2

Student Performance in Digital and Print Reading

This chapter examines the particular features of digital texts and analyses how well students can read those texts. It also discusses the similarities and differences between print and digital reading, and compares the results of the two reading assessments by merging them into a single scale. Results presented throughout the chapter are also analysed by gender.

What does it mean to be a proficient reader in the digital medium? This chapter examines how well students around the world can read digital texts and whether there are any differences between boys and girls as digital readers. It also discusses the relationship between digital and print reading and presents a comparison of results among the 19 countries that participated in both digital and print reading assessments in PISA 2009. The chapter concludes by presenting countries' results in the two assessments merged into a single reading scale, and analyses these results further by gender.

DIGITAL READING

PISA defines reading literacy as understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society.

This broad definition refers to the texts that we read, the processes of reading and the purposes for which we read. It is as applicable to digital reading as it is to print reading. This section describes the main features of the reading framework as it relates to digital reading, and the way in which those features have been operationalised in the 2009 digital reading assessment.

Texts

Digital texts are conceived of as a subset of *written* texts. For the purposes of PISA 2009, digital text is synonymous with hypertext: a text or texts with navigation tools and features that allow the reader to move from one page or site to another. They are texts composed predominantly of language rendered in a graphic form. While non-verbal graphic elements, such as illustrations, photographs, icons and animations can, and typically do, constitute part of a digital text in PISA, oral language, such as audio recording or the soundtrack of a film, is not included in this definition of text.

Many kinds of hypertexts were included in PISA 2009 in order to represent the digital medium as fully as possible. The characteristics of digital texts in PISA are specified in terms of *environment*, *format* and *type,* and *navigation tools and features*.

The *environment* variable comprises two categories: authored and message-based. *Authored* texts are those with which readers are expected to engage receptively. *Message-based* texts are those with which readers are invited to interact. A small number of tasks that require reading both authored and message-based texts with equal attention are categorised as *mixed*. Figure VI.2.1 shows the distribution, by environment, of all tasks in the 2009 digital reading assessment, and examples of each category are provided in the coloured section later in this chapter.

■ Figure VI.2.1 ■
Digital reading tasks by environment

Environment	% of tasks	Sample tasks
Authored	66%	▪ *IWANTTOHELP* – Task 3 ▪ *SMELL* – Tasks 1, 2 and 3 ▪ *JOB SEARCH* – Tasks 1 and 3
Message-based	28%	▪ *IWANTTOHELP* – Tasks 1 and 2 ▪ *JOB SEARCH* – Task 2
Mixed	6%	▪ *IWANTTOHELP* – Task 4

Source: OECD, *PISA 2009 Database*.
StatLink ⌐═┐ http://dx.doi.org/10.1787/888932435378

In order to approximate the experience of reading message-based texts, some of the tasks based on these texts require the test-takers to respond as if interacting with the text, for example by "replying" to an e-mail message (see the sample IWANTTOHELP Task 4).

The second text characteristic defined for digital reading in PISA is *text format*, which comprises four categories: *continuous*, *non-continuous*, *mixed* and *multiple*. Figure VI.2.2 shows the distribution, by text format, of all tasks in the 2009 digital reading assessment. Examples of each category are provided in the coloured section later in this chapter.

■ Figure VI.2.2 ■
Digital reading tasks by text format

Text format	% of tasks	Sample tasks
Continuous	7%	▪ *IWANTTOHELP* – Task 1
Non-continuous	10%	▪ *JOB SEARCH* – Task 1
Mixed	7%	▪ *JOB SEARCH* – Task 3
Multiple	76%	▪ *IWANTTOHELP* – Tasks 2, 3 and 4 ▪ *SMELL* – Tasks 1, 2 and 3 ▪ *JOB SEARCH* – Task 2

Source: OECD, *PISA 2009 Database*.
StatLink ᐧᐧᐧ http://dx.doi.org/10.1787/888932435378

Given the assessment's intention to represent the experience of navigating across multiple pages and sites that is typical of digital reading, the weighting towards multiple texts is strong, with over three-quarters of the tasks in that category. Only tasks that focus on a single digital page are classified as *continuous*, *non-continuous* or *mixed*. Nevertheless, many of the tasks classified as *multiple* are based on sets of *continuous*, *non-continuous* and *mixed* format material.

The third text classification is *text type*, which has six categories: *argumentation*, *description, exposition, instruction, narration* and *transaction*. Four of the six are represented in the digital assessment: *argumentation, description, exposition* and *transaction*. While narrative texts were sought for the assessment, no suitable material of an appropriate length and quality was found; the test development phase for PISA 2009 pre-dated the rise of e-books. Instructional texts are also absent from the PISA 2009 assessment – a matter of space limitations rather than deliberate exclusion.

Figure VI.2.3 shows the distribution by text type of all tasks in the 2009 digital reading assessment. Examples of tasks representing three of the categories are found in the coloured section later in this chapter.

■ Figure VI.2.3 ■
Digital reading tasks by text type

Text type	% of tasks	Sample tasks
Argumentation	21%	▪ *IWANTTOHELP* – Task 3
Description	31%	▪ *IWANTTOHELP* – Tasks 1 and 2 ▪ *JOB SEARCH* – Tasks 1, 2 and 3
Exposition	31%	▪ *SMELL* – Tasks 1, 2 and 3
Transaction	14%	–
Mixed	3%	▪ *IWANTTOHELP* – Task 4

Source: OECD, *PISA 2009 Database*.
StatLink ᐧᐧᐧ http://dx.doi.org/10.1787/888932435378

The text type of one of the sample tasks, IWANTTOHELP Task 4, is classified as mixed because, while the end point is a response to a transactional text (an e-mail), the text that the reader needs to consult also includes substantial pieces of both argumentation and description.

Important distinguishing characteristics of digital texts are the *navigation tools and features* that help readers to negotiate their way into, around and across texts. While there are parallels in the print medium, such as tables of contents, headings and page numbers, many navigation tools and features are unique to the digital medium, and they are indeed part of the definition of hypertext.

Some navigation tools and features allow the reader to move the reading window over the text page – using scroll bars, buttons, index tabs and so forth – so that the whole of the digital page can be viewed, even though only part of it is visible at any one time. Other tools and features, such as hyperlinks and menus, allow the reader to move from one page or site to another, or – in the case of pop-ups – to call up additional, superimposed information.

A third type of navigation feature is global organisers, such as structured menus and content maps, which represent the relational structure of pages and links. They are used to help orient the reader to what is available on a site beyond the visible page, allowing readers to gauge the full scope of a text.

Digital reading requires familiarity with explicit and embedded hyperlinks, non-sequential page structures and global content representation devices. Consequently, in the PISA 2009 digital reading assessment a range of navigation tools and structures is included as one important component in measuring proficiency in digital reading. The tools and features include: scroll bars for moving up and down a page; tabs for different websites; lists of hyperlinks displayed in a row, in a column or as a drop-down menu; embedded hyperlinks – that is, hyperlinks included in paragraphs, tables of information or a list of search results; and site maps.

Cognitive processes
Aspects

The definition of reading in PISA includes the words *understanding, using* and *reflecting (*see Chapter 1 of this volume and *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science* [Volume I]). These are the cognitive skills involved in processing texts and they are at the heart of both digital and print reading. In the PISA reading framework and in the tasks built to reflect the framework, these terms are further defined in relation to three aspects: *access and retrieve*, *integrate and interpret* and *reflect and evaluate*. A fourth aspect category, *complex*, has been added specifically to accommodate those digital reading tasks that involve multiple demands.

Figure VI.2.4 shows the distribution, by aspect, of all tasks in the 2009 digital reading assessment, and indicates the examples of tasks provided later in this chapter. A little over one-third of all the tasks are categorised as *integrate and interpret*, with the rest spread fairly evenly across the other three categories.

■ Figure VI.2.4 ■
Digital reading tasks by aspect

Aspect	% of tasks	Sample tasks
Access and retrieve	24%	▪ *IWANTTOHELP* – Tasks 1 and 2
Integrate and interpret	35%	▪ *IWANTTOHELP* – Task 3 ▪ *SMELL* – Tasks 1 and 3 ▪ *JOB SEARCH* – Task 2
Reflect and evaluate	21%	▪ *SMELL* – Task 2 ▪ *JOB SEARCH* – Tasks 1 and 3
Complex	21%	▪ *IWANTTOHELP* – Task 4

Source: OECD, *PISA 2009 Database.*
StatLink ⌗ http://dx.doi.org/10.1787/888932435378

Text processing and navigation

In the digital medium, the cognitive processes of accessing, retrieving, interpreting, integrating, reflecting and evaluating are called upon for both *text processing* and *navigation*.

Text processing in the digital medium is in many ways similar to the constellation of skills and strategies typically associated with print reading. Confronted with a chunk of digital text, the reader may need to locate key pieces of information, interpret nuances of language, integrate different elements of the text, draw on prior knowledge of textual and linguistic structures and features, make judgements about the cogency of an argument or the appropriateness of the style, and reflect on the relationship between the content and his or her own experience or knowledge of the world.

Navigation involves moving around the digital medium to access the information that is needed. A set of cognitive skills parallel to those required for text processing is drawn upon – though the structures and features that need to be negotiated are different, and therefore the kinds of mental activities required also vary. Typically in navigating the digital medium there is a strong emphasis on predicting, and on evaluating and integrating information. Accessing and retrieving information may require traversing several pages or sites, predicting the likely content of a series of unseen screens, based on visible text information, in order to efficiently locate the required information.

Readers integrating and interpreting in the digital medium use the traditional repertoire of constructing meaning from continuous and non-continuous texts, but their task is often complicated by the fact that the relevant text is not immediately visible in its entirety. Readers need to make decisions about which links and menus to use to access material from different pages within the same website, or they may need to use tabs to view and compare information from different websites. The reader needs to navigate to survey what is available, to compare, contrast and filter the material, and to synthesise information. Predicting what is relevant and appropriate to a search requires the reader to reflect and evaluate, as does deciding on the authority, relevance and utility of a text, once it is accessed.

Navigation as described here is part of the cognitive process of digital reading, not merely a set of technical manoeuvres such as cliking on links or scrolling. However, because navigation is manifested in behaviours like these, in a way that is mostly unobservable during print reading (other than through page-turning or through laboratory techniques, such as eye- or brain-scanning), it offers new opportunities for insights into the cognitive processes of reading. Some of these opportunities are explored in Chapter 3 of this volume.

Both navigation and text-processing skills are required to complete most digital reading tasks. Some tasks place more emphasis on navigation and others on text processing. The relationship between the two skills in the tasks included in the PISA 2009 digital reading assessment, based on the jugdgement of expert raters, is represented in Figure VI.2.5. The horizontal axis represents the cognitive load that comes from processing the text, while the vertical axis represents the cognitive load that comes from the navigation required to successfully complete the task. Each task is represented by one plot (or, in the case of tasks with both full- and partial-credit scoring, by two plots). The position of the plot indicates the relative contribution of text processing and navigation to the task. The data points for the tasks described in the coloured section in this chapter are numbered from 1 to 12.

■ Figure VI.2.5 ■
Relationship between text processing and navigation in digital reading tasks
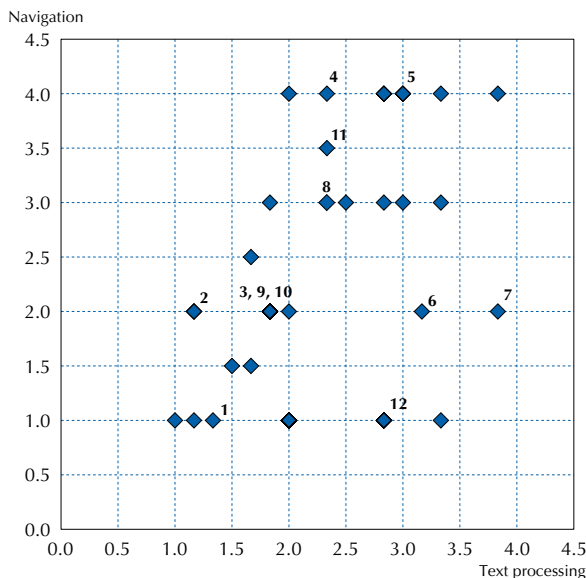
Number on graph	Task ID
1	*IWANTTOHELP* – Task 1
2	*IWANTTOHELP* – Task 2
3	*IWANTTOHELP* – Task 3
4	*IWANTTOHELP* – Task 4 (partial credit)
5	*IWANTTOHELP* – Task 4 (full credit)
6	*SMELL* – Task 1
7	*SMELL* – Task 2
8	*SMELL* – Task 3
9	*JOB SEARCH* – Task 1
10	*JOB SEARCH* – Task 2 (partial credit)
11	*JOB SEARCH* – Task 2 (full credit)
12	*JOB SEARCH* – Task 3

Source: OECD, *PISA 2009 Database*.
StatLink ⌷ http://dx.doi.org/10.1787/888932435378

Tasks that require low levels of both skills – requiring little or no navigation and minimal text processing – appear at the bottom left corner of the graph, close to the origin. The task closest to this description among the sample tasks is *IWANTTOHELP* Task 1. In this task, the required information is in a prominent position in a short text, and it is explicit. The page on which the information appears is presented to the reader at the beginning of the task; in other words, no navigation is required. Tasks that require high levels of both navigation and text processing appear in the top right corner of the graph: the further from the origin, the more complex the task.

In between the two extreme cases, tasks represent different combinations of the two variables. A digital reading assessment might include tasks that require high levels of navigation, but low levels of text processing. These tasks would be represented in the top left corner of the graph. This kind of task might require the use of multiple strategies to navigate between web pages, such as the use of embedded links or drop-down menus, but involve web pages with little other text on them, therefore requiring a low level of text processing but high levels of navigation. No tasks in the 2009 digital reading text that had low levels of text processing combined with high demand in navigation; the closest to this description among the sample tasks is *IWANTTOHELP* Task 4 (partial credit). To gain even partial credit for this task, readers need to negotiate several web pages, sometimes with explicit direction but also using text-based clues to predict which links will lead to relevant information. While the task demands that the reader traverse several pages of text, no more than superficial processing of any of the encountered texts is required for a partial credit score.

Tasks that require high levels of text processing, but low levels of navigation, appear at the bottom right of the graph. A task of this kind might involve, for example, dealing with a text that is dense or complex, therefore requiring a high level of text processing, but that is immediately visible to the reader in its entirety, thus requiring no navigation. The task closest to this description among the sample tasks is *JOB SEARCH* Task 3. This task requires no navigation apart from scrolling on the presented page. The text itself is not particularly dense or complex; however, the task does require drawing inferences from the text and relating them to knowledge from beyond the text. Therefore it depends more heavily on text processing than on navigation. It was considered necessary to include a small number of tasks of this kind because although they do not require the skills that are unique to digital reading, they do represent one kind of task that might be required in the real-life digital environment. If this kind of task were excluded, the differences between digital and print reading would be artificially inflated.

Ideally, an assessment of digital reading would show tasks distributed fairly evenly across the space defined in Figure VI.2.5. As the mapping shows, the actual distribution of tasks in PISA 2009 approaches this ideal.

Situation

Situation is used in PISA to classify texts and their associated tasks, and refers to the contexts and uses for which the author constructed the text. By sampling texts across a variety of situations the intent is to maximise the diversity of content included in the PISA reading literacy survey. Each set of stimuli is assigned to one of the four identified situations – *educational, occupational, personal* and *public* – according to the likely audience and purpose for which it is intended.

Figure VI.2.6 shows the distribution, by situation, of all tasks in the 2009 digital reading assessment and indicates the situation category of the material provided in the coloured section later in this chapter.

■ Figure VI.2.6 ■
Digital reading tasks by situation

Situation	% of tasks	Sample tasks
Educational	10%	–
Occupational	24%	▪ *IWANTTOHELP* ▪ *JOB SEARCH*
Personal	21%	–
Public	45%	▪ *SMELL*

Source: OECD, *PISA 2009 Database*.
StatLink ⌗ http://dx.doi.org/10.1787/888932435378

HOW THE PISA 2009 READING RESULTS ARE REPORTED

How the PISA 2009 digital reading tests were designed, analysed and scaled

The development of the PISA 2009 digital reading assessment was co-ordinated by a consortium of educational research institutions under the auspices of the OECD Secretariat, and under the guidance of a group of international reading experts, several of whom were included because of their research interest in digital reading. Consortium test-development centres and some participating countries submitted stimulus material and questions.

The material was refined iteratively over the three years leading up to the administration of the assessment in 2009. The development process included several rounds of commentary from participating countries, as well as piloting with small groups of 15-year-olds, and a formal field trial in which 15-year-olds from all of the countries participating in this international option. The reading expert group recommended the final selection of tasks, which was made based on the technical quality of the tasks, assessed according to how they performed in the field trial, and their cultural appropriateness and interest for 15-year-olds, as judged by the participating countries. The set of tasks also needed to represent the required framework balance, reflecting the various categories of text, aspect and situation. In addition, the selection sought to ensure that tasks varied in their emphasis on text processing and navigation, and that they ranged widely in difficulty, allowing for an accurate assessment of all 15-year-old students, from the least proficient to the most able in digital reading.
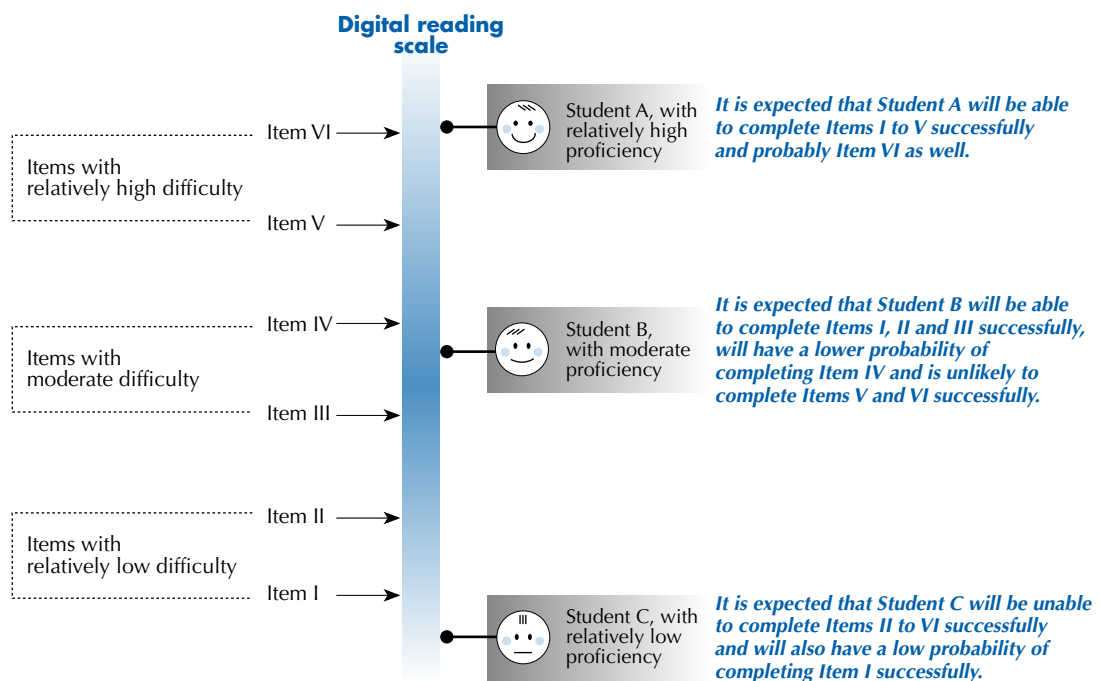
Twenty-nine digital reading tasks yielding 38 score points were used in PISA 2009, but each student in the sample saw only some of these tasks because different sets of tasks were given to different students. The tasks were organised into three 20-minute clusters, with each sampled student administered two of the clusters. Each student was thus given a forty-minute digital reading assessment, with an additional 10 minutes for orientation and practice questions at the beginning of the testing session. The clusters were rotated in six forms so that each cluster was paired with the other two and appeared in both first and second position in the pairing.

