conception of socioeconomic status to include home resources that have the potential to facilitate student learning.

Parents Like Reading

Parents who like reading and read themselves provide important role models for their children. Promoting reading in the home can foster children's motivation to read as well as their reading achievement.[7,8,9] Parents own reading behaviors and beliefs about reading can shape their child's motivation to read.[10] Socialization can be subtle (e.g., young children seeing adults reading or using texts in different ways learn to appreciate and use printed material) and this process can have long term effects on a student academic performance.[11] PIRLS began collecting information on parents' reading habits and enjoyment in 2001, and in 2011, created the *Parents Like Reading* scale. Indicators of parents liking reading include considering reading an important activity and reading for enjoyment often.

Language Spoken in the Home

It is common for some students to speak one language at home and another at school, especially among immigrant families. In addition, some parents prioritize multilingualism and make great efforts to ensure their child is exposed to more than one language in the home. Because learning to read is dependent on children's early language experiences, the language or languages spoken at home and how they are used are important factors in reading literacy development.[12] If students are not fluent in the language of instruction, often there is an initial learning gap because students must learn the concepts and content of the curricula through a new language.[13,14] PIRLS has collected data on student language background at home since the first PIRLS cycle.

Emphasis on Literacy

Early Literacy Activities

Considerable research, including results from PIRLS, has documented the importance of early childhood literacy activities in fostering higher student achievement in reading.[15,16,17,18,19] Examples of these activities include reading books, telling stories, playing with alphabet toys, talking with their children, helping children write letters or words, and reading aloud signs and labels. Perhaps the most common and important early literacy activity involves adults and older children reading aloud to their young children.[20,21,22] By being read aloud to, children are exposed to oral language, which also is important for literacy acquisition.[23,24,25] Beginning in PIRLS 2001, and in each cycle since then, PIRLS has asked parents about their child's early literacy activities. In 2011, when PIRLS and TIMSS were assessed together, the *Early Literacy Activities Before Beginning Primary School* scale was supplemented with questions about early numeracy activities. PIRLS 2021 asks parents how often they engaged their child in a range of early literacy as well as numeracy activities.

Preprimary Education

Much research has detailed the importance of preprimary education (e.g., preschool, kindergarten, early childhood education programs) as an early start toward higher academic outcomes.[26] High-quality preprimary education and other early childhood interventions are especially beneficial for disadvantaged students because they can play an important role in breaking the generationally repetitive cycle of poverty and low achievement.[27,28] PIRLS always has gathered information from parents about their child's preprimary school attendance and duration of attendance.

Early Literacy Tasks When Beginning Primary School

Quality preprimary education and early literacy activities in the home help children develop foundational literacy skills that support higher achievement in later grades. PIRLS has shown that children whose parents reported that the children could do basic literacy tasks when beginning primary school had higher reading achievement in fourth grade. The *Could Do Early Literacy Tasks When Beginning Primary School* scale created in 2011 asks parents to report on how well their child could do certain literacy tasks, such as recognizing most of the letters of the alphabet and writing some words.

Parental Expectations for Their Children's Education

Parents convey their expectations to their children and provide educational goals for them.[29,30] This includes parents and children talking about the value of education, discussing future educational and occupational expectations for the child, and helping children draw links between schoolwork and its real-world applications.[31,32] PIRLS asks parents about their expectations for their child's education.

School Contexts

PIRLS 2021 collects data about important school contexts for learning. This includes school resources generally and specifically for reading instruction, the school climate for learning, the degree of discipline and safety in the school, and the school's emphasis on reading instruction.

School Resources

School Composition of Student Body

Socioeconomic Background—Since the Coleman report,[33] there has been sustained interest in how the socioeconomic composition of the student body is related to individual student achievement.[34,35,36] There is evidence that students from disadvantaged backgrounds may have higher achievement if they attend schools where the majority of students are from advantaged backgrounds. Some have attributed this association to peer effects—observing a strong student achievement relationship between classmates.[37] The higher achievement for students in socioeconomically advantaged schools also may be partially explained by such schools having better facilities and instructional materials. Additionally, in some countries, schools with high proportions of disadvantaged students have difficulty attracting highly qualified teachers.[38,39] PIRLS routinely collects information from schools about the socioeconomic composition of their student body, including the percentages of students from economically disadvantaged homes and from economically affluent homes.

Languages Spoken in the School—Schools where many students speak a language other than the primary language of instruction may need to have policies and resources that provide extra support for these students. Since 2001, PIRLS has asked principals to indicate the percentage of students in their school who have the language of the PIRLS assessment as their native language. In the majority of past PIRLS assessments, academic achievement was higher in schools where there was a higher percentage of students who speak the language of instruction as their native language.

Literacy Skills of Entering Student Body—Preprimary education as well as learning experiences in the home play important roles in promoting students' literacy skills in preparation for primary school. Students who enter the first grade well-equipped with literacy skills have a stronger foundation for formal reading instruction. Since 2001, PIRLS has collected data on student literacy skills upon entering primary school. The *Schools Where Students Enter the Primary Grades with Early Literacy Skills* scale was developed in PIRLS 2011 to determine the percentage of students who enter schools with literacy skills based on principals' reports. Skills in the scale include whether students can recognize most of the letters of the alphabet, read some words, and write letters of the alphabet. Similarly, as described under Home Contexts, parents also are asked to report on their child's early literacy skills through the *Could Do Early Literacy Tasks When Beginning Primary School* scale.

Resources for Reading Instruction

Adequate working conditions and facilities as well as sufficient instructional resources are important for maintaining a favorable learning environment in schools.[40] Although “adequacy” in terms of resources can be relative, the extent and quality of school resources have been shown to be critical for quality instruction.[41,42,43,44] Based on principals’ perceptions of school resource shortages that affect the school’s capacity to provide instruction, PIRLS results since 2001 have consistently indicated that students in well-resourced schools generally have higher achievement than those in schools with resource shortages. PIRLS 2001 began collecting data on general school needs such as school supplies, adequate school buildings, and instructional space. In later cycles, PIRLS also asked about specific shortages affecting reading instruction such as library resources and educational software/applications (apps). Principals’ reports about school resource shortages are summarized by the *Instruction Affected by Reading Resource Shortages* scale.

School resources also include having computers or tablets available for students for learning purposes. PIRLS regularly creates a student-to-computer ratio for schools. In PIRLS 2016, students in schools with available computers had higher achievement than students in schools with no computers.

School Library or Media Center

The variety and richness of the reading material available to students form the core of students’ reading experience in school. Schools with a well-resourced library or multi-media center may be well-positioned to promote student reading. Research has shown that students use the library when there are books that interest them; therefore, ensuring that there is a variety of current reading materials that would be of interest to the students at each grade is essential to promoting reading achievement.[45] Since 2001, PIRLS has collected information on school libraries, asking principals whether their schools have a library and for the number of books in the library. Because libraries also are becoming multi-media centers, students also can seek information on subjects of interest through access to ebooks, digital periodicals, and online resources. In 2016, PIRLS began gathering school information on the availability of digital learning resources.

While school libraries are common in most countries, some countries have moved toward classroom libraries, as discussed under Classroom Reading Instruction.

Principals’ Formal Education

Principals act as leaders in schools by overseeing school staff, students, and the school environment. Research has shown that strong principal leadership can foster student achievement by creating an atmosphere of collective efficacy through a positive school climate and trust among teachers.[46,47] Recognizing the crucial role school principals play and the importance of highly trained and well-prepared principals, PIRLS 2016 began collecting data on country requirements to become a principal as well as principals' educational background, including their highest level of formal education and qualifications in educational leadership.

Principals' Years of Experience

Principals' years of experience can contribute to their strength of leadership. PIRLS 2016 began asking principals how many years they have been a principal. Because rapid turnover can lead to dips in student achievement,[48,49] principals also are asked how many years they have been a principal in their current school.

Size and Urbanicity of Schools

PIRLS provides data about school size and school urbanicity because these characteristics can impact student learning. Schools vary in the size of student enrollment and can be located in very different geographical areas (e.g., urban, suburban, rural). An advantage of small schools is that they can provide a more intimate learning environment, allowing for more adult support for students through meaningful staff and student relationships and individualized learning.[50] However, smaller schools also may have less supportive infrastructure such as libraries, laboratories, and gymnasia. Depending on the country, schools in urban areas may have access to more resources (e.g., museums, libraries, bookstores) than schools in rural areas.

School Climate

Parents' Perceptions of Child's School

Since 2001, PIRLS has asked parents about their perceptions of their child's school. In 2016, PIRLS created the *Parents' Perceptions of Their Child's School* scale. The scale summarizes parents' or caregivers' level of agreement with statements about school academics, school safety, and schools' efforts to include them in their child's education. The 2016 results showed that most parents tended to be satisfied with the school their child attended, which is consistent with results from other educational surveys.[51,52]

School Emphasis on Academic Success

A school atmosphere of high expectations for academic excellence can contribute to school success. Research has shown that there is a positive association between a school's emphasis on academic success and academic achievement.[53,54] Academic emphasis, collective efficacy in promoting academic performance, and trust among school staff, parents, and students, are indicators of academic optimism in a school, a characteristic that fosters a positive academic environment.[55,56,57] Since PIRLS 2011, the *School Emphasis on Academic Success* scale has asked principals and teachers to characterize their school in terms of a series of teacher, parent, and student attitudes and actions that can contribute to academic success. In 2016, PIRLS expanded the scale to include more items to better capture the construct, asking principals and teachers the degree to which students respect their classmates who excel academically, and parental expectations for student achievement.

