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PISA 2009 Reading Framework

This chapter discusses the conceptual framework underlying the PISA 2009 assessment of students' reading competencies. It provides PISA's definition of reading literacy and presents the elements of the survey which have remained consistent throughout the previous cycles, along with a new element: reading and understanding electronic texts. It describes how PISA assesses and analyses electronic reading tasks, as well as the way in which students navigate through texts and respond to the format of tasks. Sample print and electronic reading items are included throughout the chapter to further illustrate how students' skill are measured. Finally, a discussion on reading engagement and metacognition addresses the motivational and behavioural elements of reading literacy.



INTRODUCTION

Continuity and change in the reading literacy framework

Reading literacy was the major domain assessed in 2000 for the first PISA cycle (PISA 2000). For the fourth PISA cycle (PISA 2009), it is the first of the domains to be revisited as a major focus, requiring a full review of its framework and new development of the instruments that represent it.

The original reading literacy framework for PISA was developed for the PISA 2000 cycle (from 1998 to 2001) through a consensus building process involving reading experts selected by the participating countries and the PISA 2000 advisory groups. The definition of reading literacy evolved in part from the IEA Reading Literacy Study (1992) and the International Adult Literacy Survey (IALS, 1994, 1997 and 1998). In particular, it reflected IALS' emphasis on the importance of reading skills for active participation in society. It was also influenced by contemporary – and still current – theories of reading, which emphasise reading's interactive nature (Dechant, 1991; McCormick, 1988; Rumelhart, 1985), models of discourse comprehension (Graesser, Millis, & Zwaan, 1997; Kintsch, 1998), and theories of performance in solving reading tasks (Kirsch, 2001; Kirsch & Mosenthal, 1990).

Much of the substance of the PISA 2000 framework is retained in the PISA 2009 framework, respecting one of the central purposes of PISA: to collect and report trend information about performance in reading, mathematics and science. However, the PISA domain frameworks also aim to be evolving documents that will adapt to and integrate new developments in theory and practice over time. There is therefore a significant amount of evolution, reflecting both an expansion in our understanding of the nature of reading and changes in the world.

There are two major modifications in this new version of the reading framework. It incorporates the reading of electronic texts and elaborates the constructs of reading engagement and metacognition.

The PISA 2000 reading literacy framework briefly mentioned electronic texts, stating, "It is expected that electronic texts will be used in future survey cycles but will not be included in this cycle because of time and access issues" (OECD, 1999). The PISA 2009 cycle is now upon us, and with it, recognition of the increasing prevalence of digital texts in many parts of our lives: personal, social and economic. The new demands on reading proficiency created by the digital world have led to the framework's inclusion of electronic reading, an inclusion that has in turn resulted in some redefinition both of texts and of the mental processes that readers use to approach texts. This edition of the framework thereby acknowledges the fact that any definition of reading in the 21st century needs to encompass both printed and digital texts.

PISA is the first large-scale international study to assess electronic reading. As such, this initiative, while grounded in current theory and best practices from around the world, is inevitably a first step. This reality is reflected in the fact that not all participating countries have elected to take part in the administration of the electronic reading assessment in PISA 2009, which has therefore been implemented as an international option. The assessment of electronic reading will be reviewed and refined over successive cycles to keep pace with developing technologies, assessment tools and conceptual understanding of the electronic medium's impact.

Changes in our concept of reading since 2000 have already led to an expanded definition of reading literacy, which recognises motivational and behavioural characteristics of reading alongside cognitive characteristics. Both reading engagement and metacognition – an awareness and understanding of how one thinks and uses thinking strategies – were referred to briefly at the end of the first PISA framework for reading under "Other issues" (OECD, 1999). In the light of recent research, reading engagement and metacognition are featured more prominently in this PISA 2009 reading framework as elements that can make an important contribution to policy makers' understanding of factors that can be developed, shaped and fostered as components of reading literacy.