This design makes it possible to construct a single scale of digital reading proficiency, in which each question is associated with a particular point on the scale that indicates its difficulty, and each student's performance is associated with a particular point on the same scale that indicates his or her estimated proficiency. A description of the modelling technique used to construct this scale can be found in *PISA 2009 Technical Report* (OECD, forthcoming).

The relative difficulty of tasks in a test is estimated by considering the proportion of test-takers who answer each question correctly. The relative proficiency of students taking a particular test is estimated by considering the proportion of test questions they answer correctly. A single continuous scale shows the relationship between the difficulty of questions and the proficiency of students. By constructing a scale that shows the difficulty of each question, it is possible to locate the level of digital reading literacy that the question represents. By showing the proficiency of each student on the same scale, it is possible to describe the student's level of digital reading literacy.

■ Figure VI.2.7 ■
Relationship between questions and students on a proficiency scale

Digital reading scale

Items with relatively high difficulty — Item VI, Item V

Student A, with relatively high proficiency

It is expected that Student A will be able to complete Items I to V successfully and probably Item VI as well.

Items with moderate difficulty — Item IV, Item III

Student B, with moderate proficiency

It is expected that Student B will be able to complete Items I, II and III successfully, will have a lower probability of completing Item IV and is unlikely to complete Items V and VI successfully.

Items with relatively low difficulty — Item II, Item I

Student C, with relatively low proficiency

It is expected that Student C will be unable to complete Items II to VI successfully and will also have a low probability of completing Item I successfully.

Estimates of student proficiency reflect the kinds of tasks that students would be expected to perform successfully. This means that students are likely to be able to complete questions successfully at or below the difficulty level associated with their own position on the scale (but they may not always do so). Conversely, they are unlikely to be able to successfully complete questions above the difficulty level associated with their position on the scale (but they may sometimes do so). Figure VI.2.7 illustrates how this probabilistic model works.

How digital reading proficiency levels are defined in PISA 2009

PISA 2009 provides an overall scale drawing on all the questions in the digital reading assessment. The metric for the digital reading scale was set so that the mean and the standard deviation of the 16 equally weighted OECD countries that participated in the digital reading assessment are the same as those for the same group of countries' print reading mean and standard deviation. This mean was 499 score points, with a standard deviation of 90.

To help in interpreting what students' scores mean in substantive terms, the scale is divided into levels, based on a set of statistical principles, and then descriptions are generated, based on the tasks that are located within each level, to describe the kinds of skills and knowledge needed to successfully complete those tasks. Given the relatively small number of items in the pool for PISA 2009, the range of difficulty of digital reading tasks allows for the description of four levels of reading proficiency: Level 2, Level 3, Level 4 and Level 5 or above. Below Level 2 there is a "place-holder" region of the scale, with too few items to support level descriptions. This area is called "Below Level 2". It is anticipated that items reflecting this low level of proficiency will be developed for future PISA surveys. Similarly, tasks may be added to the top of the scale to allow for the description of a Level 6.

Students with a proficiency within the range of Level 2 are likely to be able to successfully complete tasks within that band of difficulty, but are unlikely to be able to complete tasks at higher levels. Students with scores within the range of Level 4 are likely to be able to successfully complete tasks located at that level and at the lower levels.

PISA applies a standard methodology for constructing proficiency scales. Based on a student's performance on the tasks in the test, his or her score is generated and located in a specific part of the scale, thus allowing the score to be associated with a defined proficiency level. The level at which the student's score is located is the highest level for which he or she would be expected to successfully answer most of a random selection of questions within the same level.

■ Figure VI.2.8 ■
Summary descriptions for four levels of proficiency in digital reading

Level	Lower score limit	Percentage of students able to perform tasks at this level or above (OECD average)	Characteristics of tasks
5 or above	626	7.8%	Tasks at this level typically require the reader to locate, analyse and critically evaluate information, related to an unfamiliar context, in the presence of ambiguity. They require generating criteria to evaluate the text. Tasks may require navigation across multiple sites without explicit direction, and detailed interrogation of texts in a variety of formats.
4	553	30.3%	Tasks at this level may require the reader to evaluate information from several sources, navigating across several sites comprising texts in a variety of formats, and generating criteria for evaluation in relation to a familiar, personal or practical context. Other tasks at this level demand that the reader interpret complex information according to well-defined criteria in a scientific or technical context.
3	480	60.7%	Tasks at this level require that the reader integrate information, either by navigating across several sites to find well-defined target information, or by generating simple categories when the task is not explicitly stated. Where evaluation is called for, only the information that is most directly accessible or only part of the available information is required.
2	407	83.1%	Tasks at this level typically require the reader to locate and interpret information that is well-defined, usually relating to familiar contexts. They may require navigation across a limited number of sites and the application of web-based navigation tools such as drop-down menus, where explicit directions are provided or only low-level inference is called for. Tasks may require integrating information presented in different formats, recognising examples that fit clearly defined categories.

Source: OECD, *PISA 2009 Database*.
StatLink ᵃⁱˢᵖ http://dx.doi.org/10.1787/888932435378

Thus, for example, in an assessment composed of tasks spread uniformly across Level 4, students with a score located within this level would be expected to complete at least 50% of the tasks successfully. Because a level covers a range of difficulties and proficiencies, success rates across the band vary. Students near the bottom of the level would be likely to succeed in just over 50% of the tasks spread uniformly across the level, while students at the top of the level would be likely to succeed in well over 70% of the same tasks.

Figure VI.2.8 provides details of the nature of the skills, knowledge and understanding required at each level of the digital reading scale.

A profile of PISA reading questions

In order to establish reliable trends in PISA, a sufficient number of questions must be retained from year to year. Other questions are publicly released after the survey to illustrate how performance was measured. A selection of the released questions for the 2009 reading assessment is presented in the coloured section of this chapter to illustrate the framework characteristics and the levels of proficiency described above.

Four variables that influence the difficulty of digital reading tasks have been identified:

- *Characteristics of text*. This variable relates to the features of the texts that need to be processed to complete a task. Tasks based on texts with unfamiliar content in formal or technical language will, on average, be more difficult than short texts with familiar, everday content expressed in idiomatic language. The complexity of text structure, the vocabulary and the layout all influence the ease with which a text-based task can be completed. Moreover, the sheer quantity of text influences difficulty. The longer the text, and the more pages of digital text that must be consulted, the more difficult a task is likely to be.

- *Complexity of navigation*. A digital reading task may focus on information that is immediately visible on the starting page of the task, it may require scrolling on that page, or it may require the reader to visit several pages or sites. Tasks become more difficult when the information needed to complete the task is not immediately visible. Complexity of navigation also depends on the quantity, prominence, consistency and familiarity of navigation tools and structures on the available pages. When moving between pages is required, if there are many hyperlinks or menu items to choose from, the reader is likely to find the task more difficult than if there are only one or two hyperlinks to choose from. A task is made easier if there are prominently placed links in a conventional location on the screen; a task is more difficult if links are embedded in the text or are in an otherwise unconventional or inconspicuous location. Finally, the degree of direction in navigating influences task difficulty. Even when the reader needs to consult several pages, explicit directions about the pages that must be visited and the navigation structures to use can make the task relatively easy.

- *Explicitness of task demands*. This variable relates to the specificity of direction in completing the task: how much the reader needs to infer the scope and substance of what is required for the response. Difficulty is influenced by the relationship between the task and the text that must be processed. If the question uses the same or similar terminology to that used in the text, the task will be easier than if the terms used are different. When the criteria for responding are not explicitly stated in the task, so that readers have to generate their own criteria, difficulty increases. In this context, task formats in which the student selects a response from a limited list, such as multiple-choice items, tend to be easier than those for which the student needs to construct the response. (This variable does not reflect the specificity of guidance for navigation, which is accounted for in the *complexity of navigation* variable.)

- *Nature of response*. This variable relates to the kind of mental processing that the reader has to undertake to complete the task. Where the reader needs to generate concepts from within the text, rather than having them supplied, the task is likely to be more demanding. Where the reader needs to make a series of inferences, to evaluate and reflect, to construct relationships, such as causation or contrast among elements of the text, the task is typically more difficult than one in which processing the text only requires a simple transfer or basic identification of material. Further, a task that focuses on abstract concepts will be more difficult than one in which concrete information is the focus.

The difficulty of the digital reading tasks is varied by manipulating these four variables. Figure VI.2.9 shows an item map of the digital reading tasks that are presented later in this chapter. The 12 locations on the map represent the 10 tasks, with two of the tasks yielding two locations because they have full-credit and partial-credit scoring. The item map shows the score for each location, with a brief general description of the nature of the task. It also shows, for each location, difficulty ratings made by expert judges in relation to each of the four variables described above on a scale of 1 to 4, with 1 designating the least demand and 4 the greatest.

■ Figure VI.2.9 ■

Map of selected digital reading questions in PISA 2009, illustrating the proficiency levels

Level	Lower score limit	Task (and score)	Nature of task	Quality of text	Complexity of navigation	Explicitness of task demand	Nature of response
5 or above	**626**	*SMELL* Task 2 (657)	Evaluate a web page in terms of credibility/ trustworthiness of information after following an explicitly directed link from search results, generating own criteria for evaluation. Scroll to read the full text, which includes some specialised (scientific) language.	4	2	3.5	4
4		*JOB SEARCH* Task 2.2 full credit (624)	Analyse a list of options in a descriptive text related to employment, using predefined criteria. Follow two links using explicit instructions, and scroll. Select four options from drop-down menus, combining prior knowledge with information integrated from a seond page. (Full Credit)	2	3.5	2	3
		SMELL Task 1 (572)	Distinguish between the main idea and subsidiary ideas in an expository scientific text, in the presence of strong distracting information. Follow a link from search results to a web page using a literal match, scrolling to read the full text.	3.5	2	3	3
		IWANTTOHELP Task 4.2 full credit (567)	Integrate and reflect upon information from several web pages by comparing short texts on multiple pages of a website about community work with criteria referred to on a personal blog; explain a choice based on this comparison. Follow a series of at least four links, using explicit instructions. (Full Credit)	3	4	3	3
	553	*JOB SEARCH* Task 3 (558)	Hypothesise about the reason for including a condition in a job advertisement. Support explanation using prior knowledge and information from the text. No navigation required.	1.5	1	4	3
3		*IWANTTOHELP* Task 4.1 partial credit (525)	Integrate information by comparing a short text on one website about community work with criteria referred to on a personal blog. Follow a series of at least four links, using explicit instructions. (Partial Credit)	3	4	2	2
	480	*SMELL* Task 3 (485)	Synthesise information from two websites, following links from search results guided by explicit directions. Identify a generalisation common to information on the two sites using low-level inference.	3	3	2	2
2		*JOB SEARCH* Task 1 (463)	Select a job suitable for a student from a list of four search results comprising short descriptions of jobs.	1.5	2	2	2
		IWANTTOHELP Task 3 (462)	Recognise the main purpose of a website dealing with a community activity from a short description on its Home page. Follow a single link with explicit directions.	1.5	2	2	2
		JOB SEARCH Task 2.1 partial credit (462)	Analyse a list of options in a descriptive text related to employment, using predefined criteria. Follow two links using explicit instructions. Select three suitable options from drop-down menus. (Partial Credit)	2	2	2	1.5
	407	*IWANTTOHELP* Task 2 (417)	Locate explicitly stated personal information on a page of a personal blog, following one explicitly directed link and using two literal matches between task and text.	1	2	1	1.5
Below 2		*IWANTTOHELP* Task 1 (362)	Locate explicitly stated information in a personal blog. Find a synonymous match between the task and the text. No navigation required.	1	1	1.5	1.5

*StatLink* ⌂🖵🖵 http://dx.doi.org/10.1787/888932435378

WHAT STUDENTS CAN DO IN DIGITAL READING

PISA summarises student performance on a scale that provides an overall picture of students' accumulated digital reading skills, knowledge and understanding at age 15. Results for this overall digital reading performance measure are presented in the following part of the chapter, covering both the average level of reading performance in each country and the distribution of reading proficiency.

Students reading the different levels of proficiency on the digital reading scale

This section describes performance in terms of the four levels of proficiency that have been constructed for reporting digital reading in PISA 2009. Figure VI.2.8 shows the cumulative percentage of students in all participating OECD countries who are proficient at each of the four levels. The distribution of student performance across these proficiency levels in each participating country is shown in Figure VI.2.10.

Table VI.2.1 shows the percentage of students at each proficiency level on the digital reading scale, with standard errors.

■ Figure VI.2.10 ■
How proficient are students in digital reading?
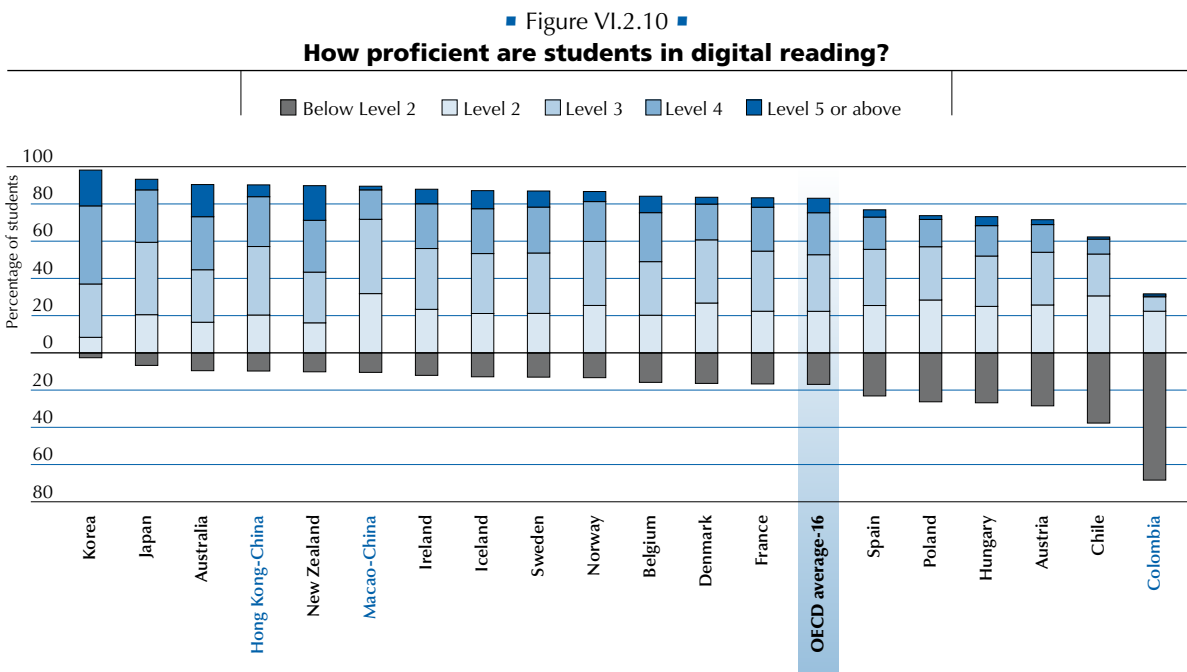
Countries are ranked in descending order of the percentage of students at Levels 2, 3, 4, 5 or above.
Source: OECD, *PISA 2009 Database,* Table VI.2.1.
StatLink http://dx.doi.org/10.1787/888932435378

Proficiency at Level 5 or above (scores higher than 626)

Students proficient at Level 5 on the digital reading scale are skilled readers in this medium. They are able to evaluate information from several web-based sources, assessing the credibility and utility of what they read using criteria that they have generated themselves. They are also able to work out a pathway across multiple sites to find information without explicit direction: that is, they are able to navigate autonomously and efficiently. These two capabilities – critical evaluation and expertise in locating relevant information – are key skills in a medium in which there is virtually unlimited material available, and in which the integrity of the sources is often dubious. Dealing with semi-technical material as well as with more popular and idiomatic texts, students performing at Level 5 or above assimilate the broad sense of the material they encounter and also notice fine distinctions in the detail of the texts, allowing them to draw inferences and form plausible hypotheses. Those performing at Level 5 or above can be regarded as "top performers" in digital reading. Across the 16 OECD countries that participated in the digital reading assessment in 2009, 8% of students performed at this level. But there is considerable variation across the countries, from over 17% in Korea, New Zealand and Australia to fewer than 3% in Chile, Poland and Austria. The partner country Colombia and partner economy Macao-China also had very small percentages of students at Level 5 or above.

Proficiency at Level 4 (scores higher than 553 but lower than or equal to 626)

Students at this level can perform challenging reading tasks in the digital medium. They evaluate the authority and relevance of sources of information when provided with support, and can explain the criteria on which their judgements are based. They can locate and synthesise information across several sites when navigation between the sites requires the exercise of low-level inference. Dealing with a range of text formats and text types, including those in more formal registers and written in technical language, students at this level are able to compare and contrast the information they find on different sites, and to hypothesise and form opinions about what they read drawing on information from everyday life. Students proficient at Level 5 or above can also successfully complete Level 4 tasks.

Across the participating OECD countries, 30% of students are proficient at Level 4 or above. For the majority of these countries and for the partner economy Hong Kong-China, about one-fifth to one-quarter of students perform within this level. A notable exception is Korea, where over 40% of students perform within Level 4. Taken together with the students performing at Level 5 or above, over 60% of Korean students are proficient at Level 4 – a proportion larger than that of any other country. The next highest-performing countries are Australia and New Zealand, both with 46% of students proficient at least at Level 4. Belgium, Japan, Iceland, Sweden and Ireland and the partner economy Hong Kong-China all have over 30% of students proficient at Level 4 or above. The proportion of students in Chile proficient at that level is less than 10% and in the partner country Colombia it is less than 2%.

Proficiency at Level 3 (scores higher than 480 but lower than or equal to 553)

Students performing at this level can cope with digital reading tasks of moderate complexity. They respond to digital texts in both authored and message-based environments. When given explicit guidance, they navigate across several pages to locate relevant material, and compare and contrast information from a number of web-based texts when the criteria for comparison or contrast are clearly stated. They evaluate information in terms of its usefulness for a specified purpose or in terms of personal preference.

Across the 16 participating OECD countries, a majority (61%) of 15-year-olds is proficient at Level 3 or above. In most of these countries, this is the modal level of highest attainment; only in Korea, Australia and New Zealand is the modal level of performance higher (Level 4), while in Chile, the model level is lower (Level 2). Among partner economies, students in both Hong Kong-China and Macao-China also most commonly perform at Level 3, while the modal performance of students in the partner country Colombia is below the described levels. In all participating countries except Chile and Colombia, then, it can be inferred that the majority of young people is capable of dealing with many everyday digital reading tasks, although they are unlikely to be able to manage more challenging tasks, such as finding information entirely by themselves or critically evaluating sources to ascertain their authenticity and their relevance to the reader.