Teacher Job Satisfaction

Fostering teacher job satisfaction through a favorable work environment is important in retaining qualified teachers in the classroom.[58] Collaboration and support, as well as other social factors such as a positive school culture and strong principal leadership can be essential for cultivating teacher job satisfaction and retaining teachers.[59,60,61] In contrast, emotional exhaustion from work stress has been found to be negatively related to teacher job satisfaction.[62] PIRLS began reporting data on teacher job satisfaction in 2006 and created the PIRLS *Teacher Job Satisfaction* scale in 2016.

Students' Sense of School Belonging

Students' sense of school belonging, also referred to as school connectedness, has been found to contribute to their general well-being.[63,64] Students with a strong sense of school belonging feel safe at school, enjoy school, and have a good relationship with teachers. The *Students' Sense of School Belonging* scale was developed in PIRLS 2016, asking students to indicate the extent to which they like being in school, how much they feel they belong at the school, and whether teachers are fair to them. The 2016 results showed a positive association between school belonging and academic achievement, corroborating other research on the subject.[65,66,67] PIRLS 2021 improves the scale by including whether students have friends at this school to reflect the importance of positive student relationships within the school community for students' sense of school belonging.[68,69]

School Discipline and Safety

School Discipline

Schools with disciplinary issues can experience problems with bullying, classroom disturbance, and truancy. The sense of security that comes from having a stable school environment with few behavioral problems and little or no concern about student or teacher safety is conducive to student learning. Research shows that schools where rules are clear and enforced fairly tend to have atmospheres of greater discipline and safety.[70,71] In past PIRLS assessments, students in schools with hardly any discipline problems had higher reading achievement than students in schools with disciplinary problems. PIRLS has gathered data on school discipline since 2001, and now includes the *School Discipline* scale developed in 2011. The scale summarizes principals' reports on school discipline based on the degree to which schools have issues with student conduct ranging from intimidation or verbal abuse among students to student cheating.

Safe and Orderly School

School effectiveness research analyzing PIRLS/TIMSS 2011 data has shown that school safety is an important prerequisite for student achievement in many countries.[72] Respect for individual students and teachers, a safe and orderly environment, and constructive interactions among administrators, teachers, parents, and students all contribute to a positive school climate and are associated with higher student achievement.[73,74,75] Together the *School Discipline* scale reported by principals and the

Safe and Orderly School scale reported by teachers gather information on safe schools. Teachers are asked to indicate the extent to which they agree or disagree with various statements on school safety, including whether they feel safe at the school and if they believe school rules are enforced in a fair and consistent manner.

Bullying

Bullying is repeated aggressive behavior that is intended to intimidate or harm the victim and takes a variety of forms, both mental and physical. Bullying causes distress to victims, leads to low self-esteem, and makes victims feel like they do not belong.[76,77,78] Previous PIRLS reports have shown that bullied students tend to have lower reading achievement, aligning with findings of other research.[79,80,81]

PIRLS began collecting data on student bullying in 2001. It developed the student bullying scale in 2011, based on students' reports of how often they experience various bullying behavior ranging from being made fun of to being physically hurt. With the prevalence of the internet and cyberbullying, the *Student Bullying* scale was expanded in 2016, and again for 2021. Cyberbullying behaviors include being sent nasty or hurtful messages or having nasty or hurtful information shared online. Like other forms of bullying, cyberbullying is associated with low self-esteem, distress, and poor achievement.[82,83]

School Emphasis on Reading Instruction

Emphasis in Early Grades on Reading Skills and Strategies

National and school level policies establish the reading curriculum. The extent to which the prescribed national reading curriculum is implemented in schools can be reflected in the school reading curriculum. In every assessment cycle, PIRLS collects data on schools' reading curricula through the fourth grade by asking principals which grades specific reading skills and strategies are first emphasized at their school. These skills range from knowing letters of the alphabet to more advanced skills such as determining the author's perspective or intention.

Time Spent on Language and Reading Instruction

The amount of time that teachers have to teach the reading curriculum is a key factor in curriculum implementation. PIRLS results show countries vary in the intended instructional time prescribed by the curriculum and in the actual time of implementation in the classroom. Research has found instructional time to be related to student achievement,[84] although this relationship may depend on how efficiently and effectively instructional time is used.[85] Since 2001, PIRLS has collected data from teachers on the time spent on reading instruction across the curriculum, and began collecting data on language instruction in 2006. Additionally, instructional time at school and the instructional time prescribed by the language/reading curriculum are reported by principals and the PIRLS National Research Coordinators, respectively.

Classroom Contexts

Because the classroom is the primary locus of instruction, PIRLS 2021 pays particular attention to classroom contexts associated with the teaching of reading. These include student engagement, teaching strategies for comprehension skills, types of texts assigned, organization for teaching, classroom library resources, and classroom assessment. Complementing the introduction of digitalPIRLS, PIRLS 2021 collects data on information technology in the classroom, including access to digital devices (including desktop computers, laptops, or tablets) for reading instruction, use of technology, and instruction in online reading. PIRLS 2021 also collects data on classroom climate and on teacher preparation, professional development, and experience.

Classroom Reading Instruction

Students Engaged in Reading Instruction

Student engagement focuses the student's "in-the-moment" cognitive interaction with the content.[86] Engagement can result from teacher instruction, text discussions with peers, or independent reading. The challenge for the teacher is to use effective methods of instruction that maintain/support student engagement with the content. Classroom support for engagement involves cognitive activation, a clear and well-structured instruction, teacher support through feedback, and teaching adapted to the students' needs and interests. [87,88] Clear instruction is particularly important to ensure students are engaged, including explaining the content in an accessible way and gauging student understanding of the topic. [89,90,91] Additionally, students who find the reading content interesting itself are more likely to be engaged during lessons.

PIRLS developed the *Students Engaged in Reading Lessons* scale in 2011, which includes items about whether the teacher is easy to understand, has clear expectations, gives students interesting things to read, supports students' autonomy, and does a variety of things to help them learn and enhance their reading skills.

Teachers Develop Students' Reading Comprehension Skills and Strategies

Reading fluency has been shown to be related to reading comprehension with students having high achievement in reading comprehension also displaying high levels of reading fluency.[92] PIRLS collects data on the various ways teachers help students practice fluency, including how often teachers ask students to read aloud and silently on their own.

Students who also develop and utilize various comprehension skills and strategies can have a deeper understanding of the text they are reading.[93] Since the first PIRLS cycle, the teacher questionnaire has collected information on the types of reading comprehension skills and strategies taught to students including identifying main ideas and making predictions. Additional items have been added in subsequent cycles to reflect skills and strategies that are important in reading comprehension, such as determining an author's perspective or intention and student ability to self-monitor their reading.

Teachers Encourage and Motivate Students to Read

Fostering student motivation in reading is fundamental for reading teachers, because students who are motivated to read more, especially at a young age, become better readers.[94] Motivation can be facilitated, according to self-determination theory,[95] by creating a supportive environment that fosters a sense of *relatedness*, *competence*, and *autonomy.* A classroom environment that is overly controlling can stifle student motivation because it removes the student's sense of autonomy.[96] One way teachers can foster autonomy in reading instruction is by allowing students the opportunity to choose their reading material.[97] Additionally, supportive teacher-student relationships are important in fostering student motivation.[98] PIRLS asks teachers about how often they do various activities to encourage and motivate students to read such as giving students time to read books of their own choosing and encouraging student discussions of the text.

Types of Texts Assigned

The reading materials teachers assign to students help shape students' reading experiences in school. With the burgeoning increase in readily accessible information on the internet, there has been a push for students to develop the skills to comprehend various forms of informational text. Literary texts also serve important purposes by engaging students through personal identification with characters in a story and encouraging students to think critically when making predictions or connections in the text.[99] Because PIRLS assesses student comprehension in both informational and literary texts, teachers are asked to report how often they assign various types of informational and literary reading materials to their students.

Organizing Students for Reading Instruction

Teachers use a variety of ways of grouping students to maximize the effectiveness of their reading instruction. Generally, small-group instruction can improve reading ability.[100,101] For example, in the guided reading approach to small group reading instruction, teachers form small groups that are focused on instruction involving a specific skill or strategy rather than on reading ability in general. This type of flexible within-class grouping allows for differentiation in order to address the needs of each individual student. Homogeneous grouping by ability is another type of grouping thought to support students in learning at a pace that reflects their skills in the subject. However, research has found that grouping students according to the same reading ability in elementary school may benefit high achieving students but have negative consequences for low performing students.[102,103] The PIRLS teacher questionnaire has routinely collected information on various grouping practices, asking teachers the frequency that reading is taught as a whole-class activity, in groups of same- or mixed-ability students, or to students individually.