THE STRUCTURE OF THE READING LITERACY FRAMEWORK

This chapter addresses what is meant by the term *reading literacy* in PISA, and how it will be measured in PISA 2009. This section introduces the importance of reading literacy in today's societies. The second section defines reading literacy and elaborates on various phrases that are used in the reading framework, along with the assumptions underlying the use of these words. The third section focuses on the organisation of the domain of the assessment of reading literacy, and discusses the characteristics that will be represented in the tasks included in the PISA 2009 assessment. The fourth section discusses some of the operational aspects of the



assessment. The fifth section describes the theoretical basis for the constructs of engagement and metacognition in the context of reading, and outlines approaches for measuring those constructs. Finally, the last section describes how the reading literacy data will be summarised and outlines plans for reporting.

Reading literacy as a foundational skill

We live in a rapidly changing world, where both the quantity and type of written materials are increasing and where more and more people are expected to use these materials in new and sometimes more complex ways. It is now generally accepted that our understanding of reading literacy evolves along with changes in society and culture. The reading literacy skills needed for individual growth, economic participation and citizenship 20 years ago were different from those of today; and it is likely that in 20 years time they will change further still.

The goal of education has shifted its emphasis from the collection and memorisation of information only, to the inclusion of a broader concept of knowledge: The meaning of knowing has shifted from being able to remember information, to being able to find and use it" (Simon, 1996). The ability to access, understand and reflect on all kinds of information is essential if individuals are to be able to participate fully in our knowledge-based society. The PISA framework for assessing the reading literacy of students towards the end of compulsory education, therefore, must focus on reading literacy skills that include finding, selecting, interpreting and evaluating information from the full range of texts associated with situations that reach beyond the classroom.

According to Holloway (1999), reading skills are essential to the academic achievement of middle- and high-school students. Olson (1977a; 1977b) claims that in today's society, reading literacy introduces a bias because it provides advantages to those who acquire the necessary skills. As the currency used in schools, literacy provides access to literate institutions and has an impact on cognition, or thinking processes (Olson, 1994); it also shapes the way in which we think.

Achievement in reading literacy is not only a foundation for achievement in other subject areas within the educational system, but also a prerequisite for successful participation in most areas of adult life (Cunningham & Stanovich, 1998; Smith, Mikulecky, Kibby, & Dreher, 2000).

Today, the need for higher levels of education and skills is large and growing. Those with below average skills find it increasingly difficult to earn above average wages in global economies where the restructuring of jobs favours those who have acquired higher levels of education and skills. They have little hope of fully participating in increasingly complex societies where individuals are required to take on additional responsibility for different aspects of their lives: from planning their careers, to nurturing and guiding their children, to navigating health-care systems, to assuming more responsibility for their financial future. The non-economic returns from literacy in the form of enhanced personal well-being and greater social cohesion are as important as the economic and labour-market returns, according to some authorities (Friedman, 2005; OECD, 2001). Elwert (2001) has advanced the concept of societal literacy, referring to the way in which literacy is fundamental in dealing with the institutions of a modern bureaucratic society. Law, commerce and science use written documents and written procedures such as laws, contracts and publications that one has to be able to understand in order to function in these domains. The European Commission (2001) summed up the foundational nature of reading literacy skills as "key to all areas of education and beyond, facilitating participation in the wider context of lifelong learning and contributing to individuals' social integration and personal development". More recently, the European Union endorsed this statement with its enshrinement of communication in the mother tongue, comprising listening, speaking, reading and writing, as the first of eight key competencies "which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment" (Education Council, 2006).

Reading literacy skills matter not just for individuals, but for economies as a whole. Policy makers and others are coming to recognise that in modern societies, human capital – the sum of what the individuals in an economy know and can do – may be the most important form of capital. Economists have for many years developed models showing generally that a country's education levels are a predictor of its economic growth potential. Although the strength of this link is limited by the fact that an educational credential means something different from one country to another, international surveys such as the International Adult Literacy Survey (IALS) or the upcoming OECD Programme for the International Assessment of Adult Competencies (PIAAC) now let us



measure adults' literacy skills directly and not just through their credentials. These surveys, in turn, allow us to make more credible inferences about the connection between human capital and national economic growth. In a recent study, several Canadian economists analysed links between literacy levels and economic performance over a long period. They found that the average literacy level of a nation's population is a better predictor of economic growth than educational achievement (Coulombe, Tremblay, & Marchand, 2004).