Proficiency at the Level 2 (scores higher than 407 but lower than or equal to 480 points)

Students proficient at this level navigate successfully using conventional navigation tools and features. When provided with explicit instructions, they locate links even when they are not prominent and scroll to find required information. Using predefined criteria they select relevant material from a list of search results or a drop-down menu. They can locate several pieces of information in one text and transfer them to another format (such as an order form). They form generalisations, such as recognising the intended audience of a website, or figuring out a common requirement of two correspondents in an e-mail exchange.

Across participating OECD countries, more than four-fifths of students (83%) are proficient at Level 2 or above. In Australia and Japan, this proportion rises to over 90% and in Korea to 98%.

All participating countries and partner economies, except Korea, have significant numbers of students performing below the defined levels for the digital reading scale. In the OECD countries Chile, Poland, Austria and Hungary, more than one-quarter of students perform below Level 2, and in Colombia, nearly 70% of students perform below this level. This does not mean that such students have no proficiency in digital reading. Many students performing at this level can scroll and navigate across web pages, as long as explicit directions are provided, and can locate simple pieces of information in a short block of hypertext. Nevertheless, although the digital reading skills of these students are not necessarily negligible, they are performing at levels that are not likely to allow them full access to educational, employment and social opportunities in the 21st century.

Average level of proficiency

Another way of summarising the differences between countries is to consider their mean performance. Since only about half of the OECD countries participated in the PISA 2009 digital reading assessment option, the mean and standard deviation for the pooled data set of the 16 OECD countries in digital reading were arbitrarily set at the same values as this group of countries' mean (499) and standard deviation (90) for print reading in 2009.[1] These values establish the benchmark against which each country's digital reading performance in PISA 2009 is compared.

Figure VI.2.11 shows each country's mean score for digital reading. For each country shown in the middle column, the list in the right hand column shows countries whose mean scores are not sufficiently different to be distinguished with at least 95% certainty. For all other cases, one country has higher performance than another if it is above it in the list in the middle column, and lower performance if it is below. For example, Hong Kong-China's performance, which comes fifth on the list, is not significantly different from that of Japan, which comes fourth, Iceland, which comes sixth, Sweden (seventh) and Ireland (eighth). The dark band in the middle shows the participating countries Norway and France, whose performances are not statistically significantly different from the OECD average.

■ Figure VI.2.11 ■
Comparing countries' performance in digital reading

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

Mean	Comparison country	Countries whose mean score is NOT statistically significantly different from that of the comparison country
568	Korea	
537	New Zealand	Australia
537	Australia	New Zealand
519	Japan	Hong Kong-China
515	Hong Kong-China	Japan, Iceland, Sweden, Ireland
512	Iceland	Hong Kong-China, Sweden, Ireland, Belgium
510	Sweden	Hong Kong-China, Iceland, Ireland, Belgium
509	Ireland	Hong Kong-China, Iceland, Sweden, Belgium
507	Belgium	Iceland, Sweden, Ireland
500	Norway	France
494	France	Norway, Macao-China, Denmark
492	Macao-China	France, Denmark
489	Denmark	France, Denmark
475	Spain	Hungary
468	Hungary	Spain, Poland, Austria
464	Poland	Hungary, Austria
459	Austria	Hungary, Poland
435	Chile	
368	Colombia	

Source: OECD, *PISA 2009 Database.*
StatLink ⬛⬛⬛ http://dx.doi.org/10.1787/888932435378

Korea is the top-performing country by a significant margin, with a mean score of 568. This indicates that, on average, 15-year-olds in Korea perform at Level 4 in digital reading. New Zealand and Australia are in second and third positions, both at 537. Japan (519) and the partner economy Hong Kong-China (515) are in the next rank, together with Iceland (512) and Sweden (510). Two additional European countries have mean scores significantly higher than the OECD average: Ireland (509) and Belgium (507). Norway (500) and France (494) have means not significantly different from the OECD average. Denmark (489) and the partner economy Macao-China (492) have means not significantly different to that of France, though they are below the OECD average. On average in all of these countries except Korea, 15-year-olds perform at PISA proficiency Level 3 in digital reading. Students in the remaining five OECD countries perform, on average, at Level 2: Spain (475), Hungary (468), Poland (464), Austria (459) and Chile (435). The partner country Colombia's mean score (368) is well below those of the other participating countries, indicating that, on average, Colombian 15-year-olds perform below the described levels of digital reading. As mentioned above, however, this does not signify a complete lack of skills.

Because the figures are derived from samples, it is not possible to determine a precise rank of a country's performance among the participating countries. It is possible, however, to determine, with 95% likelihood, a range of ranks in which the country's performance lies, as shown in Figure VI.2.12.

■ Figure VI.2.12 ■

Where countries rank in digital reading performance

	Statistically significantly **above** the OECD average
	Not statistically significantly different from the OECD average
	Statistically significantly **below** the OECD average

			Digital reading scale			
			Range of rank			
			OECD countries		**All countries/economies**	
	Mean score	**S.E.**	**Upper rank**	**Lower rank**	**Upper rank**	**Lower rank**
Korea	568	(3.0)	1	1	1	1
New Zealand	537	(2.3)	2	3	2	3
Australia	537	(2.8)	2	3	2	3
Japan	519	(2.4)	4	4	4	5
Hong Kong-China	515	(2.6)			4	7
Iceland	512	(1.4)	5	7	5	8
Sweden	510	(3.3)	5	8	5	9
Ireland	509	(2.8)	5	8	6	9
Belgium	507	(2.1)	6	8	7	9
Norway	500	(2.8)	9	10	10	11
France	494	(5.2)	9	11	10	13
Macao-China	492	(0.7)			11	13
Denmark	489	(2.6)	10	11	11	13
Spain	475	(3.8)	12	13	14	15
Hungary	468	(4.2)	12	14	14	16
Poland	464	(3.1)	13	15	15	17
Austria	459	(3.9)	14	15	16	17
Chile	435	(3.6)	16	16	18	18
Colombia	368	(3.4)			19	19

Note: See Annex A3 for a detailed description of how the range of ranks is computed.
Source: OECD, *PISA 2009 Database.*
StatLink ⊠⊡ http://dx.doi.org/10.1787/888932435378

Inequality of learning outcomes

The gap between the means of the highest- and lowest-performing OECD countries (Korea and Chile) is 133 points – one-and-a-half standard deviations and almost two full proficiency levels. While the disparities between countries are evident, an equally large disparity in performance exists between the highest- and lowest-performing students within some of the countries. This is the case in Hungary, Austria and Belgium, where 141, 137 and 133 score points, respectively, separate the mean performance levels of the top and bottom quarters of the 15-year-old population. This finding is of particular concern. There is growing consensus that not only does such inequality reflect a reduced possibility for those on the lower rungs either to contribute to society or to benefit from its capital, but inequality within countries (compared to that between countries) is more likely to be perceived as unfair, because the disparities are local and obvious; and that, in turn, could sap a collective sense of well-being or lead to social unrest (Friedman, 2005; Pickett & Wilkinson, 2009).

A wide disparity in performance within countries is not inevitable, and relatively narrow gaps between the highest and lowest performance are not associated with any particular level of overall proficiency. With the average gap between the top and bottom quarter of students at 120 score points across the participating OECD countries, the Asian countries and economies, whose mean scores range from average to very high, all have distribution ranges well below the OECD mean. The interquartile range (the difference between the first and third quartiles) in these two countries and two economies is 88 for Korea, 89 for Macao-China, 95 for Japan and 103 for Hong Kong-China. The comparable figure for Colombia, the lowest performing country, was also below the OECD average difference (113), while for one of the best-performing countries, New Zealand, the difference is 131 score points. Chapters 4, 6 and 7 examine some of the factors that may explain these variations in performance.

Gender differences in performance on the digital reading scale

Girls have outperformed boys in print reading in every OECD and partner country and economy – except in Israel and the partner country Peru in PISA 2000 – since PISA's first reading assessment was administered in 2000 (OECD, 2003). Does the same hold true for digital reading? The brief answer is "almost". Figure VI.2.13 shows gender differences in reading performance for each country; Tables VI.2.2, VI.2.3 and VI.2.4 provide further details.

The mean difference between boys' and girls' performance in digital reading is 24 score points in favour of girls. In all but one country the difference is statistically significant. The exception is Colombia, where girls outperform boys by an average of only three score points. Except for Poland, the greatest gender differences are all in either

English-speaking or Nordic countries: New Zealand (40-point difference), followed by Norway (35), Ireland (31), Iceland (30), Poland (29), Australia (28) and Sweden (26). Denmark is alone among Nordic and English-speaking countries in having a below-average gap between boys' and girls' performance.

Figure VI.2.14 shows the percentages of boys and girls performing at each proficiency level and the percentage below the lowest level.

■ Figure VI.2.13 ■
Gender differences in digital reading performance
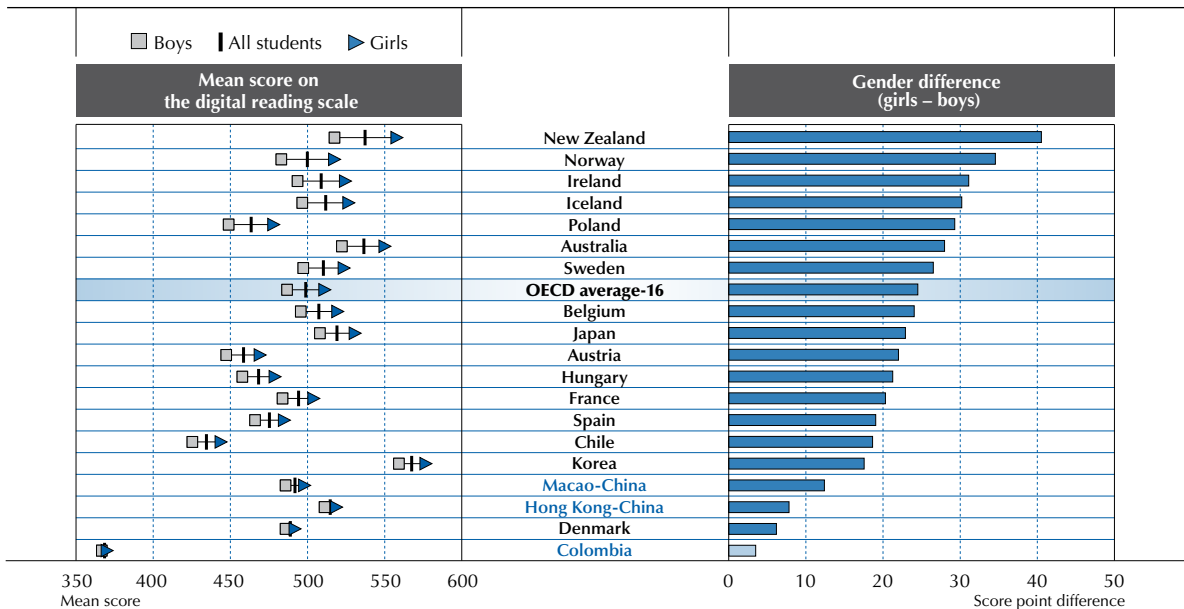
Note: Gender differences that are statistically significant are marked in a darker tone.
Countries are ranked in ascending order of the gender score point difference (girls – boys).
Source: OECD, *PISA 2009 Database,* Table VI.2.4.
StatLink ᴬˢᴾ http://dx.doi.org/10.1787/888932435378

■ Figure VI.2.14 ■
How proficient are girls and boys in digital reading?

Source: OECD, *PISA 2009 Database,* Tables VI.2.2 and VI.2.3.
StatLink ᴬˢᴾ http://dx.doi.org/10.1787/888932435378
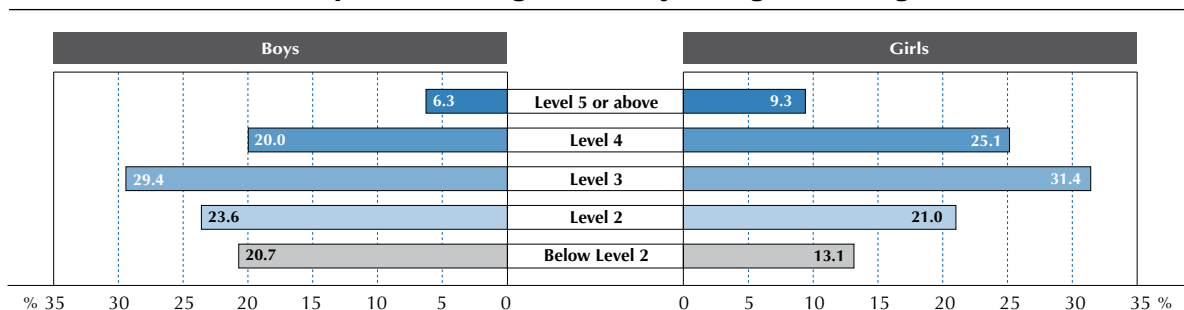
As shown in Figure VI.2.14, the mean highest proficiency level for both boys and girls across the participating OECD countries is Level 3, and the percentages of boys and girls performing at this level are quite similar (29% and 31%, respectively). However, the next most common level of performance for boys is Level 2 (24% of boys), while for girls it is Level 4 (25%); in both cases, around one-quarter of students perform at that level. In other words, on average, over half the boys in participating OECD countries perform at Levels 2 and 3, whereas a similar percentage of girls performs at Levels 3 and 4. Again, there is substantial variation among countries. At one end of the proficiency spectrum, more girls in Korea, Australia and New Zealand perform at Level 4 than at any other level, whereas only in Korea do more boys perform at that level than at any other. At the other end of the spectrum, only in Chile do more girls perform at Level 2 than at any other level, while more boys in both Chile and Poland perform at Level 2 than at any other level.

EXAMPLES OF DIGITAL READING ITEMS FROM THE PISA 2009 ASSESSMENT

■ *IWANTTOHELP*

IWANTTOHELP – *QUESTION 1*

Situation: *Occupational*
Environment: *Message-based*
Text format: *Continuous*
Text type: *Description*
Aspect: *Access and retrieve – Retrieve information*
Question format: *Multiple choice*
Difficulty: *362 (below Level 2)*

	Level 5 or above
626	**Level 4**
553	**Level 3**
480	**Level 2**
407	**Below Level 2**

Read Maika's blog entry for January 1. What does the entry say about Maika's experience of volunteering?

A. She has been a volunteer for many years.

B. She only volunteers in order to be with her friends.

C. She has done a little volunteering but would like to do more.

D. She has tried volunteering but does not think it is worthwhile.

Scoring

Full Credit: C. She has done a little volunteering but would like to do more.

Comment

The first page that students see in this unit is the home page of the blog (Life Begins at 16) of a young person named Maika. This page contains two entries from the blog, for January 1 and January 6. Although this kind of text often appears on a social networking site, the specific content describes Maika's interest in and plans for doing voluntary work, so this question (and later questions in this unit) are classified as falling within the **occupational** *context.*

Fifteen-year-old students may not have much experience of volunteering, but the concept is quite concrete, and the text is made accessible by the use of language that is relatively simple and colloquial ("Just a quick post", "(seriously)"), and addressed directly to the audience who may be reading it ("share my New Year's resolution with you", "You may remember", "has anyone else used this site?"). The page contains features typical of social networking sites, with four links available within the site ("About", "Contact", "Read my complete profile", "Comments") and one link to an external site (www.iwanttohelp.org).

This task requires the reader to identify information about Maika's experience of volunteering. Students need to read the short text entry for January 1 in order to locate the answer. It is not necessary to scroll down to see the remainder of the entry for January 6, nor for any other kind of navigation. The second and third sentences of the text give an indication of Maika's desire to work as a volunteer, which discounts option D and guides the reader towards the second part of the key ("would like to do more"). The key is a simple paraphrase of two pieces of information in the following sentence: "… last year I did a couple of short term voluntary jobs …, but this year I'd like a long-term position …". Given the relative prominence of the information in this short text, the direct and relatively simple language, the lack of need to navigate, and the straightforward way in which terms in the question and key to expressions they locate in the text are related, this has all the features of an easy question.

IWANTTOHELP – *QUESTION 2*

Situation: *Educational*
Environment: *Message-based*
Text format: *Multiple*
Text type: *Description*
Aspect: *Access and retrieve – Retrieve information*
Question format: *Multiple choice*
Difficulty: *417 (Level 2)*

	Level 5 or above
626	Level 4
553	Level 3
480	Level 2
407	Below Level 2

Go to Maika's "About" page.

What kind of work does Maika want to do when she leaves school?

A. Photography.

B. Web design.

C. Banking.

D. Social work.

Scoring

Full Credit: B. Web design.

Comment

This question also starts on the home page of the blog, but the question directs students to navigate to a second page. Therefore, in contrast to all print reading tasks, the information needed to answer the question cannot be obtained from the material initially presented: the student needs to locate an additional text by clicking on the link. In this instance, selecting the correct link from the five available is easy because there is a literal match between the term in the task and the name of the link ("About"), and because the link is prominent.

Once students click on this link, a second text appears, hiding the first text – this is one of the strongest distinctions between print and digital texts. This new text is very brief, containing a small amount of background information about the personal life of the writer of the blog. It can be considered as dealing with information of a kind likely to be fairly familiar to most 15-year-olds. There is minor distracting information in option A, with reference to "PhotoSet" in the text, while option D is also plausible, given the information on the first text (the home page) about Maika's expressed desire to do voluntary work and to make a difference to someone's life. Answering this question relies on making a literal match between the key and one of the terms in the text, "web design". The brevity of the text, its simple language, and the literal matches make this question relatively comprehensible; it appears that the need for one navigation step adds an element of difficulty, making it slightly more difficult than the previous question.

IWANTTOHELP – *QUESTION 3*

Situation: *Educational*
Environment: *Authored*
Text format: *Multiple*
Text type: *Argumentation*
Aspect: *Integrate and interpret – Form a broad understanding*
Question format: *Multiple choice*
Difficulty: *462 (Level 2)* ▪

	Level 5 or above
626	**Level 4**
553	**Level 3**
480	**Level 2**
407	**Below Level 2**

Open the link that Maika refers to in her January 1 post. What is the main function of this website?

A. To encourage people to buy **iwanttohelp** products.

B. To encourage people to give money to people in need.

C. To explain how you can make money by volunteering.

D. To provide people with information about ways to volunteer.

E. To tell people in need where they can find help.

Scoring

Full Credit: D. To provide people with information about ways to volunteer.

Comment

In this task students are required to recognise the main idea of a text, but in order to do this, they first need to find the text. In order to view the necessary text, they have to click on a link, as indicated in the task. Only one of the hyperlinks on this page occurs within the blog entry for January 1, so the direction in the task is explicit, but four other links available on the page act as distractors. Clicking on the correct link takes the reader not only to a new page, but also to an entirely new website, the home page for an organisation called iwanttohelp. This page opens in a new tab, so that it is possible for students to click on the tab "Maika's Blog" if they wish to return to the first text, although that is not necessary for this task. The content of the new website is more abstract, employing terms that may be relatively unfamiliar to students, such as "non-profit organisation", "opportunity" and ".org", and is addressed to a large anonymous audience rather than operating at the personal level of a blog.