Classroom Libraries

Students who have easy access to reading materials are more likely to read, and for this reason, some countries have moved to creating classroom libraries that provide a wide variety of text and text types, including digital resources, as well as a special place for independent reading. The presence of an organized and readily accessible classroom library encourages students to read[104] and can aid teachers in incorporating literature into instruction and fostering positive reading habits and attitudes. However, size and access to classroom libraries can vary depending on the socioeconomic composition of the school, with students from disadvantaged backgrounds having access to fewer books than students from advantaged backgrounds.[105]

In some countries classroom libraries replace school libraries, especially in smaller schools, and in others they complement school libraries. PIRLS began collecting information on the level of access and size of classroom libraries in 2001.

Homework

Homework is one way teachers can extend instruction and evaluate student learning. The amount of homework assigned varies both within and across countries, with homework not assigned at all to fourth grade students in some countries. Although there are differences across countries, teachers who assign homework can discuss the homework in class and provide feedback to students. Since 2001, PIRLS has asked teachers about how often reading homework is assigned to students and the time they expect students to spend on homework. In 2011, PIRLS also began asking teachers how homework is used.

Classroom Assessment

Teachers have a number of ways to monitor student progress and achievement, including direct assessments of what students have learned. PIRLS asks teachers about the types of assessments administered to students. Informal assessments such as observing students as they work, asking students to answer questions during class, and short written assessments help teachers identify needs of particular individuals, evaluate the pace of the presentation, and adapt instruction. Formal tests, both teacher-made and standardized, as well as long-term projects, typically are used to make important decisions about students' achievement (e.g., grades).

Information Technology in the Classroom

Classroom Access to Computers for Reading Instruction

Classroom access to computers for reading instruction is becoming increasingly important in developing students' online educational research skills and expanding their literacy competencies in online reading. Access to digital resources such as PCs and tablets allow teachers to provide instruction in online reading strategies.[106] Since 2001, PIRLS has asked teachers about the availability and access of computers for student use in the classroom. For PIRLS 2021, access includes whether the school provides each student with a digital device, whether the class has digital devices that students can share, and whether students can bring their own digital devices to class.

Use of Technology

Teachers' attitudes such as self-efficacy toward technology are related to the use of technology in the classroom.[107] Teachers who often use technology for instruction are more confident in using technology compared to teachers who are less frequent users.[108] PIRLS 2021 gathers information on teachers' level of confidence in using digital devices in instruction.

Classroom technology can be used to create individualized instruction. While technology use in primary grades is often used for remedial purposes, technology also can provide challenging enrichment activities for more advanced students.[109] Also new to PIRLS 2021 are data on how often teachers use digital devices to support learning for low-performing students, high-performing students, students with special needs, and for the whole class.

Instruction in Online Reading

Reading instruction includes specific instruction in online reading strategies.[110,111,112] Compared to print media, reading on the internet poses numerous additional challenges as readers need to navigate non-linearly to locate information, evaluate the credibility of online information, and synthesize information across websites and modes. Since 2001, PIRLS has collected information on how often teachers ask students to perform various computer activities such as read texts on the computer or use the computer to write stories. With the development of ePIRLS in 2016, additional items were included to gather information on online reading instructional practices and strategies, such as whether teachers taught students how to be critical when reading on the internet and strategies for reading digital text.

Classroom Climate

Classroom Management

Teachers who are strong classroom managers are able to minimize disruptions to instruction and focus instructional time on teaching the curricular content. Research has shown a positive association between effective classroom management and student achievement.[113,114,115] Measures of classroom management examine whether class lessons are disrupted, whether students respect the teacher, and whether students behave according to teacher instructions.[116,117] New for PIRLS 2021, information on classroom management is gathered through a series of items asking students to indicate the frequency with which various threats to effective classroom management such as disruptive noise and student interruption occur during reading lessons.

Classroom Instruction Limited by Student Attributes

Student attributes such as hunger or lack of sleep can limit the impact of classroom instruction and make some classes more challenging to teach than others. Developed for PIRLS 2016, the *Classroom Instruction Limited by Student Attributes* scale summarizes teachers' reports about student absences, hungry or tired students, and students who do not have the prerequisite foundation of content knowledge to learn the reading content. Students also are asked to report whether they feel tired and hungry, and how often they are absent from school.

Teachers' Preparation

Teachers' Formal Education

Teacher education is critical for effective teaching,[118,119] with prospective teachers needing coursework to gain knowledge in the subjects that they will teach, to understand how students learn, and to learn about effective pedagogy for teaching reading. Analysis conducted using PIRLS data showed a relationship between teachers' reading coursework and PIRLS reading achievement.[120] Additionally, as reported by PIRLS 2016, many countries have increased their educational requirements for primary school teachers and almost all countries now require fourth grade teachers to have a four-year degree from a university. In every assessment cycle, PIRLS has collected information on teachers' formal education, areas of study, and national policies and practices on teacher education. Teachers are asked about their highest level of schooling completed, main areas of study such as primary/elementary education or secondary education, and the extent to which they studied specific areas of reading (e.g., literature, education psychology, reading theory). National Research Coordinators report information on national policies and practices on teacher education and the requirements to become a teacher.

Teachers' Years of Experience

In addition to teacher education and training, teaching experience is important for teacher development, especially in the first years of teaching.[121,122,123] Research also has found that teachers continue to develop pedagogical skills after five years of experience, and that this development can positively affect student achievement.[124,125,126] PIRLS routinely collects data on teachers' years of experience.

Teachers' Professional Development

The *PIRLS 2016 Encyclopedia* indicates that many countries are increasing efforts to provide teachers with professional development opportunities. Professional development can help teachers increase their effectiveness and broaden their knowledge and is especially important for exposing teachers to recent developments such as curricular changes or new technology for classroom instruction. For example, professional development is crucial for training teachers on how to incorporate online reading into their classroom practices.[127] Additionally, for professional development to be effective, professional development opportunities should engage teachers through concrete tasks, be sustained and ongoing, and provide teachers the space to reflect on their teaching.[128,129] Support systems also should be in place to encourage teachers to partake in professional development.[130] Since 2001, PIRLS has asked teachers about their professional development. For PIRLS 2021, the teacher questionnaire builds on the professional development topic area and collects information on teacher participation and demand in specific areas of professional development (e.g., teaching reading comprehension skills and strategies, instruction related to digital literacies). PIRLS 2021 also gathers data on the type of professional development (e.g., workshops, seminars, mentor access) that is most useful to teachers, and on barriers to teacher participation in professional development activities.

Student Attributes

PIRLS 2021 collects data on important student attributes including student reading attitudes and student demographics. Students who are motivated to read and have a strong reading self-concept tend to have better reading comprehension,[131] and cultivating these attitudes also may support students in becoming lifelong readers. Results from PIRLS have shown relationships between positive reading attitudes and reading achievement. It is noted that achievement and attitudes can be mutually reinforcing of one another. Better readers may enjoy and value reading more than poorer readers, thus reading more and further improving their skills. Because student demographics are important for analyzing reading achievement, PIRLS also collects data on student gender and age.

Student Reading Attitudes

Students Like Reading

Student readers who are intrinsically motivated find reading interesting and enjoyable for its own sake. Intrinsic motivation is the "energizer of behavior,"[132] and research has shown that intrinsic motivation is more closely related to reading achievement than extrinsic motivations such as praise and money.[133,134] PIRLS has recognized the importance of collecting data on students' attitudes toward reading since its inception. In 2011, PIRLS developed the *Students Like Reading* scale to measure students' intrinsic motivation to read. Students are asked how much they agree with statements about liking more time to read, reading for fun, and learning a lot from reading. The scale was revised in 2016 and additional items were included to better measure the construct.

Students Confident in Reading

Students tend to have distinct views of their own reading ability, and their self-appraisal is often based on their past experiences and how they see themselves compared with their peers.[135] Students who are confident in their ability persevere in completing a school task because they believe they can be successful.[136] PIRLS has asked about students' self-concept as readers from the beginning. Since 2011, reading self-concept has been measured using the *Students Confident in Reading* scale. Students are asked to indicate the extent to which they agree with statements such as "reading is easy" and "I usually do well in reading."

Familiarity in Using Digital Devices

According to the *PIRLS 2016 Encyclopedia*, PIRLS countries are working toward integrating technology into instruction across the curriculum to help students develop Information and Communications Technology (ICT) and digital literacy skills. With the introduction of ePIRLS in 2016, PIRLS began asking students about using digital devices. Students were asked how well they could use the computer, type, and find information online. Results from 2016 showed a positive association between students' computer use and their achievement in online informational reading, which aligned with other similar research.[137,138] PIRLS 2021 includes a new scale measuring students' familiarity with using computers or tablets as well as their confidence in finding information on the internet.[139]

Students Liking of Assessment Passages

Students who enjoy the reading content are more interested and engaged with the text than students who do not enjoy the reading content. PIRLS aims to develop a variety of texts that are interesting to a wide range of students. In PIRLS 2016, most students (over 80%) participating in PIRLS liked the PIRLS passages and ePIRLS tasks.

Student Demographics

Gender

Over the last four cycles of PIRLS, the gender gap in reading achievement has favored girls over boys in the majority of participating countries. In PIRLS 2016, girls outperformed boys in 48 out of the 50 countries, reflecting a pattern seen in research.[140] Similar results favoring girls were found in the ePIRLS assessment of online informational reading.