This text is classified as argumentation because it encourages readers to take action, either by contacting other organisations ("Find an Opportunity Now") or by making donations ("We rely on public donations"). Four links to other part of the website are available on this page if students wish to explore the site in order to obtain a broader picture of the organisation. This, however, would be time consuming and inefficient. Such opportunities always exist for anyone reading material on the Internet, so one feature of reading in this environment is being able to judge when it is necessary to open new links, thus expanding the number of available texts.

In this case, in order to answer this broad understanding question, students need to read the short description of the organisation provided in the box on the left of the home page, supported by the prominent question and link above the photograph. It is not possible to make any literal matches between the task and the key: some (relatively low) level of inference is needed to recognise that this site provides information explaining how people could volunteer. The distractors all have some degree of plausibility, because of their references to the iwanttohelp site, to money and people in need, to volunteering, and to giving information about help.

This task is somewhat harder than the previous task, although it is still relatively easy. The comparative difficulty is explained by the need to navigate to the text with the required information using the correct link; the amount of potentially distracting information available through irrelevant links on the web pages; the somewhat abstract and unfamiliar information and language used; and the need for a level of inference to answer the question.

IWANTTOHELP – *QUESTION 4*

Situation: *Educational*
Environment: *Mixed*
Text format: *Multiple*
Text type: *Mixed*
Aspect: *Complex*
Question format: *Constructed response*
Difficulty: *Full credit 567 (Level 4); Partial credit 525 (Level 3)* ■

	Level 5 or above
626	**Level 4**
553	**Level 3**
480	**Level 2**
407	**Below Level 2**

Read Maika's blog for January 1. Go to the iwanttohelp site and find an opportunity for Maika. Use the e-mail button on the "Opportunity Details" page for this opportunity to tell Maika about it. Explain in the e-mail why the opportunity is suitable for her. Then send your e-mail by clicking on the "Send" button.

Scoring

Full Credit: Selects Graphic Artist or Upway Primary School and writes a message in the e-mail text box with a relevant explanation that matches Maika's criteria.

E-mail message for Graphic Artist

Refers to ongoing position or future or web design or art.
- You're a great artist and it is ongoing – you said you wanted a longer type of work right?
- It's ongoing and it would help you get experience for your future.
- You are obviously interested in graphic design, and want to pursue this when you finish school, and you would also love to volunteer. This would be a great opportunity to do both these things, and will look great on your CV too!

OR

E-mail message for Upway Primary School

Refers to ongoing position or making a difference.
- This would be a good job – ongoing and you get to help some kids.
- Here's a job where you'll really make a difference.

Partial Credit: Selects Graphic Artist or Upway Primary School and writes a message in the e-mail text box with no explanation or an irrelevant explanation.

E-mail message for Graphic Artist

Gives insufficient or vague answer.
- You'd like it.

Shows inaccurate comprehension of the opportunity or gives an implausible or irrelevant answer.

- You'd be working with kids a lot. *[Irrelevant, not one of Maika's criteria.]*
- It gives you a chance to get out and about.

OR

E-mail message for Upway Primary School

Gives insufficient or vague answer.

- You need an hour a week but it sounds like this could be what you're looking for. *[Lacks reference to job criteria, repeats part of stem.]*
- You'd like it.

Shows <u>inaccurate comprehension of the opportunity</u> or gives an <u>implausible or irrelevant</u> answer.

- It gives you a chance to get out and about.

Comment

This is an example of a complex task, which involves all three aspects of reading. It also has a substantial navigation requirement. This complexity highlights a number of differences between print and digital reading tasks. The overall task requires students to construct a short e-mail message after integrating and reflecting upon information located in several texts. The text type has not been specified because the task requires the reader to integrate information from several types of text: argumentation (the iwanttohelp website), description (Maika's blog) and transaction (the e-mail).

Beginning with an interpretation of information given on Maika's blog, students are then required to locate a number of pages on the iwanttohelp website, evaluate information on these pages in relation to what they have read on the blog, and use the evaluation to send Maika a simple message. There is no single pathway for navigation, and two different texts can be used to formulate responses that receive credit. This variability is typical of navigation in the digital environment.

The task requires students to navigate from the starting page, Maika's blog, to the Latest Opportunities page shown below. To see the whole page, scrolling is required.

This page offers four opportunities for students to evaluate on Maika's behalf, each with links providing additional information. Students may open as many of the links as they consider necessary. The page for the Upway Primary School opportunity is shown below.

This text is fairly short, but relatively dense, with quite complex vocabulary ("an innovative approach", "a more diverse population", "foster the academic development", "academic support"). Having located the opportunities, students need to compare descriptions of the opportunities with the criteria given on Maika's blog. They may click on the tab to re-read her entry for January 1, where she refers to wanting "a long-term position" in which she can "make a difference". A broad understanding of the Upway Primary School text would support the evaluation that working here would fit Maika's criteria. This interpretation is supported by expressions such as "The volunteer meets with the student … for a minimum of one year" and "through academic support, positive role-modelling, and a one-to-one friendship, students will succeed".

Some students may also use the link "Read my complete profile" or "About", which refers to her interest in "a future in web design" and to her "artwork". The information here supports the selection of the Graphic Artist opportunity.

Students may use the "Back" and "Forward" buttons, the links on each page and the scroll bar to navigate back and forth between descriptions of various opportunities until they have selected the one that they judge to be most suitable. In each case it is necessary to scroll down to see a full description of the opportunity.

Once students have chosen an opportunity, they need to construct an e-mail message to send to Maika. They do this by opening yet another link, "E-mail opportunity details to a friend", in accordance with the task instructions.

The page where they do this has the e-mail address and subject lines already completed, together with the beginning of a message: "Thought you'd be interested in this volunteer opportunity because...". To receive credit, students must select either the Graphic Artist or the Upway Primary School opportunity. Students who recommend the Graphic Artist opportunity receive full credit if they refer to the fact that this opportunity is an ongoing position; or comment that it is relevant to her future or to her interest in web design or art. Students who recommend Upway Primary School receive full credit if they refer either to the fact that this is an ongoing position or to the idea of making a difference.

Students who select one of these two opportunities but do not write a message that refers to the criteria Maika is seeking nevertheless receive partial credit for having successfully completed much of this complex task: accessing relevant information, comparing information from different texts and making a judgment about which opportunity is suitable.

In summary, in order to obtain full credit for this task, students need to go through a series of processes, involving multiple navigation steps to access a series of texts. Some of the navigation steps are made explicit in the task instructions, but readers need to make multiple evaluations of the available links to decide which ones would allow the most efficient way of completing the task. Students need to make multiple interpretations of texts, from Maika's blog as well as various pages on the iwanttohelp website, and to compare ideas and information across these texts, in support of the reflection and evaluation that the task requires.

■ SMELL

SMELL – QUESTION 1

Situation: *Educational*
Environment: *Authored*
Text format: *Multiple*
Text type: *Exposition*
Aspect: *Integrate and interpret – Form a broad understanding*
Question format: *Multiple choice*
Difficulty: *572 (Level 4)*

	Level 5 or above
626	
	Level 4
553	
	Level 3
480	
	Level 2
407	
	Below Level 2

Go to the "Smell: A Guide" web page. Which of these statements best expresses the main idea on this page?

A. Smell can interfere with normal patterns of behaviour.

B. Smell warns humans and animals of danger.

C. The primary purpose of smell is to help animals to find food.

D. The development of smell takes place early in life.

E. The basic function of smell is recognition.

Scoring

Full Credit: E. The basic function of smell is recognition.

This question presents a list of six search results for the term "smell". Only the first four are immediately visible. If students wish to see the full list of six they need to either scroll down or click on the "Maximise" button in the top right corner of the browser. The screen shot below shows what the students see if they click the "Maximise" button.

Comment

The question first directs students to navigate to a second web page, "Smell: A Guide", and to identify the main idea of the text on this page. The information needed to answer the question cannot be obtained from the material presented in the search results. Links are available from the search results page to several other pages. There are a maximum of four available tabs in this task: the Global Search page, Smell: A Guide, Food in the News, and Psychology Now. The links to the remaining three results lead to a page that states, "This page has no content available." and has a link back to the search results page. Selecting the correct link from the six available is easy, because there is a literal match between the term in the task and the name of the link ("Smell: A Guide"), and because the link is the first in the list, and hence the most prominent.

Once students click on this link, a second text appears, in a new tab. This is a relatively long and dense expository text dealing with the role of smell. Students can identify that it is published by a research and teaching department (as indicated by the link "Current Research Projects" on the left of the page, and the headings "Teaching" and "Research and teaching information") in a university (the URL for the page is "www.biology.litternuni.edu.au/smell/ index.html"). The text examines the everyday concept of smell in a scientific way. It contains multiple reference to everyday concepts, relating the abstract notion of the role of smell to these concepts in concrete ways (for example, "potential danger" is illustrated by "smoke indicates fire"; "Elephants' sense of smell" is related to how humans harness it in tracking poachers; babies' reactions to unpleasant smells are described). Consistent with its origin and purpose, the text includes some specialised (scientific) language ("identity of other living creatures", "uniquely identifiable", "land mammal", "foraging ants", "facial expressions that indicate rejection", "a putrid smelling substance") that requires careful reading and good vocabulary knowledge for complete understanding.

Students need to use the scroll bar to view the full text, and scrolling is probably necessary for this question, which focuses on the main idea of the text. Distracting navigational features are provided by top and side menus.

The first four options contain strongly distracting information of various kinds. Option A includes the ideas both of interference and of patterns of behaviour, plausible in this scientific context, except that the text does not support a link between them. Option B (chosen by over 25% of students) is possibly the strongest distractor because it appeals to common sense, and offers a simple paraphrase of an example of how smell is used, an idea presented in the second sentence in the text ("Sometimes our sense of smell can warn of potential dangers."); however, this idea is not consistently discussed through the text. Option C involves a misinterpretation of another sentence in the same paragraph, which describes another example of the use of smell ("sometimes"; "for example"), not its primary purpose. Option D presents a literal match ("early in life") with an idea presented in the text, but a detail rather than the main idea. Students can be expected to need to skim the entire text in order to relate the terms "basic function" and "recognition" in option E with a global interpretation of the text. The idea of "basic function" is hinted at in the opening sentence of the text ("the role of smell"), but it would be premature to link "information about the environment" from the text with ""recognition". It is the repetition of descriptions of functions of smell and examples of how these relate to recognition, scattered through the text ("potential dangers … smoke … fire"; "distinguish … twins .. siblings";

"elephants … track poachers"; "ants … know when to leave the nest"; "babies … rejection"), that allows the reader to identify this option as the key. Despite this repetition of ideas, the item is relatively difficult, most likely as a result of the combination of the length of the text, the use of specialist (scientific) language, and the plausibility of the information provided in the distractors.

SMELL – QUESTION 2

Situation: *Public*
Environment: *Authored*
Text format: *Multiple*
Text type: *Exposition*
Aspect: *Reflect and evaluate – Reflect on and evaluate content of text*
Question format: *Open constructed response*
Difficulty: *657 (Level 5 and above)* ▪

626	**Level 5 or above**
553	**Level 4**
480	**Level 3**
407	**Level 2**
	Below Level 2

Go to the "Food in the news" web page. Would this web page be a suitable source for you to refer to in a school science assignment about smell? Answer Yes or No and refer to the content of the "Food in the news" web page to give a reason for your answer.

Scoring

Full Credit

Answers (or implies) No and gives a plausible supporting explanation, referring to the trivial or sensational nature of the website content, or the popularisation of the issues by journalists or the site's failure to explicitly give its sources of information.

- No, it's just trying to popularise science and has almost certainly oversimplified the original research.
- No, it just offers sensational news. Look at the superficial issues covered in this site.
- No, it is obviously from a popular news magazine not a scholarly source.
- No, it has loads of silly links that show it's not a serious site.
- No, not suitable because it is just written by journalists not scientists.

OR

Answers (or implies) Yes and indicates that the site would be helpful as a secondary source, leading to more reputable sources.

- Yes, it would help me to find the original research.
- Yes, I would use it to look and see if more serious publications said the same thing.

OR

Answers (or implies) Yes and gives a plausible supporting explanation, referring to the article's sources of information or the level of detail provided.

- Yes, because it is a review of real research.
- Yes, because it talks about several real studies.
- Yes, they're talking about a study that won a Nobel prize, so it must be true.
- Yes, the study is described in detail so I don't think they would make it up.

No Credit

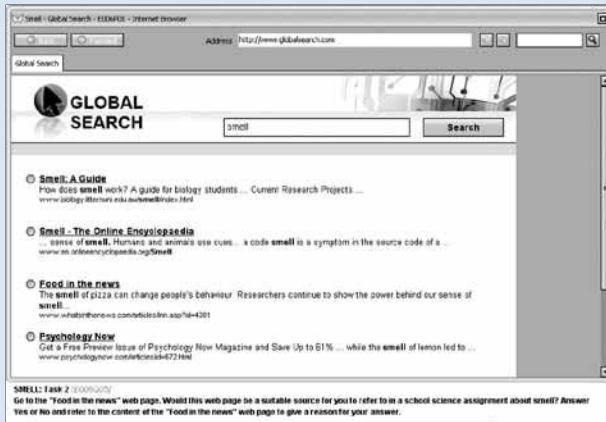Gives insufficient or vague answer.

- Yes, The Food in the News page was convincing because the results that they were showing did not seem opinionated and sounded reliable. *[vague]*
- I don't think it's reliable because it's about the power behind our sense of smell. *[vague]*
- Yes, it's a long article. Why would they make all that up?
- No, my teacher would not be impressed.

OR

Shows inaccurate comprehension of the material or gives an implausible or irrelevant answer.

- Yes, because it's by a motoring organisation, which really matters. *[irrelevant]*
- I think it would be reliable because it describes how smell can affect your mood. *[irrelevant]*

The text is again quite lengthy, and scrolling is required to view it in its entirety.

This question asks students to open a different link from the previous question. Again, the relevant link is simple to identify there is a literal match with the question stem, and no scrolling is required to see the link, "Food in the news".

Evaluate two web pages in terms of credibility/ trustworthiness of information. Follow a link from search results to a web page using literal match. Scrolling is needed to read the full text. Contextual support relevant to response includes other links on the page. Text includes some specialised (scientific) language.

Students are required to evaluate the web page, "Food in the news", in terms of its suitability as a reference for a school assignment. This kind of task may be considered representative of the kind of issue faced with tremendous frequency by students when completing school tasks involving Internet-based research.

The page has many features which may contribute to the students' evaluation. The page itself has numerous links that indicate this is a commercial site (carrying the url "whatsinthenews.com"), which clearly has a populist pitch that intends to reach a wide audience ("Entertainment", "TV Guide", "Shopping", "Advertise with us"), and which has few, if any, pretensions to academic seriousness. There are also links to related sites ("Travel in the news", etc.), and to a series of related stories which have a rather sensationalist flavour ("Cheese makers to use electronic nose for market gain?", "Anyone can learn to love vegetables"). These features would tend to make the text accessible to students. The lack of academic pretension is reinforced by the fact that the article on this page carries a somewhat sensationalist title, "The smell of pizza can change people's behaviour", and is not credited to any specific source. There is reference to "a leading European motoring organisation" as the source for a "review of research", but no reason is offered for why such an organisation should concern itself with the diverse findings related to smell that are included here. All of these features may be considered relevant to a view that the site could be considered unsuitable as a source for a school assignment.

On the other hand, the article presented here does refer to results of a range of scientific findings from several studies; it does name the author of the review ("Conrad King"); it refers to some of the researchers by name ("Researchers Richard Axel and Linda Buck") and offers them credibility by citing the fact that they were recipients of "a Nobel Prize in 1994 for their ground-breaking research". Some of the detail presented lends credibility to the article, most notably the paragraphs which begin, "Smell, which essentially dictates the incredible complexity of food tastes, has always been the least understood of our senses" and "However, the way genes regulate smell differs from person to person". These paragraphs contain technical (scientific) language appropriate to the topic and information presented ("family of 1,000 olfactory genes"; "olfactory genes which are switched on in some people and not in others"; "nearly every human being displays a different pattern of active and inactive odour-detecting receptors"); these also add to the difficulty of the text. These features could be referred to in support of a claim that the site would provide suitable information for a school assignment on smell.

Students have to make their own evaluation of the web page for the stated purpose, using one or more of the ideas discussed here, and then to express this. Evaluation of the suitability of something as abstract as a text page for a hypothetical purpose is a complex psychological task, perhaps especially so when, as here, there are multiple arguments to be made in support of or against a position. Students need to form a mental image of a hypothetical school science assignment, including the process of conducting research, then consider whether the information here would be suitable for it. There is no direction as to whether they should consider the content, the style or any other specific features of the web page. The challenge posed by the specialist nature of some of the scientific language, the length of the text, including the wide range and the requirement to refer to the content of the web page, rather than just to talk in vague terms about notions of suitability or its lack all contribute to the difficulty of this task. It seems that this kind of evaluative task, critical though it probably is for 15-year-old students, is not easily managed, as this task is in the high range of difficulty.

SMELL – *QUESTION 3*

Situation: *Public*
Environment: *Authored*
Text format: *Multiple*
Text type: *Exposition*
Aspect: *Integrate and interpret – Develop an interpretation*
Question format: *Multiple choice*
Difficulty: *485 (Level 3)*

626	Level 5 or above
553	Level 4
480	Level 3
407	Level 2
	Below Level 2

There is information about the smell of lemon on the pages "Food in the news" and "Psychology Now". Which statement summarises the conclusions of the two studies about the smell of lemon?

A. Both studies suggested that the smell of lemon helps you work quickly.

B. Both studies suggested that most people like the smell of lemon.

C. Both studies suggested that the smell of lemon helps you to concentrate.

D. Both studies suggested that females are better at detecting the smell of lemon than males.

Scoring

Full Credit

Code 1: C. Both studies suggested that the smell of lemon helps you to concentrate.

Synthesise information from two web pages. Follow links from search results to two websites using literal match. Identify generalisation common to information on both sites.

Comment

As with the previous tasks in this unit, students cannot answer this question from the Global Search page initially presented. Instead, students need to locate and read multiple texts. This task introduces a third text, again accessible using literal matches between the question and the search result links. Students are required to compare ideas in this new text, "Psychology Now", and the one seen in the previous task, "Food in the news". Three tabs are open, and students need to switch between two of them, possibly multiple times, in order to synthesise information in the texts. Because only one text can be visible at one time, demands are placed on students' memory in a way that is unlikely when all relevant information is presented on a single page. The new text is shorter than the other two students have read, with no scrolling required. The page contains a series of links on the left, but these are not strong distractors, as there are no terms in them which match expressions or ideas in the question. They need to locate within the two pages references to studies about lemon. In each case they can make a literal match on the word "lemon". In "Psychology Now", this is easily found in the second paragraph, but the term is much harder to locate in "Food in the news", as students need to scroll down until they see it in the penultimate paragraph.

The options offer distracting information in the form of ideas included in one of the texts.

The ease of locating the term "lemon" in both the pages is very likely the key reason why this task proved to be relatively easy.

The paragraph about lemon in the text "Psychology Now" is about work (option A); the paragraph also mentions "smell of lemon" and "54%", which could lead to association with option B ("most people like the smell of lemon"); option D receives support from the sentence, " Women are generally better at identifying smells than men.", which provides a generalisation that goes beyond the specific issue of lemon, the focus of the question. Students need to synthesise information spread throughout the paragraph to infer a link between a reduction in typing errors in the workplace and the idea that the smell of lemon helps concentration.