Age

Students at different ages may perform differently on PIRLS depending on their academic history. In countries where students are admitted to primary school strictly on the basis of age, older students may be more skilled in reading comprehension compared to younger peers because of greater maturation. However, depending on retention policies, older students who have been held back may struggle more with reading comprehension than students who have not been held back.

National Contexts

In every country, the educational system is embedded in a unique configuration of historical, economic, and language factors that combine to determine priorities in how the system is organized for teaching and learning. Countries participating in PIRLS 2021 contribute information on many of these factors through their chapter in the *PIRLS 2021 Encyclopedia* and by way of the curriculum questionnaire. More specifically, countries provide information about the organization of the education system and the reading curriculum.

Organization of Education System

Country Language(s) of Instruction

The historical background of language and literacy in a country can influence the challenges and instructional practices in teaching students to read. For example, some countries have one commonly spoken language, while others are historically multilingual. Immigration also can increase language diversity. Multilingual countries across the world have different policies for educating their population and specifically for language literacy. Thus, decisions about the language(s) of instruction and how to implement those decisions can be very complicated.

System for Preprimary Education

Even before children begin formal primary school, they receive considerable exposure to literacy as part of their preprimary educational experience (e.g., preschool, kindergarten). Preprimary education is an area of investment for many countries. Research findings indicate that attendance in preprimary programs can have a positive effect on academic outcomes.[141] The PIRLS curriculum questionnaire gathers information on countries' provisions of early childhood education and preprimary education detailing the degree of universal coverage. In PIRLS 2016, almost all participating countries provided universal preprimary education for children age 3 or older, and a number of countries also sponsored universal programs for children younger than 3 years old. Additionally, the European Union recently legislated that member countries should provide universal access to preprimary education[142] and Norway recently began universal access to early childhood education starting at age 1.[143]

It is also becoming increasingly clear that the effect of preprimary education on later academic and life outcomes is dependent on the quality of the preprimary program.[144,145,146] PIRLS gathers data on any associated curriculum for early childhood and preprimary education. As described in the *PIRLS 2016 Encyclopedia*, preprimary education programs often have curricula that focus on children's physical and socioemotional development and incorporate literacy and numeracy pedagogy as well as experiential science activities.

Age of Entry and Retention

Policies about the age of entry into formal education (first year of primary school, ISCED Level 1) are important for understanding achievement differences as well as the variation in students' ages across countries at the fourth grade.[147] Students who enter school at an older age are more mature at school entry and may be able to cope more easily with complex reading materials from the first grade onward. Data on country's age of entry to primary school are reported by National Research Coordinators.

Additionally, because PIRLS is a grade-based study, PIRLS also gathers information on countries' student promotion and retention policies, an important factor to consider when evaluating achievement results. Research has shown that grade retention does not have a positive relationship with student achievement or the emotional well-being of the student and is overall inefficient.[148,149] For these reasons, many PIRLS countries practice automatic promotion, especially in the primary grades.[150]

Number of Years of School

More years of required schooling allow more time for students to learn and become more educated individuals with higher educational attainment. PIRLS collects data on nationally mandated compulsory years of education. In PIRLS 2016, most countries reported beginning compulsory education around age 6 and ending compulsory education around age 16.

Reading Curriculum

Reading Curriculum in the Primary Grades

Whether formulated at the national, community, or school level, countries have curricula that define what students should be taught, providing expectations for students in terms of the knowledge, skills, and attitudes to be developed or acquired through their formal reading instruction.

Curricular aspects and governing policies particularly relevant to the acquisition of reading literacy include the standards or benchmarks established for reading development. A coherent progression of instruction and comprehension strategies for reading development includes a change in emphasis from decoding to comprehension strategies, and access to a wide variety of reading materials, as well as sensible differentiation policies for accelerated readers and struggling readers.

Especially relevant to the ePIRLS assessment of online informational reading is the extent to which a country's curriculum emphasizes online reading and new media. As documented in the *PIRLS 2016 Encyclopedia*, some countries have transformed their standards, curriculum, and assessments in order to address teaching elementary school students digital reading strategies such as how to navigate and retrieve online information.[151,152]

In every assessment cycle, PIRLS National Research Coordinators report on their country's reading curriculum through the PIRLS encyclopedia. Data gathered about the reading curriculum from the curriculum questionnaire has evolved over the cycles to also include how the implementation of the curriculum is evaluated, the use of technology in reading instruction, and the degree of emphasis placed on digital reading in the curriculum.

Students with Reading Difficulties

Countries have taken initiatives to ensure that education is inclusive of all students, providing equal educational opportunities to all students, including those with reading difficulties.[153] In order for appropriate accommodations to be made to student learning and assessment, it is important to identify students who need these accommodations. Identification of reading difficulties such as dyslexia early in students' education can help educators determine the best course of action for these students and prevent students from falling further behind in their reading development.[154] PIRLS 2021 gathers information on national provisions regarding diagnostic testing for reading difficulties and instruction for children with reading difficulties.

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CHAPTER 3

PIRLS 2021 Assessment Design

Michael O. Martin, Matthias von Davier, Pierre Foy and Ina V. S. Mullis

Overview

PIRLS 2021 is a comprehensive assessment of fourth grade students' reading literacy achievement. Conducted on a regular five-year cycle, with each assessment linked to those that preceded it, PIRLS provides regular data on trends in students' reading literacy on a common achievement scale. PIRLS 2021 begins the transition from paper-and-pencil to digital format, with about half the countries choosing to administer the digital format (digitalPIRLS) and half the paper format (paperPIRLS). To ensure comparability across formats, digitalPIRLS and paperPIRLS have the same content in terms of reading passages and questions, although digitalPIRLS takes advantage of some features and item types not available in paper and pencil mode. Countries choosing digitalPIRLS will also administer ePIRLS, an assessment of online reading to acquire and use information first conducted as part of PIRLS 2016. Similar to previous PIRLS assessments, PIRLS 2021 includes a series of contextual questionnaires to gather information about community, home, and school contexts for developing reading literacy.

Based on PIRLS experience in earlier assessment cycles, it is clear that achievement levels in reading comprehension vary widely both across and within countries, posing a challenge in matching the difficulty of the assessment to the reading ability of the students in every country. When an assessment is much too difficult or too easy for a population, little information is available to accurately measure performance. To address this challenge, PIRLS in the past has offered less difficult versions of its assessment materials that countries could choose to administer, beginning with prePIRLS in 2011 and following up with PIRLS Literacy in 2016. These efforts were successful in expanding PIRLS coverage of students at the lower end of the ability distribution but required separate (although linked) versions of PIRLS and did not address the need for more challenging material for higher achieving students.

PIRLS 2021 addresses the need for a broader range of assessment difficulty and better targeting of student ability by adopting a single unified assessment based on a new group adaptive assessment design (Click here for the rationale underlying adaptive assessment designs). The new design is based on having three levels of passage difficulty—difficult, medium, and easy—that are combined into two levels of booklet difficulty. More difficult booklets are composed of two difficult passages or one medium and one difficult passage while less difficult booklets consist of an easy and a medium passage or two easy passages. Each country administers the entire assessment, but the balance of more difficult and less difficult booklets varies with the reading achievement level of the students in the country. For example, a country with higher average reading achievement (average score of 550 or above) could assign the more difficult booklets to 70% of its students and the less difficult booklets to 30% of its students, whereas a country with lower achievement levels (average score of 450 or below) could assign the more difficult booklets to 30% of its students and the less difficult booklets to 70%.

The group adaptive design improves the match between assessment difficulty and student ability in each country's population by having a greater proportion of more difficult booklets in countries with relatively high achievement and a greater proportion of less difficult booklets in countries with relatively low achievement. Accordingly, the new design maximizes the information obtained from the assessment while minimally changing existing procedures and time requirements.

Although the group adaptive design was developed to provide a better match between assessment difficulty and student ability at the country level, it also is possible to apply the approach within a country, provided the country has clearly defined subpopulations that differ substantially in student achievement.

Student Population Assessed

PIRLS assesses the reading literacy of children in their fourth year of formal schooling. This student population was chosen for PIRLS because it is an important transition point in children's development as readers. Typically, at this point, students have mastered the basics of learning to read and are now reading to learn. In many countries, this also is when students begin to have separate classes for different subjects, such as mathematics and science.

PIRLS defines the fourth year of formal schooling according to the International Standard Classification of Education (ISCED) developed by the UNESCO Institute for Statistics.[1] The ISCED classification provides an international standard for describing levels of schooling across countries, and covers the full range of schooling, from early childhood education (Level 0) to doctoral study (Level 8). ISCED Level 1 corresponds to primary education, or the first stage of basic education, and is considered to be the first stage of formal schooling.

The target population for PIRLS is defined as follows:

> The PIRLS target grade should be the grade that represents four years of schooling, counting from the first year of ISCED Level 1.

The PIRLS target grade is four years after the beginning of Level 1, which is the fourth grade in most countries. However, given the linguistic and cognitive demands of reading, PIRLS wants to avoid assessing very young children. Thus, if the average age of fourth grade students at the time of testing would be less than 9.5 years, PIRLS recommends that countries assess the next higher grade (i.e., fifth grade).