In the text, "Food in the news", the reference to smell is not at all prominent, being found in the sixth paragraph. Once students have located this, though, it is relatively easy to relate terms in the text ("concentration levels … Similarly … smells of lemon … promote … mental focus") with the key.

■ *JOB SEARCH*

Screen shots are used to illustrate parts of the stimulus relevant to each question. The digital version of this unit and other released tasks are available at *www.erasq.acer.edu.au*.

JOB SEARCH – *QUESTION 1*

Situation: *Occupational*
Environment: *Authored*
Text format: *Non-continuous*
Text type: *Description*
Aspect: *Reflect and evaluate – Reflect on and evaluate content of text*
Question format: *Multiple choice*
Difficulty: *463 (Level 2)* ■

626	**Level 5 or above**
553	**Level 4**
480	**Level 3**
407	**Level 2**
	Below Level 2

This is a page from a job search website. Which job in this list is most suitable for school students?
Click on the button next to the job.

Scoring

Full Credit

Code 1: B. Juice Bar Team Members.

Comment

The context for this question is a website that helps people to find and apply for jobs. The page that students see is a list of four available jobs, listed as "Today's Jobs". Initially the first two are fully visible, and students can see the full list by either scrolling down or clicking on the "Maximise" button in the top right corner of the browser. The screen shot below shows what the students see if they click the "Maximise" button.

The text is fairly short, organised in list form, and uses fairly simple language that should be familiar to students, even if they have had no experience of employment or seeking a job.

In order to determine which job is most suitable for school students, readers need to use clues related to time and availability. The expressions "for weekdays", "full time" and "9am will allow them to 5pm" to reject the first and the last two options; "part-time job" and "from 5pm" indicate that the second option is likely to suit school students. Distracting information is included in the reference to "secondary school" in the third job listed, while the kinds of jobs listed, "café staff" (the first job in the list) and "retail assistant" (the third job) are the kind of job that many students may think of as suitable for school students.

There is no need to click on any links, or to explore the Job Search website in order to find the information needed to answer this question. The combination of the fact that the text is fairly simple, and the lack of navigation needed probably contribute to the relative facility of this question, which about two-thirds of students answered successfully.

JOB SEARCH – *QUESTION 2*

Situation: *Occupational*
Environment: *Message-based*
Text format: *Multiple*
Text type: *Description*
Aspect: *Integrate and interpret – Develop an interpretation*
Question format: *Complex Multiple choice*
Difficulty: *Full credit 624 (Level 4); Partial credit 462 (Level 2)* ▪

626	Level 5 or above
553	Level 4
480	Level 3
407	Level 2
	Below Level 2

You have decided to apply for the Juice Bar job. Click on the link and read the requirements for this job. Click on "Apply Now" at the bottom of the Juice Bar job details to open your résumé page. Complete the "Relevant Skills and Experience" section of the "My Résumé" page by choosing four experiences from the drop down lists that match the requirements of the Juice Bar job.

Scoring

Question intent:

- ▪ Integrate and interpret – Develop an interpretation
- ▪ Analyse a list of options using predefined criteria

Scoring Comment: Initially each part is coded separately. Final scoring combines codes as shown below.

Full Credit

Selects the following <u>four</u> experiences (in any order):

- ▪ Efficient at cleaning dishes: working at Corner Restaurant
- ▪ Good at following instructions: followed kitchen safety regulations daily
- ▪ Knowledge of food handling and preparation experience: work at Corner Restaurant
- ▪ Work well with team: won the 2007 sports team player award

Partial Credit

Selects <u>any three</u> of the following four experiences (in any order):

- ▪ Efficient at cleaning dishes: working at Corner Restaurant
- ▪ Good at following instructions: followed kitchen safety regulations daily
- ▪ Knowledge of food handling and preparation experience: work at Corner Restaurant
- ▪ Work well with team: won the 2007 sports team player award

Comment

The task in the second question of this unit is for students to open a job advertisement, then adopt the role of someone applying for this job, and to decide which of a list of qualifications and experiences from their résumé are relevant to the job described in the advertisement. They are not required to write a job application, nor to have experience of working or applying for jobs, as all the information needed is supplied in the texts.

This question opens on a different page from the first, although is still part of the same Job Search website. The open tab "Today's Jobs" from the previous question has been replaced here with "Current Job", and the main text displayed here is the prominent link "View details of job: Juice Bar Team Members", which is the job from the list displayed in the previous question that is suitable for school students. The link also explains that if it is clicked, a new tab will open.

This question requires relatively complex navigation, in that students need to open several pages, and to compare multiple piece of information on two of them. The question provides explicit instructions to students about these navigation steps, directing them to click on the prominent link on the page that is open to view the job advertisement, then on a link on that page, and finally to select four options in the drop down menus available on the third page that will open. They are also directed to use information from the job advertisement to inform their selection.

The screen shot below shows the job advertisement, and how the tab for the "Job Search" page remains open.
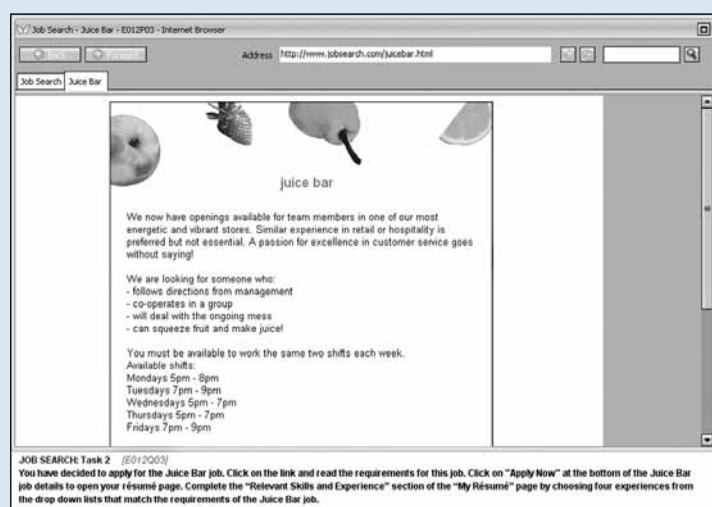
The "Apply Now" link referred to in the task instructions is only visible if they scroll down or maximise the page. The text of the "Juice Bar" advertisement is written in a way designed to appeal to young people, using terms such as "energetic", "vibrant", "HEAPS OF ENERGY", "FUN" and "a bit of extra cash", and aims to make the job appear accessible to people even if they do not have relevant experience ("preferred but not essential"). The absence of specialist language, and the list format for qualifications of Juice Bar workers and of the available shifts, mean that the reading demand should be fairly low, as each idea is expressed in a minimum number of words.
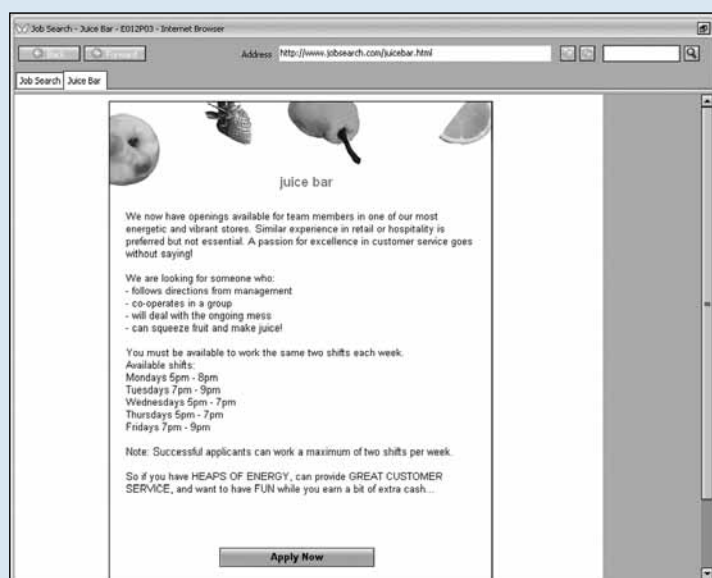
The screen shot below shows how the third page opens in a third tab. Students are therefore able to move between the key pages, the "Juice Bar" advertisement and the "My Résumé" page, by clicking on these tabs.

In order to view all the options in the drop-down menus, students need to scroll down using the arrows under "My Relevant Skills and Experience". The screen shots below illustrate the first six options that students see when they first click on one of the arrows, and then the last six of the available ten, when they scroll down within the window. The list of ten options is the same for each drop-down menu.

A number of irrelevant links can be clicked, but these are at the bottom of the "Job Search" pages and are not prominent. Clicking on the tabs on the "Job Search" page allows students alternative (if slightly longer) pathways for navigating to the "Juice Bar" and "My Résumé" pages.

Students are directed to refer to the Juice Bar advertisement for the job specifications, in order to inform their choices when completing the drop-down lists. It is to be expected that many students will switch between these two pages several times, to be sure they have obtained all the information they need.

Because navigation for this task requires a number of steps, including comparing information on two pages, and making choices in four different drop-down menus, it can be seen as relatively complex. The first three relevant options are visible without scrolling down. Although a level of common sense may assist in making choices relevant to a job in a juice bar, only reference to the advertisement can confirm the nature of the job requirements. It is relatively easy for students to obtain partial credit by correctly selecting three relevant options. The fourth option relevant to the job advertisement is the final one in the list, and selecting it requires making a inference to link winning a "Sports Team Player of the Year award", which is not immediately relevant to working in a juice bar, with the job requirement, "co-operates in a group". In order to obtain full credit for this item, students need to select all four relevant options. The combination of the multiple navigation steps, the multiple drop-down menus, and the need for an inference to select the fourth relevant option contribute to the relative difficulty of obtaining full credit for this item.

JOB SEARCH – *QUESTION 3*

Situation: *Occupational*
Environment: *Authored*
Text format: *Mixed*
Text type: *Description*
Aspect: *Reflect and evaluate – Reflect on and evaluate content of text*
Question format: *Open Constructed Response*
Difficulty: *558 (Level 4)*

626	**Level 5 or above**
	Level 4
553	
	Level 3
480	
	Level 2
407	
	Below Level 2

"Note: Successful applicants can work a maximum of two shifts per week."
Why do you think the employer has made this rule?

Scoring

Question intent:

- Reflect and evaluate – Reflect on and evaluate content of text.
- Hypothesise about the reason for including a condition in a job advertisement using prior knowledge and information from the text.

Full Credit

Code 1: Refers (explicitly or implicitly) to a <u>benefit or protection for the employer OR employee</u>. Must be <u>consistent</u> with the <u>stipulation of not working more than two shifts</u> and with working a <u>fixed two shifts</u>. May refer to the flexibility, reliability or effectiveness of the (pool of) employees or to the employer's concerns about employee welfare.

- It is safer that way because the business can still operate OK if someone is off work for a few weeks.
- Students often have other priorities at those times. *["Those times" refers to the shifts in the advertisement. Implies benefit to employee.]*
- It is unlikely most students can do more than 2 shifts a week.
- They don't want to rely on any one person. [implied protection from risk]
- They say that at the start in case you're not very good.
- They want lots of different people working there.
- They want lots of happy faces.
- They don't want you to get tired.
- Because it's a tough job, and they don't want you to get tired and quit.
- Because they want a big staff in case someone quits or gets sick.
- Because the chaos at the Juice Bar is too much for anyone more often than twice a week.
- Because the best workers are people with other interests/hobbies than the job, and they want you to keep doing what you like.
- So students and other people who may be studying or holding down other jobs can still work casually but don't have the restrictions of working all day every day.

Comment

The final question in this unit requires no navigation beyond scrolling down the open page (the advertisement for the Juice Bar) to view the sentence referred to in the instructions, that students may work no more than two shifts a week. Students need to draw on their world knowledge as well as ideas presented in the advertisement to understand why such a restriction might be included. They receive credit for answers that consider the interests of either the employer or the employee. Clues in the advertisement that may be relevant include the reference to a team (numerous workers), to the busy, energetic nature of the work, the need to present a happy face, etc. The requirement for students to make plausible links between these ideas in the text and their potential implications in the real world, seeing the view point of either employers or employees, rather than considering only their own situation, is likely to play a major role in the relative difficulty of this item.

SIMILARITIES AND DIFFERENCES BETWEEN DIGITAL AND PRINT READING ASSESSMENTS

The framework for reading (see Box VI.1.1 and OECD, 2010a, Chapter 2) treats digital and print reading as a single domain, while acknowledging that there are some intrinsic differences. A key distinction that underpins many consequential differences is the fact that, in the digital medium, the reader is generally unable to see the physical extent of the available text at any given moment, while at the same time he or she has almost immediate access to a nearly infinite array of material via the Internet. The differences reflected in the framework were built into the design of the two assessments and the tests themselves. In this section, the construct and balance of the digital and print assessment instruments are compared in relation to the assessment framework, and then the design and operational similarities and differences of the two assessments are reviewed.

Framework characteristics and test construct

The intent in developing and extending the framework for reading to include digital reading was both to acknowledge the unitary nature of reading, regardless of medium, and to respect the differences between digital and print. Two main framework variables, text and aspect, shape the development of both digital and print reading assessments.[2]

Text

The PISA framework for reading describes four text characteristics: medium (print or digital), environment, format and text type. The *text environment* category – authored or message-based – is only applicable to digital reading.

The main categories of *text format* in print reading are continuous and non-continuous, reflecting the fact that in print, readers often have access to and encounter only a single text at a particular time. While in everyday life readers often need to consult several print texts, PISA makes only minimal use of such tasks for practical reasons. By contrast, a computer-based reading assessment makes presentation of multiple texts a practical possibility, as well as reflecting the reality that in the world of hypertext, on which the PISA digital reading assessment is focused, there is almost unlimited access to texts; and reading in this medium usually involves referring to several pages, and often to several texts from different sources, composed by different authors and appearing in different formats. The distribution of tasks by text format in the two media thus reflects both typical reading practices, and a better opportunity for large-scale assessment to measure readers' capacity to access, sort and selectively use several texts. Figure VI.2.15 shows the number and percentage of score points by text format on the PISA 2009 digital and print reading scales. The numbers and percentages quoted in this and the following similar figures relate to score points rather than individual task numbers. This allows for a more accurate representation of the relative weighting of these categories in the instruments.

■ Figure VI.2.15 ■

Distribution of score points in digital and print reading assessments, by text format

Text format	Number of score points PISA 2009 digital	% of total score points PISA 2009 digital	Number of score points PISA 2009 print	% of total score points PISA 2009 print
Continuous	2	5	87	62
Non-continuous	4	11	41	29
Mixed	2	5	7	5
Multiple	30	79	5	4
Total	**38**	**100**	**140**	**100**

Source: OECD, *PISA 2009 Database*.
StatLink ⟐ http://dx.doi.org/10.1787/888932435378

Text type refers to the rhetorical structure of a text. The category *transactional* was introduced into the PISA 2009 framework to reflect such texts as e-mails and text messages, which are the predominant type of text encountered by many digital readers (see Chapters 4 and 5). While transactional texts also exist in the print medium, in personal letters and notes, for example, they are not as prominent. Conversely, the category *narration* is more prominent in the print reading assessment, representing its importance in print reading behaviour. The substance of narration is social and personal experience and imaginative life, in the form of literature, history, biography and memoir. These texts are typically an important part of school curricula and they are also valued types of reading by many individuals beyond school. Narration in the digital medium, in the form of e-books, was not yet common when the 2009 assessment was being developed in 2006-07. Figure VI.2.16 shows the number and percentage of score points by text type in the PISA 2009 digital and print reading assessments.

■ Figure VI.2.16 ■

Distribution of score points in digital and print reading assessments, by text type

Text type	Number of scorepoints PISA 2009 digital	% of total score points PISA 2009 digital	Number of score points PISA 2009 print	% of total score points PISA 2009 print
Argumentation	8	21	30	21
Description	11	29	32	23
Exposition	11	29	44	31
Narration	0	0	22	16
Instruction	0	0	12	9
Transaction	6	16	0	0
Not specified	2	5	0	0
Total	38	100	140	100

Source: OECD, *PISA 2009 Database*.
StatLink ⌨ http://dx.doi.org/10.1787/888932435378

Aspects

Three cognitive processes, or *aspects*, are common to digital and print reading: *access and retrieve*, *integrate and interpret* and *reflect and evaluate*. The aspect *access and retrieve* involves orienting and searching, using knowledge of the medium's structures and features to find information. In print reading, readers apply their skills in accessing and retrieving in a concrete space, while in digital reading they do so in a more abstract space. In addition, the sequence in which information is presented in print is more or less fixed, while in the digital medium readers construct their own sequences of information to a greater extent. As a result, the cognitive load of access and retrieve tasks in digital reading is generally greater than that in print reading. However, in the digital reading assessment, the degree to which readers have to construct their own sequence of information retrieval is often controlled by the task directives, such as "Click on the link …, then go to the page …" (for details, see Chapter 3).

The aspect *integrate and interpret* covers a very wide variety of cognitive tasks, including inferring the connection between one part of the text and another, processing the text to form a summary of the main ideas, identifying the distinction between principal and subordinate elements, finding a specific instance in the text of something earlier described in general terms, and comparing, contrasting and understanding figurative and nuanced language. All of these cognitive processes are common to digital and print reading. The main difference lies in what needs to be integrated. The number and diversity of the texts that can be drawn upon are usually much greater in the digital medium, and this is reflected in the PISA assessments. Integrating in the digital assessment requires the reader to consult multiple texts, sometimes in different formats, while integrate tasks in print reading usually focus on a single piece of stimulus.

The aspect *reflect and evaluate* involves thinking about the form and the content of texts, both in relation to personal experience and to more extrinsic standards. While predictive reading and critical evaluation are important in both media, readers of digital texts are more often required not only to predict what will be useful and relevant, because there is so much information to choose from, but also to judge the credibility of the content, given that publication is often not subject to any editorial filter between the author and the reader. This fact is reflected in the larger proportion of tasks in the assessment that focus on students' capacity to evaluate what they read.

The percentage of tasks devoted to each of the aspects varies between the digital and print reading assessments. In print reading, tasks reflecting the *integrate and interpret* aspect occupy about half of the assessment, while *access and retrieve* and *reflect and evaluate* tasks each account for roughly one-quarter of the assessment. Tasks in the digital reading assessment are more evenly spread across these three aspects. Moreover, in some digital reading tasks, readers must draw on all three aspects, for example in navigating to and between multiple texts, in sequences that may vary substantially. The digital reading assessment therefore adds another aspect, *complex*, to acknowledge the fact that the complexity of some tasks cannot be represented by any one of the three previously-established aspects. Figure VI.2.17 shows the number and percentage of score points, by aspect, in the PISA 2009 digital and print reading assessments.

■ Figure VI.2.17 ■

Distribution of score points in digital and print reading assessments, by aspect

Aspect	Number of score points PISA 2009 digital	% of total score points PISA 2009 digital	Number of score points PISA 2009 print	% of total score points PISA 2009 print
Access and retrieve	7	18%	34	24
Integrate and interpret	11	29%	69	49
Reflect and evaluate	8	21%	37	26
Complex	12	32%	0	0
Total	**38**	**100**	**140**	**100**

Source: OECD, *PISA 2009 Database*.
StatLink ⌨ http://dx.doi.org/10.1787/888932435378

Test design and operational characteristics

In addition to differences in the constructs of the two reading assessments, there were differences in how they were administered. Figure VI.2.18 sets out the major similarities and differences in the design and delivery of the PISA 2009 digital and print reading assessments.