Reporting Reading Achievement

The PIRLS assessment is designed to provide a complete picture of the reading literacy achievement of the participating students in each country. This includes achievement by reading purpose and comprehension process as well as overall reading achievement. Consistent with the goal of a comprehensive view of reading comprehension, the entire PIRLS 2021 assessment, digital and paper versions, consists of 18 reading passages and accompanying questions (known as items), half assessing reading for literary experience and half assessing reading to acquire and use information. In accordance with the group adaptive design, one third of the passages are relatively difficult, one third of medium difficulty, and one third relatively easy. Countries administering digitalPIRLS also administer ePIRLS, which consists of five tasks that assess online informational reading.

In order to keep the assessment burden on any one student to a minimum, each student is presented with just two passages, one literary and one informational, according to a systematic booklet assembly and rotation procedure, as described in the next section. In digitalPIRLS countries, some students also are presented with ePIRLS material, either two ePIRLS tasks, or one digitalPIRLS informational passage followed by one ePIRLS task. The PIRLS administration consists of two 40-minute sessions, one for each passage or task, separated by a short break, and followed by a 30-minute session for the student questionnaire. Following data collection, student responses to the assessment passages are placed on the PIRLS reading achievement scales using item response theory methods that provide an overall picture of the assessment results for each country.[2]

PIRLS was designed from the outset to measure trends over time in student reading achievement. Accordingly, the PIRLS reading achievement scale provides a common metric on which countries can compare their fourth grade students' progress in reading over time from assessment to assessment. The PIRLS achievement scale was established in 2001 so that 100 points on the scale corresponded to one standard deviation across all of the countries that participated in 2001, and the scale centerpoint of 500 corresponded to the international average across those countries. Using passages that were administered in both the 2001 and 2006 assessments as a basis for linking the two sets of assessment results, the PIRLS 2006 data also were placed on this scale so that countries could gauge changes in students' reading achievement since 2001. Following a similar procedure, the PIRLS 2011 and PIRLS 2016 data also were placed on the PIRLS scale, as will be the data from PIRLS 2021. This will enable countries that have participated in PIRLS since its inception to have comparable achievement data from 2001, 2006, 2011, 2016, and 2021, and to plot changes in performance over this 20-year period.

The PIRLS reading achievement scale is an overall measure of reading proficiency that includes both reading purposes and processes of comprehension. However, in addition to the overall scale, PIRLS also provides separate achievement scales on the same metric for purposes for reading and for processes of comprehension. More specifically, there are two scales for reading purposes:

- Reading for literary experience; and
- Reading to acquire and use information.

In addition to these, there also are two scales for processes of reading comprehension:

- Retrieval and straightforward inferencing; and
- Interpreting, integrating, and evaluating.*

Countries participating in digitalPIRLS also administer ePIRLS; so, in addition to the usual PIRLS overall reading achievement results and results by reading purpose and comprehension process, in countries participating in digitalPIRLS, student achievement will also be reported for online informational reading. The ePIRLS online reading achievement scale was established in 2016 to enable countries to examine their students' online reading performance relative to their performance on the PIRLS reading achievement scales.

PIRLS 2021 Group Adaptive Design

Implementing the group adaptive design in PIRLS 2021 required grouping the assessment passages and items into three levels of difficulty—easy, medium, and difficult—with three literary and three informational passages at each level of difficulty. Of the 18 passages needed for the design, 12 were administered previously in PIRLS 2016 and were available to support the measurement of trends and six were developed and field tested for first time use in PIRLS 2021.

In 2016, the main PIRLS assessment was accompanied by PIRLS Literacy, which was a reading assessment similar to PIRLS in size and scope but less difficult, with shorter and less demanding passages and easier items. Taking PIRLS and PIRLS Literacy together, there were eight passages (four literary and four informational) that appeared only in PIRLS, four shared passages (two for each purpose) that appeared in both PIRLS and PIRLS Literacy, and eight passages (again four for each purpose) that appeared in PIRLS Literacy only. The 12 trend passages for 2021 were chosen from among these passages, with the difficult passages drawn from the PIRLS only passages, the medium passages from the passages shared between PIRLS and PIRLS Literacy (with one exception), and the easy passages from those used in PIRLS Literacy only.

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* Retrieval and straightforward inferencing combines items from the Focus on and Retrieve Explicitly Stated Information and Make Straightforward Inferences comprehension processes. Similarly, interpreting, integrating, and evaluating is based on items from the Interpret and Integrate Ideas and Information and Examine and Critique Content and Textual Elements processes.

Exhibit 1: Reading purpose and difficulty level for 18 PIRLS 2021 passages

Passages

Reading Purpose	Difficulty Level	Passage Label*	Passage Name*
Literary	Difficult	LitD1 (06)	Shiny Straw (06)
		LitD2 (16)	Oliver and the Griffin (16)
		LitD3 (21)	New LitD3 Passage (21)
	Medium	LitM1 (16)	Pemba Sherpa (16)
		LitM2 (21)	New LitM2 Passage (21)
		LitM3 (11)	The Empty Pot (11)
	Easy	LitE1 (21)	New LitE1 Passage (21)
		LitE2 (11)	The Summer My Father Was 10 (11)
		LitE3 (16)	Library Mouse (16)
Informational	Difficult	InfD1 (11)	Where's the Honey? (11)
		InfD2 (16)	Icelandic Horses (16)
		IndD3 (21)	New InfD3 Passage (21)
	Medium	InfM1 (16)	How Did We Learn to Fly? (16)
		InfM2 (21)	New InfM2 Passage (21)
		InfM3 (06)	Sharks (06)
	Easy	InfE1 (21)	New InfE1 Passage (21)
		InfE2 (11)	Training a Deaf Polar Bear (11)
		InfE3 (16)	Hungry Plant (16)

* The number in parentheses is the assessment year in which the passage was first used.

Exhibit 1 shows how the existing trend passages fit into the purpose-by-difficulty level scheme, and also where the new passages and items belong. Of the six new passages, three will be literary and three informational, with one of each in each of the difficulty categories. The exhibit also includes a passage label for each passage to facilitate assignment of passages to booklets.

Passage Difficulty Level

For the design to be effective, it is necessary that there be distinct differences between the average difficulties of the passages in each of the passage groups. For example, reasonable difficulty goals in terms of average percent correct across the student population would be 40% for the difficult group, 60% for the medium group, and 80% for the easy group. New passages developed for PIRLS 2021 will aim for these difficulty levels, but there is less flexibility with the existing, trend passages, which make up two-thirds of the passage total.

Exhibit 2: **Average difficulties of existing trend passages from 2016 and target difficulties for 2021 (average percent correct)**

Passage Level	Difficulty of Trend Passages from 2016	Target Difficulty for 2021
Difficult	55%	50%
Medium	68%	65%
Easy	80%	80%

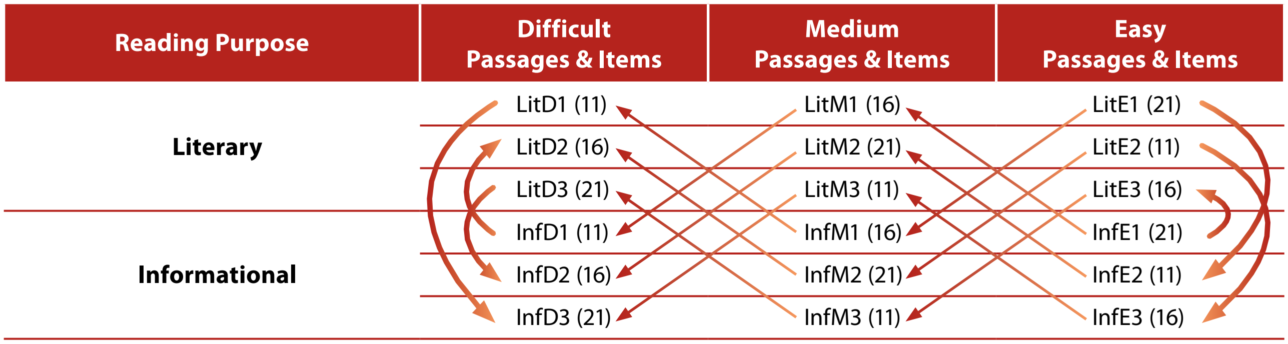
As shown in Exhibit 2, the difficulties of the existing medium and difficult trend passages (68% and 55%, respectively) are higher than the long-term goals (60% and 40%, respectively), especially for the difficult passages. However, by combining the existing passages with new passages developed to be closer to the target difficulty, it will be possible to make progress in 2021 toward these long-term goals. Exhibit 2 shows the interim target difficulties for 2021, which should be attainable given the mix of existing and new passages. Further progress will be made toward the long-term goals in PIRLS 2026, as more of the trend passages are replaced by new, more targeted passages.

Booklet Design

In the PIRLS assessment, each student is randomly assigned a test booklet (or booklet equivalent in digitalPIRLS) consisting of two passages and their items. In PIRLS 2021, the 18 passages are arranged into 18 booklets of two passages each, with each passage appearing in two booklets and paired with a different passage each time. Exhibit 3 summarizes the passage pairs that make up each booklet. The direction of the arrows shows which passage comes first in the booklet. For example, an arrow points from passage InfM1 to LitD1, indicating that these two passages share a booklet, with InfM1 preceding LitD1. Note that when passages of different difficulties are paired in the same booklet, the easier of the two always comes first.