■ Figure VI.2.18 ■

Similarities and differences between digital and print reading assessments in PISA 2009

Feature	Digital reading	Print reading
Mode of delivery and data collection	Computer-based delivery system	Pencil and paper
Number of countries participating in the assessment	A subset of 19 (16 OECD countries and 3 partner countries/economies)	65 (34 OECD countries and 31 partner countries/economies)
Required number of students per country	1 500	4 500
Actual average number of students per country that administered the assessment	OECD countries: 1944 Partner countries/economies: 1820	OECD countries: 8800 Partner countries/economies: 5700
Average number of students per school that administered the assessment	10	30
Number of items	29	131
Number of score points	38	140
Average test administration time per student	40 minutes	65 minutes
Average number of score points yielded per student	25	33
Scale construction	Single digital reading scale	Single print reading scale and subscales based on aspects and text formats

Source: OECD, *PISA 2009 Database*.
StatLink ⌨ http://dx.doi.org/10.1787/888932435378

Mode of delivery and data collection, and implications for participation and sample numbers

The immediately obvious difference between the digital and print reading assessments is that the former was delivered and completed on a computer and the latter was delivered and completed with pen and paper. Because computer-based assessment is relatively new, technically challenging and requires substantial resources, many of the early attempts to assess digital reading and other computer-based knowledge and skills have used a paper-based format. In some instances, a hybrid model was used, in which the stimulus is delivered via computer but the responses are captured on paper. Conversely, as computer-based assessments become more common and cheaper, print reading is beginning to be assessed on line, with print-style texts represented digitally. For PISA, it was judged important to use computers both for delivering the tasks and for collecting students' responses. This approach reflects the nature of the digital reading texts, thus allowing measurement of students' activated knowledge about and skills in using texts in the medium. It also allows for collecting evidence about 15-year-olds' performance on reading tasks in a way that reflects the definition of reading as entailing the capacity to "use … written texts": for example, students respond to some digital tasks by selecting from drop-down menus (in the case of selected-response items), or in the form of a blog or e-mail message (in constructed-response items). These response formats provide an added dimension of authenticity.

The decision to use a digital mode of delivery and data collection had resource implications, which undoubtedly contributed to the fact that only 19 of the 65 PISA countries opted to participate in the 2009 digital reading assessment. The need to make computers available also influenced the decision to administer the digital reading assessment to a smaller sample than usual within the participating countries. One-third of the students in each sampled school who undertook the paper-based assessment were selected for the digital reading assessment. All of the students in the digital reading sample had also been assessed in print reading, so that comparisons between performances on digital and print reading can be made with confidence.

For further details about implementing both assessments, see *PISA 2009 Technical Report* (OECD, forthcoming).

Number of items and score points in digital and print reading

Just as the sample of students who participated in the digital reading assessment is smaller per country than those who participated in the paper-based assessment, so the pool of items used in 2009 is also comparatively small: 29 digital reading tasks compared with 131 print reading tasks. A larger proportion of the digital items has partial-credit scoring, however, which means that the ratio between the pooled score points for digital and print reading (38 compared with 140) is higher than that between items.

These differences narrow further when considering the measures of student proficiency. Each student sampled for the paper-based assessment in PISA was administered a test of 120 minutes. Within this time all students in the sample spent between 30 and 120 minutes on reading tasks, with an average of 65 minutes of reading. (The students' remaining time was dedicated to mathematics and/or science assessment tasks.) All students in the subsample for digital reading assessment were delivered 40 minutes of test material. In effect, while the whole item pool is much smaller for digital than for print reading, at the student level there was much less difference between the amounts of assessment data collected per student: on average, 33 score points for print reading and 25 score points for digital reading. As a result, the precision and reliability of the measurement of student performance in the two media are similar.

Nonetheless, from the perspective of framework coverage and reporting on subscales, the difference between print and digital reading in the numbers of items and score points is significant. In print reading, framework coverage is well supported by the comparatively large pool of items, and three aspect subscales (*access and retrieve*, *integrate and interpret* and *reflect and evaluate*) and two text format subscales (*continuous* and *non-continuous*), as well as a single scale for print reading, were constructed and reported upon (See OECD, 2010b, Chapter 2). While the pool of 29 digital reading items allows for a light sampling of almost all of the categories of each of the major framework variables, yielding a single digital reading scale, there are insufficient data to support any subscale construction.

A COMPARISON OF PERFORMANCE IN DIGITAL AND PRINT READING

Overall, the correlation between digital and print reading performance is 0.83, with correlations for individual countries ranging from 0.71 to 0.89. By way of comparison, the correlations of print reading with mathematics and science (average for the 16 OECD countries) are 0.83 and 0.88, respectively; the correlation of digital reading with mathematics and science is 0.76 and 0.79, respectively. Though there is clearly a strong relationship between performance in print reading and digital reading, the correlation statistic also indicates some performance differences between the two types of reading.

The scales for the two reading assessments were constructed in a similar way so that, when considering only the 16 OECD countries that participated in the digital reading assessment, the mean and standard deviation for both digital and print reading are 499 and 90, respectively (the digital scale having been constructed to match the PISA 2009 results in print reading of the 16 participating OECD countries). Therefore, country comparisons of reading performance in the two media are valid.

Students reaching the different levels of proficiency

In order to facilitate comparison, the proficiency levels for digital reading – Level 5 or above, Level 4, Level 3 and Level 2 – are aligned with the same proficiency levels for print reading. The comparison is limited by the fact that the number of digital reading items administered in 2009 was small, so that while print reading has seven described levels (Level 6 as the highest level and Level 1b as the lowest level), digital reading has only four. A comparison between the digital and print proficiency levels, and the percentage of students at each of the four parallel described levels, are provided in Figure VI.2.19.

Figure VI.2.19 indicates that across OECD countries the percentage of students performing at any given level in digital reading is similar to the percentage performing at the equivalent level in print reading. However, there are notable differences at the country level. Figure VI.2.20 shows the distribution of students in each participating country over the four described proficiency levels for digital reading and the parallel levels in print reading. The upper bar for each country shows the distribution of performance on the digital reading scale and the lower bar shows the distribution on the print reading scale.

■ Figure VI.2.19 ■

A comparison of performance levels on the digital and print reading scales

Level	Lower score limit	Digital reading	Print reading
		Percentage of students able to perform tasks at this level or above (OECD average)	Percentage of students able to perform tasks at this level or above (OECD average)
5 or above	626	7.8%	8.5% of students in the 16 participating OECD countries can perform tasks at least at Level 5 on the reading scale
4	553	30.3%	30.5% of students in the 16 participating OECD countries can perform tasks at least at Level 4 on the reading scale
3	480	60.7%	59.6% of students in the 16 participating OECD countries can perform tasks at least at Level 3 on the reading scale
2	407	83.1%	82.6% of students in the 16 participating OECD countries can perform tasks at least at Level 2 on the reading scale

Source: OECD, *PISA 2009 Database*.
StatLink ⌸⟱ http://dx.doi.org/10.1787/888932435378

Given that the digital reading scale was constructed to match the mean and standard deviation of the print reading scale, it follows that the OECD average for performance is Level 3 for digital and print reading; both bands span the score point range of 480 to 552, and most individual countries show the same results for their mean highest proficiency levels: Level 3. An exception is Chile, where, on average, students are proficient at Level 2 for both digital and print reading. A few countries have different modal levels for digital and print reading. In Korea, New Zealand and Australia, Level 4 is the modal level in digital reading, while Level 3 is the modal level in print reading, and the proportion of students who reached Level 5 is greater in digital reading than print reading. In other words, in these countries larger proportions of students can be described as "strong performers" in the digital medium than in the print medium. In contrast, in the partner economy Hong Kong-China, the modal level in digital reading is Level 3, while in print reading it is Level 4. The partner country Colombia has a similar disparity in performance between digital and print reading, with a modal level performance in print reading (Level 2) higher than that in digital reading (below Level 2).

On average, 7.8% of students in the participating OECD countries perform at Level 5 or above on the digital reading scale, while a slightly higher percentage (8.5%) performs at Level 5 or 6 in print reading. At the country level, there are three OECD countries in which more than 15% of students are proficient in digital reading at Level 5 or above: Korea (19.2%), New Zealand (18.6%) and Australia (17.3%); whereas only one country, New Zealand, has a comparable percentage of students performing at Level 5 or 6 in print reading (15.7%). The country with the second highest percentage of students performing at Level 5 or 6 in print reading is Japan (13.4%), while only 5.7% of Japanese students are proficient at Level 5 or above in digital reading.

PISA's shorthand description of "lowest performers" applies to those performing below Level 2 of the (print and digital) reading, mathematics and science assessments. On average across the 16 OECD countries that participated in the 2009 digital reading assessment, 16.9% of students performed below Level 2 in digital reading, while a similar percentage (17.4%) performed below the baseline Level 2 on the print reading scale. Although there is wide variation across countries, about the same percentages of students within most countries are proficient below the baseline level in digital and print reading; that is, the proportions of low-performing students on digital and print reading are within five percentage points of each other. Ireland and Japan are the only countries in which there is a substantially larger proportion of low-performing students in print reading. In Ireland, 17.2% are low performers in print reading compared with 12.1% in digital reading; in Japan, 13.6% perform below Level 2 in print compared

with 6.7% below Level 2 in digital reading. The picture is reversed in Chile, Hungary, Poland and the partner country Colombia, where there are substantially larger groups of low performers in digital than in print reading. The percentage of low performers in digital reading in Chile is 37.7%, while the percentage of low performers in print reading, while still substantial, is smaller, at 30.6%. In Hungary and Poland, the disparity is greater: the percentage of low performers in digital reading in Hungary is 26.8%, while in print reading it is only 17.6%; in Poland, 26.3% perform below the baseline level in digital reading, but only 15.0% do so in print reading. The partner country Colombia shows the greatest disparity: just over one-third of students (34.2%) perform below the baseline level in print reading, but two-thirds (68.4%) are below the baseline level in digital reading.

■ Figure VI.2.20 ■
Percentage of students at each proficiency level on the digital and print reading scales

Legend:
Digital reading		Print reading
	Level 5 or above	
	Level 4	
	Level 3	
	Level 2	
	Below Level 2	
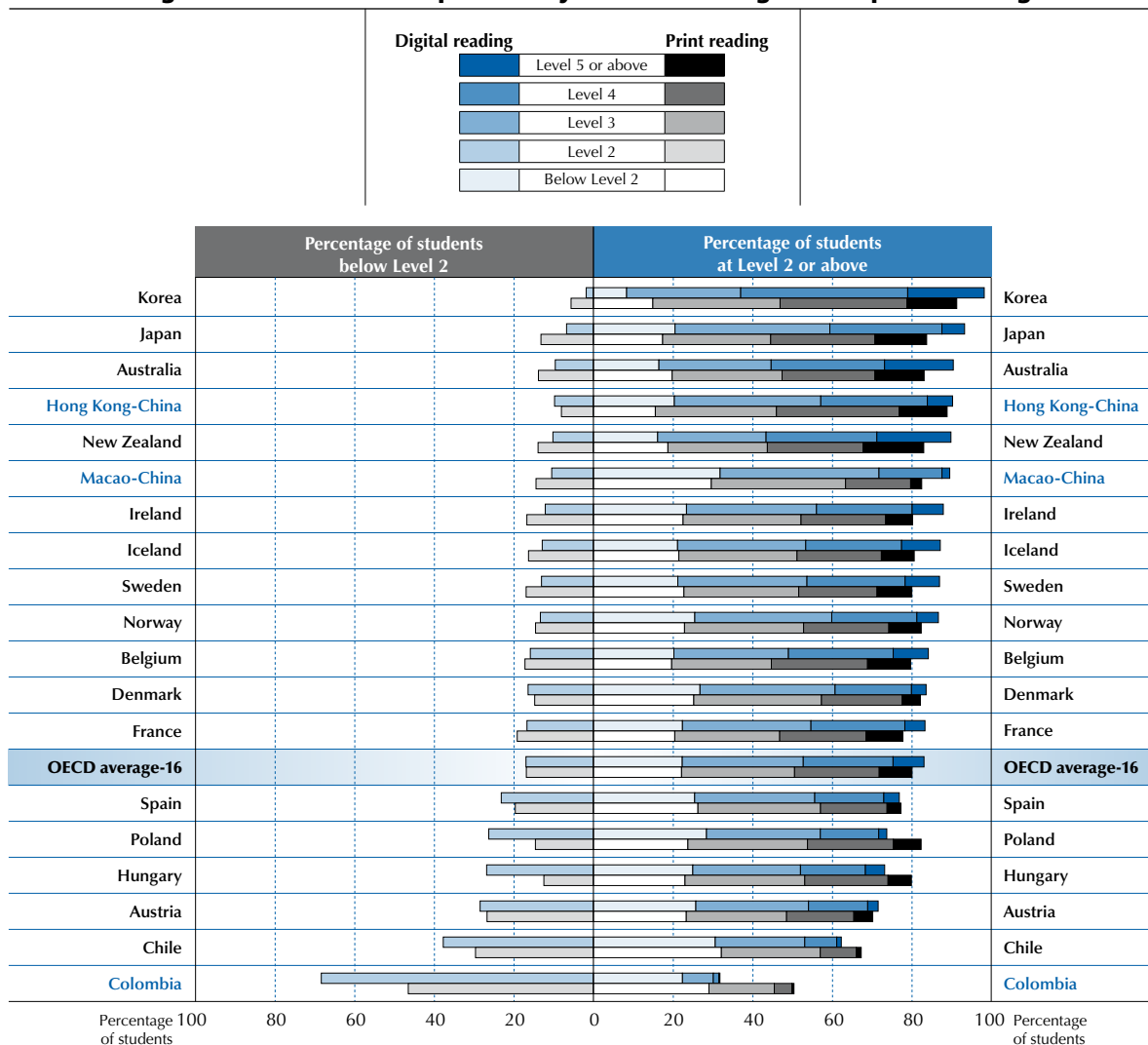
Countries are ranked in descending order of the percentage of students at Level 2 or above in digital reading.
Source: OECD, *PISA 2009 Database,* Table VI.2.1.
StatLink ⍰⍰⍰ http://dx.doi.org/10.1787/888932435378

Average level of proficiency

Another way of summarising the differences between countries is to compare their mean performances in the two reading media. A mean of 499 and a standard deviation of 90, respectively, are the benchmarks – pooled average for the 16 participating OECD countries – against which each country's digital and print reading performances in PISA 2009 are compared.

Figure VI.2.21 shows each country's mean scores for digital and print reading. Statistically significant differences are highlighted.

The figure shows that only a handful of individual countries – Japan, France, Belgium, Norway and Spain – have a similar mean for digital and print reading.

■ Figure VI.2.21 ■
Comparison of mean performance in digital and print reading

	Digital reading		Print reading		Difference between digital and print	
	Mean score	S.E.	Mean score	S.E.	Mean dif.	S.E.
Australia	537	(2.8)	515	(2.3)	**21.70**	1.81
Austria	459	(3.9)	470	(2.9)	**-11.70**	2.98
Belgium	507	(2.1)	506	(2.3)	1.45	1.61
Chile	435	(3.6)	449	(3.1)	**-14.85**	2.41
Denmark	489	(2.6)	495	(2.1)	**-5.99**	1.91
Spain	475	(3.8)	480	(3.1)	-4.95	2.79
France	494	(5.2)	496	(3.4)	-1.35	4.82
Hungary	468	(4.2)	494	(3.2)	**-25.84**	2.92
Ireland	509	(2.8)	496	(3.0)	**13.27**	2.64
Iceland	512	(1.4)	500	(1.4)	**11.56**	0.94
Japan	519	(2.4)	520	(3.5)	-0.63	2.91
Korea	568	(3.0)	539	(3.5)	**28.31**	1.99
Norway	500	(2.8)	503	(2.6)	-3.28	2.00
New Zealand	537	(2.3)	521	(2.4)	**16.48**	1.70
Poland	464	(3.1)	500	(2.6)	**-36.96**	2.20
Sweden	510	(3.3)	497	(2.9)	**12.90**	2.11
OECD average-16	499	(0.8)	499	(0.7)	0.01	0.63
Colombia	368	(3.4)	412	(3.6)	**-43.06**	2.64
Hong Kong-China	515	(2.6)	533	(2.1)	**-18.36**	2.40
Macao-China	492	(0.7)	487	(0.9)	**5.29**	0.84

Note: Values that are statistically significant are indicated in bold (see Annex 3).
Source: OECD, *PISA 2009 Database*.
StatLink ⌨≡📊 http://dx.doi.org/10.1787/888932435378

In Poland, Hungary, Chile, Austria, Denmark, the partner economy Hong Kong-China and the partner country Colombia, students perform significantly better, on average, in print than in digital reading. In Korea, Australia, New Zealand, Ireland, Sweden, Iceland and the partner economy Macao-China, students perform significantly better, on average, in digital than in print reading. There is a tendency for the higher-performing countries in both media to do better in digital media, while the lower-performing countries perform more strongly in print media, although Hong Kong-China is an exception.

Another way of comparing countries' performance is to look at their ranking. Because the figures are derived from samples, it is not possible to determine a precise rank among the participating countries. It is possible, however, to determine, with 95% likelihood, a range of ranks in which the country's performance level lies. Figure VI.2.22 shows the relative ranking of the participating countries in digital and print reading.

Figure VI.2.22 shows that Korea ranks first among OECD countries in both digital and print reading, and Chile ranks last. The partner economy Hong Kong-China is ranked at the same level as Korea in print reading, but is below it by several ranks in digital reading. At the other end of the scale, the partner country Colombia is ranked last among all the participating countries on both scales. Around the middle of the ranking, the OECD average, there is a wide band of possible ranks in both media. For example, Denmark ranks between ninth and thirteenth among OECD countries for print reading and between tenth and eleventh for digital reading. France's position is even more difficult to ascertain: it ranks anywhere between seventh and thirteenth for print reading and between ninth and eleventh for digital reading. For these countries, there is no clear difference in relative position on the two scales.

However, for other countries, the ranking does shed light on relative performance on the two scales. Spain and the partner economy Macao-China rank higher on the digital reading scale than on the print reading scale. Ireland and Australia also show this pattern, but for these two countries, possible ranks overlap.