Exhibit 3: **Passage pairings for each assessment booklet**

Passages and Links



Reading Purpose	Difficult Passages & Items	Medium Passages & Items	Easy Passages & Items
Literary	LitD1 (11)	LitM1 (16)	LitE1 (21)
	LitD2 (16)	LitM2 (21)	LitE2 (11)
	LitD3 (21)	LitM3 (11)	LitE3 (16)
Informational	InfD1 (11)	InfM1 (16)	InfE1 (21)
	InfD2 (16)	InfM2 (21)	InfE2 (11)
	InfD3 (21)	InfM3 (11)	InfE3 (16)

The 18 booklets are divided into two levels of difficulty, as follows:

- More difficult booklets (9) composed of either two difficult passages or one medium and one difficult passage
- Less difficult booklets (9) composed of two easy passages or one easy and one medium passages.

Exhibit 4 shows the passage assignments for the 18 booklets, with booklets 1-9 being the more difficult booklets and booklets 10-18 the less difficult ones.

Exhibit 4: Assessment booklets with passage assignments

Student Assessment Booklets		Part 1	Part 2
More Difficult Booklets	Booklet 1	InfM1 (16)	LitD1 (11)
	Booklet 2	LitD3 (21)	InfD2 (16)
	Booklet 3	LitM1 (16)	InfD1 (11)
	Booklet 4	InfM2 (21)	LitD2 (16)
	Booklet 5	LitD1 (11)	InfD3 (21)
	Booklet 6	LitM2 (21)	InfD2 (16)
	Booklet 7	InfM3 (11)	LitD3 (21)
	Booklet 8	InfD1 (11)	LitD2 (16)
	Booklet 9	LitM3 (11)	InfD3 (21)
Less Difficult Booklets	Booklet 10	LitE1 (21)	InfM1 (16)
	Booklet 11	InfE2 (11)	LitM2 (21)
	Booklet 12	InfE1 (21)	LitE3 (16)
	Booklet 13	LitE2 (11)	InfM2 (21)
	Booklet 14	InfE3 (16)	LitM3 (11)
	Booklet 15	LitE1 (21)	InfE2 (11)
	Booklet 16	LitE3 (16)	InfM3 (11)
	Booklet 17	InfE1 (21)	LitM1 (16)
	Booklet 18	LitE2 (11)	InfE3 (16)

Exhibit 5 also presents the passage assignments for each booklet, this time showing where the 12 existing trend passages belong and where the new passages developed for 2021 will go.

Exhibit 5: Assessment Booklets with Trend and New Passage Assignments

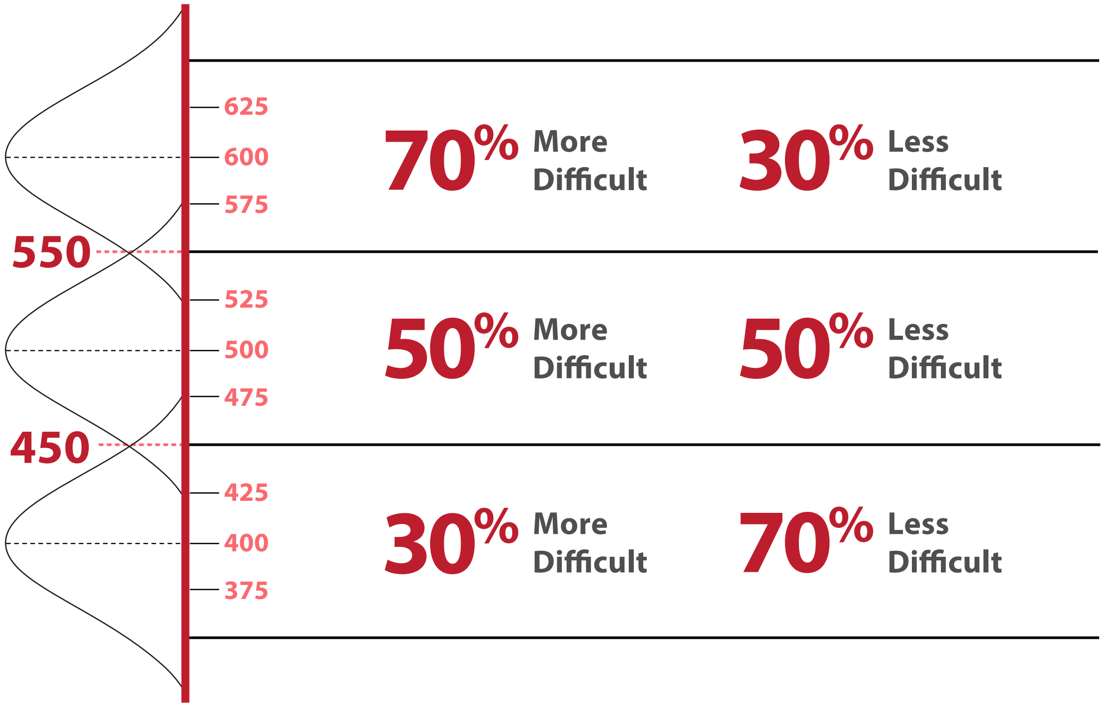
Student Assessment Booklets		Part 1	Part 2
More Difficult Booklets	Booklet 1	How Did We Learn to Fly? (16)	Shiny Straw (06)
	Booklet 2	New LitD3 Passage (21)	Icelandic Horses (16)
	Booklet 3	Pemba Sherpa (16)	Where's the Honey? (11)
	Booklet 4	New InfM2 Passage (21)	Oliver and the Griffin (16)
	Booklet 5	Shiny Straw (06)	New InfD3 Passage (21)
	Booklet 6	New LitM2 Passage (21)	Icelandic Horses (16)
	Booklet 7	Sharks (06)	New LitD3 Passage (21)
	Booklet 8	Where's the Honey? (11)	Oliver and the Griffin (16)
	Booklet 9	The Empty Pot (11)	New InfD3 Passage (21)
Less Difficult Booklets	Booklet 10	New LitE1 Passage (21)	How Did We Learn to Fly? (16)
	Booklet 11	Training a Deaf Polar Bear (11)	New LitM2 Passage (21)
	Booklet 12	New InfE1 Passage (21)	Library Mouse (16)
	Booklet 13	The Summer My Father Was 10 (11)	New InfM2 Passage (21)
	Booklet 14	Hungry Plant (16)	The Empty Pot (11)
	Booklet 15	New LitE1 Passage (21)	Training a Deaf Polar Bear (11)
	Booklet 16	Library Mouse (16)	Sharks (06)
	Booklet 17	New InfE1 Passage (21)	Pemba Sherpa (16)
	Booklet 18	The Summer My Father Was 10 (11)	Hungry Plant (16)

Booklet Assignment within Countries

To ensure that the same assessment is conducted in every country, all 18 passages are distributed in every country, but with varying proportions of the more and less difficult booklets depending on the average reading ability of the student population. This is estimated based on performance in prior PIRLS assessments, or in the field test for countries participating for the first time. Higher performing countries sample proportionally more of the more difficult booklets while lower performing countries sample proportionally more of the less difficult booklets, with the goal of a better match between assessment difficulty and student ability in each country.

Exhibit 6 illustrates the differential booklet assignment plan for higher, middle, and lower performing countries. Countries with higher average performance, above 550 on the PIRLS achievement scale, would randomly assign proportionally more of the more difficult booklets, e.g., 70%, and fewer of the less difficult booklets, e.g., 30%. Countries with performance between 450 and 550 would assign equal proportions of more and less difficult booklets, and countries with lower average performance, below 450 on the PIRLS scale, would assign proportionally fewer of the more difficult booklets (30%) and more of the less difficult booklets (70%).

Exhibit 6: Booklet assignment plan for higher, middle, and lower performing countries



Integrating ePIRLS with digitalPIRLS

The ePIRLS assessment of online informational reading in 2021 consists of five tasks presented by computer or tablet. With the guidance of a teacher avatar, students navigate within and across webpages to answer questions, explain relationships, and interpret and integrate information. Three of the tasks were administered as part of ePIRLS 2016 and are available for measuring trends and two were developed for PIRLS 2021. As a step toward the future further integration of PIRLS and ePIRLS, in digitalPIRLS countries ePIRLS tasks are included in the booklet assignment rotation scheme, as are a number of “hybrid” booklets consisting on one digitalPIRLS informational passage followed by one ePIRLS task. This means that students participating in digitalPIRLS may be presented with one of three booklet types: a regular booklet with two digitalPIRLS passages, an ePIRLS booklet with two ePIRLS tasks, or a hybrid booklet with one digitalPIRLS informational passage followed by one ePIRLS task.

digitalPIRLS Booklet Assignment Rotation Schemes

The basic assignment rotation scheme for digitalPIRLS is designed to match that of paperPIRLS, and so has the same 18 passages arranged in the same 18 booklets as paperPIRLS. In paperPIRLS these 18 booklets are distributed among the students in sampled classes using a systematic random assignment process that ensures that the proportions of more and less difficult booklets conform to the rates established for the country. digitalPIRLS follows a similar assignment process for the 18 regular booklets, but also includes provision for the ePIRLS and hybrid booklets.

Similar to the ePIRLS assignment rotation scheme used in 2016, each of the five ePIRLS tasks for 2021 is paired with each of the others, with each task appearing in both the first and second positions in each booklet. This results in 20 distinct ePIRLS booklets. In the hybrid booklets, each of the nine digitalPIRLS informational passages is paired with each of the five ePIRLS tasks, resulting in 45 hybrid booklets. In each one, the digitalPIRLS passage precedes the ePIRLS task.

Combining the 18 digitalPIRLS booklets, the 20 ePIRLS booklets, and the 45 hybrid booklets results in a total of 83 booklets to be rotated among the sampled students. However, including each booklet type in the rotation at the same rate would result in too few digitalPIRLS booklets relative to the other booklet types, and especially relative to the number of such booklets in paperPIRLS countries. To avoid this imbalance, digitalPIRLS uses a 27 booklet rotation that includes all 18 digitalPIRLS booklets, six ePIRLS booklets, and three hybrid booklets. The assignment of booklets to individual students is conducted by IEA's WinW3S within school sampling software to ensure accurate implementation of the rotation scheme.

Beginning with a booklet chosen at random by WinW3S, the first iteration of this rotation involves all 18 digitalPIRLS booklets, booklets 1 to 6 of the 20 ePIRLS booklets, and booklets 1 to 3 of the hybrid booklets. The second iteration includes the 18 digitalPIRLS booklets again, together with ePIRLS booklets 7 to 12 and hybrid booklets 4 to 6. This pattern continues with the next iteration including the 18 digitalPIRLS booklets once again, together with ePIRLS booklets 13 to 18 and hybrid booklets 7 to 9, and so on throughout the country's entire student sample. This booklet assignment scheme results in two thirds of the student sample responding to digitalPIRLS booklets, two ninths to ePIRLS booklets, and one ninth to hybrid booklets.

The PIRLS 2021 group adaptive design represents a change from the design of previous PIRLS assessments, where booklets of approximately equal difficulty were distributed at random among students in sampled classes with equal probability in each country. By allowing booklets that vary in difficulty to be assigned at country specific rates, the group adaptive design aims to improve the accuracy of measurement in countries participating in PIRLS.

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APPENDIX A

Rationale for Group Adaptive Designs in International Large Scale Assessment

Different test forms (booklets) are commonly used in large scale international assessments such as PIRLS to balance respondent burden and content coverage. Country level group adaptive assessment designs extend this approach through targeted sampling of booklets to provide better coverage of the diverse range of ability distributions encountered in such assessments. This can increase student motivation and reduce item level nonresponse. The PIRLS 2021 approach is designed to minimally change existing procedures and time requirements, while using prior data about country performance to maximize the information obtained from the assessment.

The basic idea behind adaptive assessment is that in order to enable any type of measurement, tasks must not be too easy or too difficult for the target population. If the tasks given to a sample of test takers are too difficult, nobody (or almost nobody) will be able to solve them. Similarly, if the tasks are too easy, everybody will answer them all correctly. In each of these situations all test takers receive the same observed scores, even if they are known to differ with respect to relevant skills.

For this reason, in educational and psychological measurement we try to craft test questions that match the ability of the targeted population of test takers, and quantify differences among test takers by eliciting responses that differentiate between higher and lower skilled respondents. A series of tasks that matches the skills of test takers will likely result in some correct and some incorrect responses. Mathematically, the variability of such a binary response (choice of correct versus incorrect option) is maximized when there is a 50% chance to get the tasks right. This 50/50 criterion leads to different requirements for different test takers. More proficient test takers require more challenging questions in order to have (only) a 50% chance, while less proficient test takers require a series of easier tasks to arrive at a 50% chance of correct responses. In order to achieve this optimal match for all test takers, it would be necessary to adjust the test difficulty for each individual respondent. However, since this is only possible if the exact difficulty of all items is known (or can be estimated well with little error), many testing programs instead rely on a variation of this individual level adaptivity and adapt their tests according to the known, or estimated, average ability levels of pre-defined groups, rather than individuals.

Existing Approaches

Country level adaptive assessment designs target particular booklets to specific populations in order to match ability distributions with the distribution of booklets. There are various approaches and assessment designs that adapt the assignment of tests to differences in target populations with respect to the distribution of skills, which may be estimated by previous routing instruments or inferred from variables such as age or educational attainment. The following section describes major approaches for adapting the difficulty of tests to the ability of the test taking populations.

Starting Rules and Discontinue Rules

In intelligence testing for individuals, for adult as well as child and adolescent populations, it is common to design tests that present items in the order of increasing difficulty (e.g., the Stanford Binet Intelligence Scale[1]). When first applying these tests to different age groups, it was soon noticed that the first few questions were not much of a challenge for older test takers, as they would get the first handful or so questions right in almost all cases. This led test administrators to skip these first few very easy items as they ’knew’ (i.e., made an inference on cases observed so far) that older test takers would get these easy questions right. Along the same lines, it also became apparent that for younger test takers, there was a point in these tests where the remaining, harder questions were almost impossible to solve. This in turn led test administrators to stop presenting items that experience had shown to be too difficult.

Many tests of this type have a rule about how many items a test taker must get wrong consecutively before the testing session can be terminated. This number varies typically from 23 items for short forms to 5-6 items for longer IQ tests. It can be shown that the discontinued items (those for which no response was recorded after a pre-determined number of consecutive wrong responses) are missing data that is ignorable[2] and that the data only on what students actually took is sufficient to estimate ability.

Multistage Adaptive Testing

Multistage adaptive testing (MST) has been used in large scale international studies for adult populations[3] and can be understood as a flexible approach to assign test takers to a fixed number of test forms while aiming for a good, if not perfect, match between respondent ability and test difficulty.[4] In multistage adaptive testing, the completely randomized assignment of blocks to test takers (the previous practice in TIMSS, PIRLS, and PISA) is modified to take into account the performance of the test taker on a previous block, as well as the relative difficulty of the blocks contained in the test design.

In the beginning of the assessment, some form of preliminary ability estimate is required for each test taker so that he or she can be assigned item blocks that match their expected performance.

The assignment can be done deterministically, based on fixed cut-off scores, or probabilistically, based on a preliminary estimate of the student's ability distribution. Choosing the next block probabilistically ensures that at least some easy, medium and hard blocks are likely to be still available to all respondents at subsequent stages of the test. It also allows the assignment probability to be adjusted at each stage so that weak performance on a block is more likely to result in an easy block being assigned next, while it is still possible, with lower probability, to be presented with a medium or even hard block of items. Along the same lines, following strong performance on earlier blocks the probability of being administered a hard block of items increases, while the probability of easier blocks decreases.[5]

The drawback of most multistage adaptive designs is that the initial starting point is either not adaptive because nothing is known about test takers, or it requires an initial routing block that produces a very rough first estimate of proficiency based on a short block of items. This estimate is somewhat error prone, particularly in assessments administered to a wide and diverse set of populations, as it assumes that the item characteristics of the routing items are known without error. An alternative to this approach is to use prior information based on background data such as education and occupation or other socio-economic data.[6]

Adaptive Longitudinal Designs

Another example of how tests are adapted to different group level ability distributions is a design that is being used in longitudinal large scale skill surveys.[7] These designs use information on how test takers performed in prior assessment cycles to adaptively assign a more difficult test form to students who belong to a high performing group, and an easier test form to students who belong to a low performing group. These assessments are often 2 years apart,[8] so that the adaptation in this case uses information that dates back years in time. This approach turns out to be efficient as the performance at the group level is a reliable predictor of group performance at the next time point.

Pohl[9] describes these designs in more detail and discusses applications in multi-cohort longitudinal studies of student populations. Each assessment cycle determines which test form should be administered to which group based on information from prior data collections. Group membership is based on prior performance, which may itself have been estimated using a harder or easier form. Over assessment cycles this provides a sequence of test forms that are tailored to decrease the error of measurement in proficiency estimation. It does this by increasing the expected response variance by matching prior performance to test forms that elicit optimal levels of systematic, ability related responses variability in groups of test takers.

Group Adaptive Assessment in PIRLS 2021

Group adaptive assessment in PIRLS 2021 is implemented by dividing its 18 passages into three levels of passage difficulty – difficult, medium, and easy – and combining these into two levels of booklet difficulty:

- More difficult booklets (9) composed of difficult or medium and difficult passages
- Less difficult booklets (9) composed of easy or easy and medium difficult passages

In this approach, all countries administer all 18 passages, but in varying proportions. Higher performing countries will administer proportionally more of the more difficult booklets while lower performing countries will administer proportionally more of the less difficult booklets. The goal is a better match between assessment difficulty and student achievement in each country.