■ Figure VI.2.22 ■

Where countries rank in digital and print reading performance

	Statistically significantly **above** the OECD average
	Not statistically significantly different from the OECD average
	Statistically significantly **below** the OECD average

	Digital reading scale						Print reading scale					
	Mean score	S.E.	**Range of rank**				Mean score	S.E.	**Range of rank**			
			OECD countries		All countries/economies				OECD countries		All countries/economies	
			Upper rank	Lower rank	Upper rank	Lower rank			Upper rank	Lower rank	Upper rank	Lower rank
Korea	568	(3.0)	1	1	1	1	539	(3.5)	1	1	1	2
New Zealand	537	(2.3)	2	3	2	3	521	(2.4)	2	3	3	4
Australia	537	(2.8)	2	3	2	3	515	(2.3)	3	4	4	5
Japan	519	(2.4)	4	4	4	5	520	(3.5)	2	4	3	5
Hong Kong-China	515	(2.6)			4	7	533	(2.1)			1	2
Iceland	512	(1.4)	5	7	5	8	500	(1.4)	6	10	7	11
Sweden	510	(3.3)	5	8	5	9	497	(2.9)	7	13	8	14
Ireland	509	(2.8)	5	8	6	9	496	(3.0)	8	13	9	14
Belgium	507	(2.1)	6	8	7	9	506	(2.3)	5	7	6	8
Norway	500	(2.8)	9	10	10	11	503	(2.6)	5	9	6	10
France	494	(5.2)	9	11	10	13	496	(3.4)	7	13	8	14
Macao-China	492	(0.7)			11	13	487	(0.9)			15	15
Denmark	489	(2.6)	10	11	11	13	495	(2.1)	9	13	10	14
Spain	475	(3.8)	12	13	14	15	481	(2.0)	14	14	16	16
Hungary	468	(4.2)	12	14	14	16	494	(3.2)	9	13	9	14
Poland	464	(3.1)	13	15	15	17	500	(2.6)	5	11	6	12
Austria	459	(3.9)	14	15	16	17	470	(2.9)	15	15	17	17
Chile	435	(3.6)	16	16	18	18	449	(3.1)	16	16	18	18
Colombia	368	(3.4)			19	19	413	(3.7)			19	19

Note: See Annex A3 for a detailed description of how the range of ranks is computed.
Source: OECD, *PISA 2009 Database*.
StatLink ⌐⌐ http://dx.doi.org/10.1787/888932435378

Gender differences in performance on the digital and print reading scales

The mean difference between boys' and girls' performance in digital reading is 24 score points, in favour of girls, while the mean gender difference in print reading for the same 16 OECD countries is 38 score points. There is still a marked difference in performance in favour of girls in digital reading, but it is less extreme than the disparity between boys' and girls' performance in print reading. Figure VI.2.23 shows the scores for boys and girls in digital and print reading, ranked by the gender difference in digital reading performance.

In all participating countries and economies the gap in gender performance was wider in print than digital reading. The variations in the size of the gender gap among countries do not seem to be associated with the absolute levels of performance. In the highest-performing country in both digital and print reading, Korea, the gender gaps in both digital and print reading are close to the respective OECD averages, while in one of the other top-performing countries, New Zealand, the gender gaps in both media are among the widest among all countries. Among countries performing below the OECD average in digital and print reading, Austria has a substantially narrower gap between boys and girls in digital reading (22 points) than in print reading (41 points), while the gaps between Chilean boys and girls in digital and print reading are almost the same (19 points and 22 points, respectively).

Of the 19 countries and economies that participated in the digital reading assessment, those with the widest gender gaps in digital reading tend to have a comparatively wide gender gap in print reading as well. New Zealand, for example, shows a large gender gap in digital reading (40 points) and in print reading (46 points). Ireland and Australia show a similar pattern. In these countries, whatever factors might explain the performance differences between boys and girls in the digital medium seem to be the same as, or at least have a similar effect to, those that underpin performance differences in the print medium. Like these predominantly English-speaking countries, three of the Nordic countries, Norway, Iceland and Sweden, have above-average gender gaps in digital reading performance (girls outperform boys by 35, 30 and 26 score points, respectively). However, unlike in New Zealand, Ireland and Australia, these three Nordic countries have much wider gender gaps in print reading than in digital reading: girls in Norway, Iceland and Sweden outperform boys by 47, 44, and 46 score points, respectively, in print reading. Poland also has an above-average gap (29 points) between girls' and boys' performance in digital reading and it also has a massive gap of 50 points in print reading.

■ Figure VI.2.23 ■
Comparison of gender gaps in digital and print reading
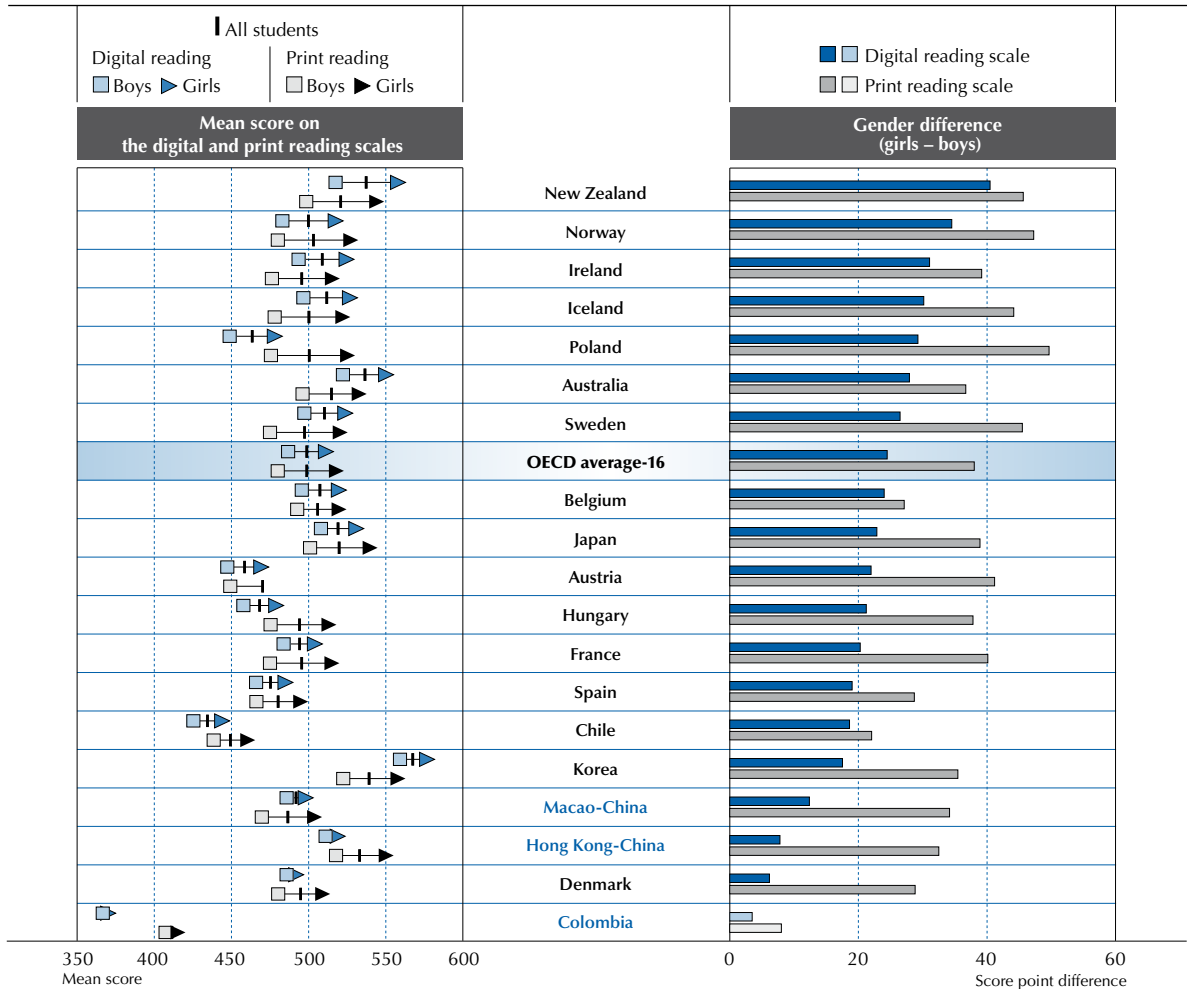
Note: Gender differences that are statistically significant are marked in a darker tone.
Countries are ranked in descending order of the gender difference in digital reading performance.
Source: OECD, *PISA 2009 Database,* Table VI.2.4.
StatLink http://dx.doi.org/10.1787/888932435378

Conversely, countries with narrow gender gaps in digital reading tend to have narrow gender gaps in print reading as well. In some cases, the differences in the gaps, measured in score points, are quite small. For example, the partner country Colombia shows no significant gender gap in digital reading proficiency and a gap of only eight score points between boys and girls in print reading. The OECD countries Chile, Spain and Belgium also show relatively small differences in the gender gap in performance for both digital and print reading.

In another group of countries with below-average gaps between boys' and girls' performance in digital reading, there is a much more substantial gender gap in performance in print reading. In the two partner economies, Macao-China and Hong Kong-China, the gap between boys and girls in digital reading is only 12 and 8 points, respectively, while the gender gap in print reading proficiency is just a little below the OECD average of 38 points, at 34 and 33 points, respectively. Denmark has a gap of just six points between boys and girls in digital reading proficiency; but while the gender gap in print reading proficiency is below-average, it is still a substantial 29 score points. For these two economies and one country, it would appear that the factors influencing boys' and girls' digital reading proficiency are different from those that affect their proficiency in print reading.

While girls are generally more proficient readers in both media, on average, girls score seven points lower in digital reading than in print reading, and boys score seven points higher. It was noted above that a handful of individual countries – Japan, France, Belgium, Norway and Spain – have a similar mean for digital and print reading. For some

of these countries, however, the apparent similarity in performance across the two media masks significant gender differences. France and Norway, the only two countries whose performance in both digital and print reading was not significantly different to the OECD average, offer illustrations. Their "average" performance masks the fact that French girls scored 11 points lower in digital reading than they did in print reading, while French boys scored 9 points higher in digital than in print reading. Similarly, Norwegian girls scored 10 points lower in digital than in print reading, while Norwegian boys performed about the same on the two assessments. Two other countries, Japan and Denmark, and the partner economy Macao-China, also show girls scoring lower in digital reading than in print reading, while boys attain higher scores.

In Sweden, Iceland and Korea, boys and girls performed better in digital than in print reading, but boys performed *much* better in digital reading than in print reading. In contrast, in Poland, Austria, Hungary and in the partner economy Hong Kong-China, boys and girls performed worse in digital reading than in print reading, but in Poland and the partner economy Hong Kong-China girls performed *much* worse in digital reading. In these countries, policy makers might consider developing strategies specifically to improve girls' familiarity with and skills in reading digital texts.

In summary, then, it is clear that, on average, the gap between boys' and girls' proficiency that has been such a constant feature in of print reading performance is narrowed in digital reading, but in every country except one it has not disappeared. It is clear too that there is a good deal of variation across countries in the relative sizes of the gaps in performance between boys and girls across the two media. The variations do not appear to be associated with the absolute levels of performance, but there are some interesting patterns among countries with cultural and/or linguistic similarities that would reward further investigation. Some of the possible explanations are explored in succeeding chapters.

A COMPOSITE SCALE FOR DIGITAL AND PRINT READING

Because readers today need to handle texts in both digital and print media, it is useful to consider reading proficiency as a single measure. Accordingly, PISA has developed a composite reading scale. The scale is based on equal weighting of results from the two assessments: an arithmetic average. The equal weighting is justified in measurement terms because both of the assessments estimate student proficiency reliably. It is justified in construct terms because proficiency in both digital and print reading is essential for citizens of the 21st century (for further details, see Annex A1a).

The distribution of the digital reading items on a single scale is similar to the distribution of the print reading items, and when the two sets of items are calibrated together, the estimates of the difficulty of each item are similar to their estimates on the separate scales. Since the same methodology was used to construct the scales for digital and print reading proficiency, with the hierarchy of levels set at the same cut-points on the respective scales and the level bands at the same widths, it is possible to align the descriptions of results for those levels in digital reading where there are sufficient data. In generating descriptions for the composite levels, the combined set of items from the two separate scales was again inspected, and the main common features identified as characteristics of the new composite level. The descriptions also include some elements specifically relating to navigation, consistent with items within the level. Thus, the construction of a composite scale provides an overall picture of reading proficiency that is both qualitatively and quantitavely consistent with the two separate scales. Figure VI.2.24 shows the match between the digital and print reading levels. The numerical terms used to describe proficiency in print reading have been adopted for the composite reading scale to allow the full range of descriptions, though the absence of digital reading items at the highest and lowest levels means that the descriptions at the extremes are confined to print reading.

■ Figure VI.2.24 ■

Alignment between the described levels for digital and print reading and composite reading

Lower score limit	Digital reading	Print reading	Composite reading
698	Level 5 or above	Level 6	Level 6
626		Level 5	Level 5
553	Level 4	Level 4	Level 4
480	Level 3	Level 3	Level 3
407	Level 2	Level 2	Level 2
335	Below Level 2 (undescribed)	Level 1a	Level 1a
262		Level 1b	Level 1b
		Below Level 1b (undescribed)	Below Level 1b (undescribed)

Source: OECD, *PISA 2009 Database*.
StatLink 🔗 http://dx.doi.org/10.1787/888932435378

■ Figure VI.2.25 ■
Summary descriptions for the composite reading scale (digital and print combined)

| Level	Lower score limit	Percentage of students able to perform tasks at this level or above (OECD average)	Characteristics of tasks
6	708	0.60%	Tasks at this level typically require the reader to make multiple inferences, comparisons and contrasts that are both detailed and precise. They require demonstration of a full and detailed understanding of one or more texts and may involve integrating information from more than one text. Tasks require the reader to deal with unfamiliar ideas, in the presence of prominent competing information, and to generate abstract categories for interpretations. Reflect and evaluate tasks may require the reader to hypothesise about or critically evaluate a complex text on an unfamiliar topic, taking into account multiple criteria or perspectives, and applying sophisticated understandings from beyond the text. There are limited data about both access and retrieve tasks and digital tasks at this level, but in both cases it appears that a salient condition is precision of analysis and fine attention to detail that is inconspicuous in the texts.
5	626	6.60%	Tasks at this level that involve retrieving information require the reader to locate and organise several pieces of deeply embedded information. In tasks requiring interpretation the reader needs to draw on a full and detailed understanding of one or more texts whose content or form is unfamiliar. Reflect and evaluate tasks require critical evaluation or hypothesis, drawing on specialised knowledge. These tasks typically require the reader to generate the criteria on which a critical evaluation is based. In the digital medium, tasks may require the reader to navigate across several sites without guidance, negotiating information in different formats. For all aspects of reading, tasks at this level typically involve dealing with concepts that are contrary to expectations or ambiguous.
4	553	29.80%	Tasks at this level that involve retrieving information require the reader to locate and organise several pieces of embedded information. Some tasks at this level require interpreting the meaning of nuances of language in a section of text by taking into account the text as a whole. Other tasks require understanding and applying categories in an unfamiliar context. Reflect and evaluate tasks at this level require readers to use formal or public knowledge to hypothesise about or critically evaluate a text. Digital reading tasks may require the reader to navigate across a number of sites with only limited guidance. Readers must demonstrate an accurate understanding of long or complex texts whose content or form may be unfamiliar, particularly texts that deal with scientific or technical content.
3	480	60.50%	Tasks at this level require the reader to locate, and in some cases recognise the relationship between, several pieces of information that must meet multiple conditions. In tasks requiring interpretation the reader may need to integrate several parts of a text in order to identify a main idea, understand a relationship or construe the meaning of a word or phrase. The reader needs to take into account many features in comparing, contrasting or categorising. Often the required information is not prominent or there is much competing information; or there are other text obstacles, such as ideas that are contrary to expectation or negatively worded. Reflect and evaluate tasks at this level may require connections, comparisons, and explanations, or they may require the reader to evaluate a feature of text. Some reflect and evaluate tasks require readers to demonstrate a fine understanding of the text in relation to familiar, everyday knowledge. Other tasks do not require detailed text comprehension but require the reader to draw on less common knowledge. In the digital medium, the task may require several steps of well-directed navigation. where evaluation is required, the reader needs to generate simple categories, and apply them using the information that is most directly accessible, or only part of the available information.
2	407	83.50%	Some tasks at this level require the reader to locate one or more pieces of information, which may need to be inferred and may need to meet several conditions. Others require recognising the main idea in a text, understanding relationships, or construing meaning within a limited part of the text when the information is not prominent and the reader must make low level inferences. Tasks at this level may involve comparisons or contrasts based on a single feature in the text. In the print medium, typical reflect and evaluate tasks at this level require readers to make a comparison or several connections between the text and outside knowledge, by drawing on personal experience and attitudes. In the digital medium, tasks require locating and interpreting well-defined information, usually in familiar contexts. The task may require navigation across a limited number of sites and use of other web-based tools such as drop-down menus; if so, the reader is supplied with clear directions to the relevant links.
1a	335	95.10%	Tasks at this level require the reader to locate one or more independent pieces of explicitly stated information; to recognise the main theme or author's purpose in a text about a familiar topic; or to make a simple connection between information in the text and common, everyday knowledge. Typically the required information in the text is prominent and there is little if any competing information. The reader is explicitly directed to consider relevant factors in the task and in the text. There are limited data about digital reading at this level, but it appears that, if access to more than one page is required for a task, navigation directions are explicitly directed and links are prominent.
1b	262	99.2%	Tasks at this level require the reader to locate a single piece of explicitly stated information in a prominent position in a short, syntactically simple text with a familiar context and text type, such as a narrative or a simple list. The text may provide support to the reader, such as repetition of information, pictures or familiar symbols. There is minimal competing information. In tasks requiring interpretation the reader may need to make simple connections between adjacent pieces of information. (There are insufficient data about digital reading at this level.)

Source: OECD, *PISA 2009 Database*.
StatLink ⌐⌐⌐ http://dx.doi.org/10.1787/888932435378

Students reaching the different levels of proficiency on the composite reading scale

Figure VI.2.25 describes the composite reading scale. Although there were few digital reading tasks designed to reflect the equivalent level of difficulty of tasks at Levels 1a, 1b and 6 in print reading, student performance can nevertheless be accurately measured to cover all seven levels of the composite reading scale.

The distribution of student performance across these proficiency levels for each participating country and economy is shown in Figure VI.2.26. Table VI.2.1 provides figures for the percentage of students at each proficiency level on the composite reading scale, with standard errors.

■ Figure VI.2.26 ■
How proficient are students on the composite reading scale?
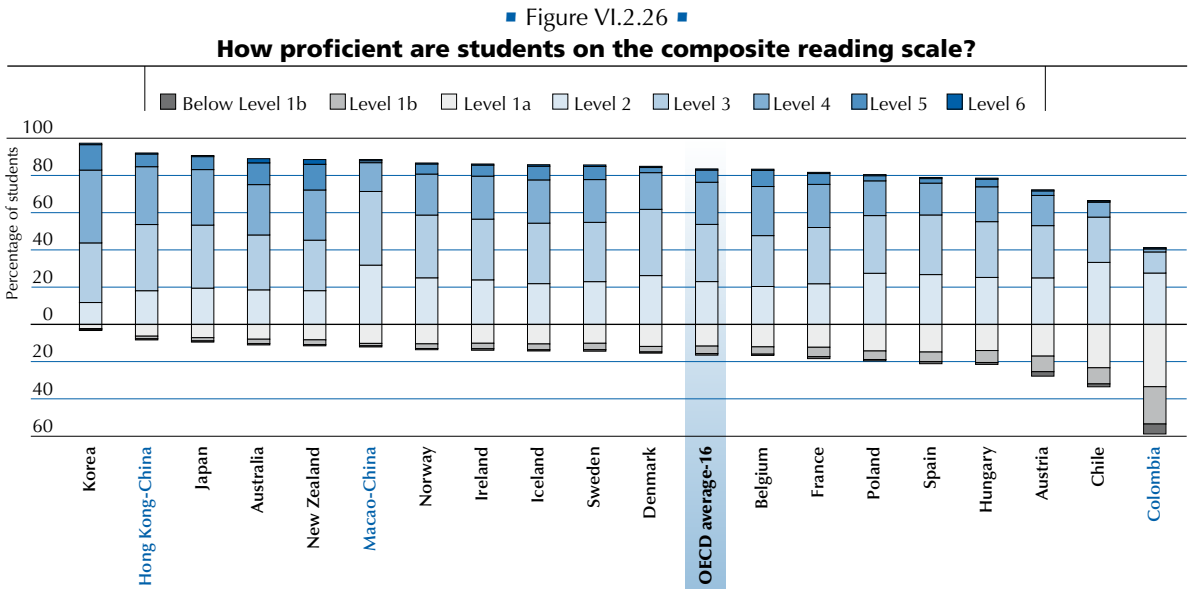
Countries are ranked in descending order of the percentage of students at Levels 2, 3, 4, 5 and 6.
Source: OECD, *PISA 2009 Database,* Table VI.2.1.
StatLink ⫶⫶⪽ http://dx.doi.org/10.1787/888932435378

Proficiency at Level 6 (scores higher than 698 points)

The description of what students proficient at Level 6 know and can do is drawn almost entirely from the print reading scale since only one digital reading item was calibrated at this level of difficulty. On average across OECD countries, 0.6% of 15-year-old students perform at this level. Only two countries have a significantly higher percentage of students performing at Level 6, New Zealand (2.5%) and Australia (2.2%). Korea (0.8%), which ranks first in mean performance, attains close to the OECD average for students performing at this very high level, reflecting the relative homogeneity of its student population's proficiency in both digital and print reading. In some countries and economies, notably Chile, Spain, the partner country Colombia and the partner economy Macao-China, fewer than one-tenth of 1% of students are proficient at this level.