The group adaptive design in PIRLS 2021 involves changing from the procedure used in previous PIRLS cycles where booklets were randomly assigned to students at the same rate in each country to one where more or less difficult booklets are assigned at different rates in different countries. This change is intended to improve the accuracy of measurement in countries participating in PIRLS and provide some practical and operational advantages. More specifically, the PIRLS group adaptive design provides the following:

1. Better measurement at all achievement levels by matching booklet difficulty to student ability at the country level
2. All countries participate in the same assessment, maintaining full coverage of the reading construct while providing adaptivity at the population level
3. Minimal disruption of the PIRLS design as there is no need for a routing block under this approach
4. Improved student response rates, more student engagement, and less student frustration as passages are better aligned with target populations
5. Possibility of targeting subpopulations – although the PIRLS 2021 group adaptive design is intended to be implemented at the country level, it also could be implemented within countries that have clearly defined subpopulations that vary in student ability

As outlined in this paper there are ample examples of group-level adaptive approaches, from simple start/discontinue rules to elaborate longitudinal stage-based assessment designs. All these are based on group-level adaptivity that identifies groups of test takers which are to be assigned targeted test forms which are better aligned with the expected performance compared to complete random assignment or the use of only a single form.

The PIRLS group-adaptive design should benefit both high and low performing countries, in that students will be administered items that are either too difficult or too easy at a lower rate than in previous assessments. This improved targeting of the ability distributions will lead to more accurate measurement and will, as an intended side effect, likely also reduce item level non-response associated with administering too challenging or too easy items. Together, this is expected to lead to an overall improved database for reporting and secondary analyses.

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PIRLS 2021 Framework Development at the TIMSS & PIRLS International Study Center at Boston College

Ina V.S. Mullis, Executive Director, TIMSS & PIRLS

Michael O. Martin, Executive Director, TIMSS & PIRLS

Pierre Foy, Director of Sampling, Psychometrics, and Data Analysis

Jenny Liu, Research Specialist, Instrument Development and Reporting

PIRLS 2021 Reading Development Group

The PIRLS Reading Development Group is a panel of internationally recognized experts in reading research, instruction, and assessment. The Reading Development Group is responsible for providing expert advice about the development of the PIRLS 2021 reading assessment, beginning with updating the reading assessment framework and then guiding assessment development.

Julian Fraillon
Australian Council for Educational Research
Australia

Jan Mejding
Aarhus University
Denmark

Liz Twist
National Foundation for Educational Research
England

Marc Colmant
Ministère de l'Éducation Nationale
France

Galina Zuckerman
Russian Academy of Education
Russian Federation

Elizabeth Pang
Ministry of Education
Singapore

Verónica Diez Girado
National Institute for Educational Assessment
Ministry of Education
Spain

Jenny Wiksten Folkeryd
Uppsala University
Sweden

Latifa Alfalasi
Ministry of Education
United Arab Emirates, Dubai

Karen Wixson
Educational Testing Service
United States

PIRLS 2021 Questionnaire Development Group

The PIRLS 2021 Questionnaire Development Group is comprised of educational policy analysis experts and PIRLS 2021 National Research Coordinators who have special responsibility for providing guidance in updating the context questionnaire framework and context questionnaires for PIRLS 2021.

Anne Matoul
Université de Liège
Belgium (French)

Hwa Wei Ko
National Central University
Chinese Taipei

Kaisa Leino
Finnish Institute for Educational Research
University of Jyväskylä
Finland

Megan Chamberlain
Ministry of Education
Educational Measurement and Assessment Team
New Zealand

Fathia Mohammed Amour Al Mawali
Ministry of Education
Oman

Surette van Staden
Centre for Evaluation and Assessment (CEA)
University of Pretoria
South Africa

Bridget Dalton
University of Colorado
United States

PIRLS 2021 National Research Coordinators

The PIRLS 2021 National Research Coordinators (NRCs) work with the PIRLS project staff in the various areas to ensure that the study is responsive to their concerns, both policy-oriented and practical, and are responsible for implementing the study in their countries. The PIRLS 2021 National Research Coordinators participated in a series of reviews of the *PIRLS 2021 Assessment Frameworks*.

Albania
Rezana Vrapi
National Agency of Examinations (NAE)
Center of Educational Cervise

Australia
Sue Thomson
Australian Council for Educational Research

Austria
Juliane Schmich
BIFIE – Federal Institute for Educational Research, Innovation & Development of the Austrian School System, Salzburg – Center for Educational Monitoring & Standards

Azerbaijan
Nermina Aliyeva
Ministry of Education

Bahrain
Huda Al-Awadi
Ministry of Education

Belgium (Flemish)
Isabelle Erauw
Strategic Policy Support Division
Education & Training Department
Flemish Government

Belgium (French)
Anne Matoul
Université de Liège

Bosnia and Herzegovina
Zaneta Dzumhur
Agency for Preschool, Primary and Secondary Education

Bulgaria
Marina Vasileva Mavrodieva
Center for Assessment in Pre-School and School Education (CAPSE)
Ministry of Education, Youth, and Science

Canada
Kathryn O'Grady
Tanya Scerbina
Council of Ministers of Education, Canada (CMEC)

Chile
Carolina Leyton
Departamento de Estudios
Internacionales División de Estudios
Agencia de Calidad de la Educación

Chinese Taipei
Yu-Wen Chang
National Taipei University of Education

Croatia
Ines Elezovic
National Center for External Evaluation of Education

Cyprus
Yiasemina Karagiorgi
Center of Educational Research and Evaluation
Pedagogical Institute

Czech Republic
Zuzana Janotová
Czech School Inspectorate

Denmark
Jan Mejding
Katja Neubert
Aarhus University

England
Grace Grima
Pearson UK

Finland
Kaisa Leino
Finnish Institute for Educational Research
University of Jyväskylä

France
Marc Colmant
Ministère de l'Éducation Nationale

Georgia
Giorgi Tchumburidze
National Assessment and Examination Center

Germany
Nele McElvany
Institut für Schulentwicklungsforschung IFS, Center for Research on Education and School Development
TU Dortmund University

Hong Kong
Shek Kam Tse
The University of Hong Kong

Hungary
Ildikó Balazsi
Péter Balkányi
Educational Authority
Department of Assessment and Evaluation

Iran, Islamic Republic
Abdol'azim Karimi
Organization for Educational Research and Planning

Ireland
Emer Delaney
Educational Research Centre
DCU St. Patrick's College Campus, Dublin

Israel
Georgette Hilu
Joel Rapp
RAMA (National Authority for Measurement and Evaluation in Education)

Italy
Laura Palmerio
INVALSI (Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e di Formazione)

Kazakhstan
Aigul Baigulova
Department of International Comparative Studies of JSC

Kosovo
Nizafete Kutllovci-Bardhi
Ministry of Education, Science and Technology of Kosovo

Kuwait
Abrar Ahmed Baqer
National Centre for Education Development

Latvia
Antra Ozola
University of Latvia

Lithuania
Ramutė Skripkienė
National Examinations Center
Research and Analysis Unit

Macao
Tang Wai Keong
Education and Youth Affairs Bureau (DSEJ)

Malta
Charles Mifsud
Centre for Literacy
University of Malta

Montenegro
Milanka Izgarevic
Examination Centre

Morocco
Mohammed Sassi
Centre National de l'Evaluation, et des Examens et de l'Orientation

The Netherlands
Joyce Gubbels
Expertisecentrum Nederlands
National Language Education Center

New Zealand
Megan Chamberlain
Ministry of Education
Educational Measurement and Assessment Team

North Macedonia
Tanja Andonova Mitrevska
Bureau for Development of Education

Norway
Åse Kari Wagner
Center for Reading Research
University of Stavanger

Oman
Zuwaina Saleh Al-Maskari
Ministry of Education

Poland
Joanna Kaźmierczak
Educational Research Institute

Portugal
Vanda Lourenço
Instituto de Avaliação Educativa, I.P.
Ministry of Education and Science

Qatar
Badriya Al-Mohannadi
Ministry of Education and Higher Education

Russian Federation
Galina Sidorova
Federal Institute for the Strategy of Education
Development of the Russian Academy of Education
Center for Evaluating the Quality of Education

Saudi Arabia
Fahad Ibrahim Almoqhim
National Center for Assessment

Serbia
Branislav Randjelović
Institute for Education Quality and Evaluation

Singapore
Vanessa Chua
Elizabeth Pang
Foo Seau Fah
Ministry of Education

Slovak Republic
Kristína Čevorová
NUCEM (National Institute for Certified Educational Measurements)

Slovenia
Eva Klemencic
Educational Research Institute
National Education Institute Slovenia

South Africa
Surette van Staden
Centre for Evaluation and Assessment (CEA)
University of Pretoria

Spain
Veronica Díez
National Institute for Educational Assessment
Ministry of Education

Sweden
Cecilia Stenman
SKOLVERKET/Swedish National Agency for Education

United Arab Emirates
Hessa Al Wahhabi
Shaikha Ali Al Zaabi
Ministry of Education

United States
Sheila Thompson
National Center for Education Statistics
U.S. Department of Education

Benchmarking Participants

Ontario, Canada
Laurie McNelles
Education Quality and Accountability Office

Québec, Canada
Latifa Elfassihi
Ministère de l'Éducation et de l'Enseignement Supérieur

Moscow City, Russian Federation
Elena Zozulya
Moscow Center for Quality of Education

Abu Dhabi, United Arab Emirates
Nada Abu Baker Husain Ruban
Mariam Alhaway Al Zarroni
Ministry of Education

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