As noted in Chapter 2 of Volume 1, *What Students Know and Can Do*, the very small percentage of students performing at Level 6 illustrates that the PISA scale is capable of distinguishing reading proficiency up to the highest level of excellence among 15-year-olds.

Proficiency at Level 5 (scores higher than 626 but lower than or equal to 698 points)

On average across the 16 participating OECD countries, 7.2% of students are proficient at this level or above, but the proportions range from over twice this percentage in Korea and New Zealand, to less than half in Chile, Austria, Spain, Poland, Denmark, the partner country Colombia and the partner economy Macao-China.

Proficiency at Level 4 (scores higher than 553 but lower than or equal to 626 points)

Across the 16 participating OECD countries, 29.8% of students are proficient at Level 4 or above. In Australia, New Zealand, Belgium, Iceland, France, Ireland, and Sweden, about one-quarter of students attain Level 4 as their

highest level of proficiency. In Japan and the partner economy Hong Kong-China, the proportion is closer to one-third, while in Korea it is almost 40%. About one-fifth of students in Norway, Denmark, Hungary, and Poland attain Level 4 as their highest level, while about 15% of students in Spain, Austria and the partner economy Macao-China attain this level. Some 8% of Chilean students and just over 2% of Colombian students attain this level as their highest level.

Proficiency at Level 3 (scores higher than 480 but lower than or equal to 553 points)

Just over 60% of 15-year-olds across the 16 participating OECD countries are proficient at Level 3 or above. It can be inferred, then, that the majority of young people in these countries is capable of dealing with many everyday reading tasks, regardless of the medium. However, in Hungary, Poland, Spain and Austria Poland and Hungary, only around 50% are proficient at Level 3 or above, and in Chile only a third of students attain this level of proficiency. This means that in these countries half or fewer of 15-year-olds are able to perform the kinds of reading tasks commonly expected of young people and adults in their everyday lives.

In all but two of the participating OECD countries, Level 3 is the modal level of highest attainment. The exceptions are Korea, whose modal highest attainment level is Level 4, and Chile, whose modal highest attainment level is Level 2. Students in the partner economies Hong Kong-China and Macao-China also most commonly perform at Level 3, while the modal performance level of Colombian students is Level 1a.

Proficiency at Level 2 (scores higher than 408 but lower than or equal to 480 points)

Across the participating OECD countries, some 84% of students are proficient at baseline proficiency Level 2 or above. Only in Austria, Chile and the partner country Colombia does the proportion of 15-year-olds proficient at this level fall below three-quarters.

Proficiency at Level 1a (from 335 to 408 points)

Some 95% of 15-year-old students across participating OECD countries are proficient at Level 1a or higher. In most countries, the proportion is well over 90%, while in Chile and Austria it is just under 90% (89.2% and 89.8%, respectively). In Colombia, nearly 75% of 15-year-olds perform at or above Level 1a; but for nearly one-third of students in this partner country, Level 1a is their highest performance level.

Proficiency at Level 1b (from 262 to 335 points) and below Level 1b (below 262 points)

The description of what students proficient at Level 1b know and can do is drawn entirely from the print reading scale. On average across the 16 participating OECD countries, 4% of students reach Level 1b as their highest level of proficiency. In Japan and the partner economies Hong Kong-China and Macao-China, fewer than 2% of students perform no higher than Level 1b, while in Korea the proportion of those students is less than 0.5%.

A small percentage of students in OECD countries perform below the lowest level on the PISA composite digital and print reading scale, Level 1b. On average, only 0.8% of students have scores below 262 points on the PISA scale. In the partner country Colombia, the lowest performing of the countries that participated in the 2009 digital reading assessment, just over 5% of students perform below this level on the composite reading scale.

Students whose proficiency is estimated at below Level 1b on the composite reading scale do not necessarily lack reading skills completely, but there is insufficient information on which to base a description of their reading proficiency, given the small number of tasks at that level presented in PISA 2009. The fact that fewer than one in one hundred students across OECD countries cannot perform tasks at Level 1b demonstrates that the PISA reading scale can measure and describe the performance of almost all students.

Average level of proficiency

Figure VI.2.27 shows each country's mean score for composite digital and print reading. For each country shown in the middle column, the list in the right column shows countries whose mean scores are not sufficiently different to be distinguished with at least 95% certainty. For all other cases, one country has higher performance than another if it is listed above the second country in the middle column, and lower performance if it is listed below. For example, Hong Kong-China's performance, which comes fourth in the list, cannot be distinguished from that of New Zealand or Australia, which come second and third respectively, and Japan, which comes fifth. The darkest band in the middle shows those participating countries whose performance is not statistically significantly different from the OECD average.

■ Figure VI.2.27 ■
Comparing countries' performance on the composite reading scale

	Statistically significantly **above** the OECD average
	Not statistically significantly different from the OECD average
	Statistically significantly **below** the OECD average

Mean	Comparison country	Countries whose mean score is NOT statistically significantly different from that of the comparison country
553	Korea	
529	New Zealand	Australia, Hong Kong-China
526	Australia	New Zealand, Hong Kong-China, Japan
524	Hong Kong-China	New Zealand, Australia, Japan
520	Japan	Australia, Hong Kong-China
507	Belgium	Iceland, Sweden, Ireland, Norway
506	Iceland	Belgium, Sweden, Ireland, Norway
504	Sweden	Belgium, Iceland, Ireland, Norway, France
502	Ireland	Belgium, Iceland, Sweden, Norway, France
502	Norway	Belgium, Iceland, Sweden, Ireland, France
495	France	Sweden, Ireland, Norway, Denmark, Macao-China
492	Denmark	France, Macao-China
489	Macao-China	France, Denmark
482	Poland	Hungary, Spain
481	Hungary	Poland, Spain
478	Spain	Poland, Hungary
464	Austria	
442	Chile	
390	Colombia	

Source: OECD, *PISA 2009 Database*.
StatLink 🔗 http://dx.doi.org/10.1787/888932435378

Korea is the top-performing country by a significant margin, with a mean score of 553. This indicates that, on average, 15-year-olds in Korea perform at the border between Levels 3 and 4 on the composite reading scale. New Zealand, Australia, the partner economy Hong Kong-China and Japan follow. These countries, together with Belgium and Iceland, perform significantly above the OECD average. Students in Sweden, Ireland, Norway and France perform near the OECD average, while students in Denmark and the partner economy Macao-China perform significantly below the OECD average, but cannot be distinguished from students' performance in France. Poland, Hungary and Spain follow. All of the countries mentioned above, except for Korea and Spain, have a mean level of proficiency within the Level 3 band. Spain, Austria and Chile have a mean proficiency within Level 2 while the partner country Colombia's mean is within Level 1a.

■ Figure VI.2.28 ■
Where countries rank on the composite reading scale

	Statistically significantly **above** the OECD average
	Not statistically significantly different from the OECD average
	Statistically significantly **below** the OECD average

			Composite reading scale			
			Range of rank			
			OECD countries		All countries/economies	
	Mean score	S.E.	Upper rank	Lower rank	Upper rank	Lower rank
Korea	553	(3.1)	1	1	1	1
New Zealand	529	(2.2)	2	3	2	3
Australia	526	(2.4)	2	3	2	4
Hong Kong-China	524	(2.0)			3	5
Japan	520	(2.6)	4	4	4	5
Belgium	507	(2.1)	5	8	6	9
Iceland	506	(1.3)	5	7	6	8
Sweden	504	(2.9)	5	9	6	10
Ireland	502	(2.6)	6	10	7	11
Norway	502	(2.5)	6	10	7	11
France	495	(3.7)	9	11	10	13
Denmark	492	(2.1)	10	11	11	13
Macao-China	489	(0.7)			12	13
Poland	482	(2.6)	12	14	14	16
Hungary	481	(3.4)	12	14	14	16
Spain	478	(3.2)	12	14	14	16
Austria	464	(3.1)	15	15	17	17
Chile	442	(3.1)	16	16	18	18
Colombia	390	(3.2)			19	19

Note: See Annex A3 for a detailed description of how the range of ranks is computed.
Source: OECD, *PISA 2009 Database*.
StatLink 🔗 http://dx.doi.org/10.1787/888932435378

For many of the countries it is not possible to determine a precise rank; however, it is possible to determine, with 95% likelihood, a range of ranks in which the country's performance level lies. Figure VI.2.28 shows the range of possible ranks for each country.

Gender differences in performance on the composite reading scale

As noted earlier, girls consistently outperform boys in digital and print reading, both on average across the OECD area and in individual countries. However, in digital reading, the gender gap is narrower by an average of 15 score points, and in the partner country Colombia, it disappears entirely. Given that the composite reading scale is an amalgam of the digital and print scales, with equal weighting for each, it is not surprising that the gender gap in favour of girls lies between the gender gap in print reading (38 score points) and that in digital reading (24 score points).

Figure VI.2.29 shows gender differences in reading performance for each country. Tables VI.2.2, VI.2.3 and VI.2.4 provide further details.

■ Figure VI.2.29 ■
Gender differences on the composite reading scale
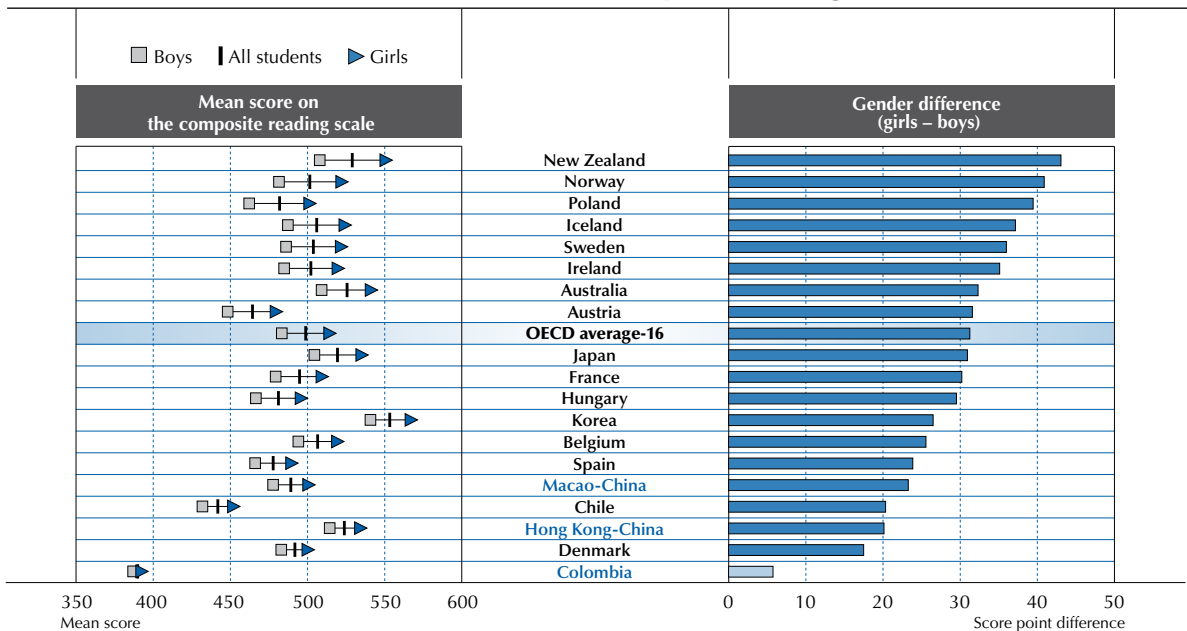
Note: Gender differences that are statistically significant are marked in a darker tone.
Countries are ranked in ascending order of the score point difference between girls and boys.
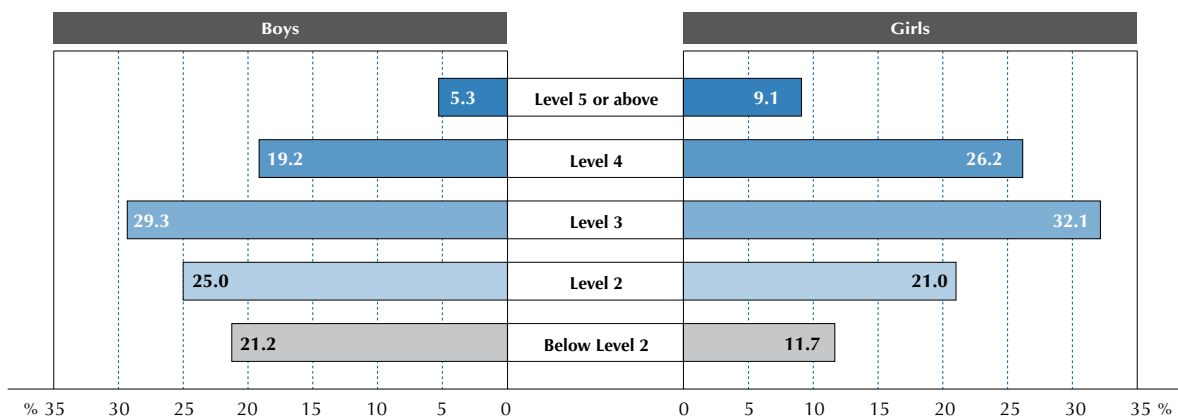Source: OECD, *PISA 2009 Database,* Table VI.2.4.
StatLink http://dx.doi.org/10.1787/888932435378

The mean difference between boys' and girls' performance on the composite reading scale is 31 score points in favour of girls. The mean score for boys is 483, near the bottom of Level 3, while it is 515 for girls, still within Level 3, but towards the top of the level. The difference in performance between boys and girls is statistically significant in all OECD countries and partner countries and economies except Colombia. New Zealand shows the largest gap among the 16 OECD countries and three partner countries and economies that participated in the 2009 digital reading assessment, with a gender gap of 43 points. Norway shows the next widest gap (41 points), then Poland (39 points), Iceland (37 points), Sweden (36 points) and Ireland (35 points). All of these countries, except Poland, are at or above the OECD average in mean proficiency. Other chapters discuss the factors that are related to the smaller gender difference in digital reading performance.

Figure VI.2.30 shows the percentages of boys and girls performing at the proficiency Levels 2, 3 and 4 on the composite reading scale. The three lowest levels are summarised as "Below Level 2" and the two highest levels as "Level 5 or above".

■ Figure VI.2.30 ■
How proficient are girls and boys on the composite reading scale?

	Boys	Girls
Level 5 or above	5.3	9.1
Level 4	19.2	26.2
Level 3	29.3	32.1
Level 2	25.0	21.0
Below Level 2	21.2	11.7

Source: OECD, *PISA 2009 Database,* Tables VI.2.2 and VI.2.3.
StatLink 🔗 http://dx.doi.org/10.1787/888932435378

Figure VI.2.30 shows that the modal highest proficiency level for both boys and girls on average across the participating OECD countries is Level 3, and the percentages of boys and girls who perform at this level are similar (29% and 32%, respectively). In most individual countries, this modal level of performance for both boys and girls is the same: usually Level 3, but Level 4 in Korea, Level 2 in Chile and Level 1a in Colombia. In a few countries, the modal levels for boys are different from that for girls. In New Zealand, Australia, Belgium and the partner economy Hong Kong-China, the modal performance for girls is Level 4, while for boys it is only Level 3 (Tables VI.2.2 and VI.2.3). In Austria and Poland, the modal level of performance for boys is Level 2, while the highest level of proficiency reached by most girls is Level 3. In these six countries in particular, a dual focus on developing strategies to improve both the digital and print reading proficiency of boys would be likely to yield overall improvements in reading at the national level.

CONCLUSIONS

This chapter has discussed the similarities and differences between digital and print reading and has shown that digital reading involves many of the skills required to process print texts, including awareness of language, and the capacity to form inferences from parts of a text and to construe connections between them. But digital reading also requires different skills, such as the deployment of new knowledge about the unique structures and features of digital texts. It also requires heightened proficiency in prediction, integration and evaluation that are even more emphatically called upon in digital than in print reading, because the amount of text visible at any one time is small, its origin often unverified and its extent often unknown.

Reporting digital reading as a separate scale highlights countries' proficiency in this medium. While countries vary in their performance in digital and print reading, one pattern emerges clearly: the gender gap is narrower in digital reading proficiency than it is in print reading proficiency. On average across the 16 participating OECD countries, the gap narrowed by 14 points, and it shrunk to some degree in every participating country and economy. These results suggest that it might be possible to harness boys' relatively strong performance in digital reading and use it to improve their overall proficiency as readers.

The results of the digital reading assessment have also been reported in combination with print reading as a composite scale. Reporting reading performance on a composite scale reflects what it means to be a proficient reader in the 21st century. Given that there is mounting evidence of the economic and social benefits of developing human capital, countries should consider allocating resources to teaching students how to read in both digital and print media.
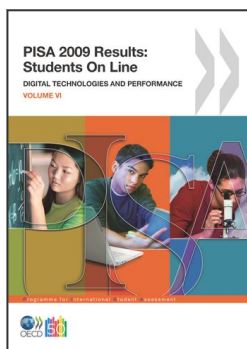
As the first large-scale international assessment of digital reading, PISA 2009 has provided initial insights into the proficiency of young people in accessing, interpreting and evaluating information on line, drawing on data from 16 OECD countries and three partner countries and economies. While this group represents only about one third of the PISA participants it is a significant proportion. The PISA 2009 digital reading assessment has laid the ground for further investigations, and for an expanded set of countries to build on in future cycles.

Notes

1. The mean and standard deviation for print reading were computed using the pooled samples of the 16 OECD countries and using transformed student final weights and replicates, so that their sum per country is a constant. These transformed weights are usually denoted as senate weights.

2. For further details, see Chapter 1 of *PISA 2009 Framework: Key Competencies in Reading, Mathematics and Science* (OECD, 2009b) and Chapter 2 of *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science* (OECD, 2010b).