The importance of electronic texts

Proficiency in reading literacy is a key not only to unlocking the world of printed text, but also electronic texts, which are becoming an increasingly important part of students' and adults' reading. As of 2007, almost 1.5 billion people – one-fifth of the world's population – were reading on line (International Telecommunications Union, 2009). The rate of growth in online use has been staggering, with much of it having occurred during the past five years – though the rate varies widely according to location (The World Bank, 2007). The variation is not only geographical, but also social and economic. In all countries, Internet use is closely linked with socio-economic status and education (Sweets & Meates, 2004). Yet the requirement to use computers is not confined to particular social and economic strata. The Adult Literacy and Life Skills Survey (OECD and STATCAN, 2005) looked at computer use by type of occupation in seven countries or regions. While “expert” knowledge workers such as scientists and computing professionals use computers most intensively in the workplace, office workers and customer service clerks are also likely to need to use computers on the job. Therefore workers in a wide range of occupations are increasingly required to use computers as part of their jobs.

Beyond the workplace, computer technology has a growing importance in personal, social and civic life. To stay informed and involved, accessing information via networked computer technologies is becoming the norm. As individuals take on more responsibility for health, retirement and finance decisions, these technologies become increasingly important sources of information. Those with access to the Internet and with the skills and knowledge to use it effectively are more likely to become empowered patients who can make informed health-care choices; active citizens who use e-mail to influence government officials' policy decisions or mobilise like-minded voters; and members of virtual communities who, via online support groups, use instant messaging and discussion boards to interact with others across social classes, racial groups and generations (Pew Internet & American Life Project, 2005).

While many of the skills required for print and electronic reading are similar, electronic reading demands that new emphases and strategies be added to the repertoires of readers. Gathering information on the Internet requires skimming and scanning through large amounts of material and immediately evaluating its credibility. Critical thinking, therefore, has become more important than ever in reading literacy (Halpern, 1989; Shetzer & Warschauer, 2000; Warschauer, 1999). Warschauer concludes that overcoming the “digital divide” is not only a matter of achieving online access, but also of enhancing people's abilities to integrate, evaluate and communicate information.

Motivational and behavioural elements of reading literacy

Reading-related skills, attitudes, interests, habits and behaviours have been shown in a number of recent studies to be strongly linked with reading proficiency. For example, in PISA 2000 there was a greater correlation between reading proficiency and reading engagement (comprising attitudes, interests and practices) than between reading proficiency and socio-economic status (OECD, 2002). In other studies reading engagement has been shown to account for more variance in reading achievement than any other variable besides previous achievement (Guthrie & Wigfield, 2000).

Like reading engagement, metacognition has long been considered to be related to reading achievement (Brown, Brown, *et al.* 1983; Flavell & Wellman, 1977; Schneider, 1989, 1999; Schneider & Pressley, 1997), but most studies of metacognition have been largely experimental and focused on young readers. The PISA 2000 reading framework alluded to the potential for using PISA to collect information about metacognition relevant to policy makers, but concluded that in the absence of an existing instrument suitable for use in a large-scale study, metacognition could not be part of the reading literacy study in 2000 (OECD, 1999). Since then, such instrumentation has been developed (Artelt, Schiefele, & Schneider, 2001; Schlagmüller & Schneider, 2006) making the inclusion of a survey of metacognition in reading within PISA 2009 feasible.



There is evidence that skills relating to engagement and metacognition can be taught. Interest in measuring both metacognition and engagement as part of PISA 2009 therefore assumes that results can yield information that will be highly relevant to policy makers and that can also influence the practice of reading and learning and ultimately levels of reading proficiency.

DEFINING READING LITERACY

Definitions of reading and reading literacy have changed over time in parallel with changes in society, economy, and culture. The concept of learning, and particularly the concept of lifelong learning, have expanded the perception of reading literacy. Literacy is no longer considered an ability acquired only in childhood during the early years of schooling. Instead it is viewed as an expanding set of knowledge, skills and strategies that individuals build on throughout life in various contexts, through interaction with their peers and the wider community.

Cognitively-based theories of reading literacy emphasise the interactive nature of reading and the constructive nature of comprehension, in the print medium (Binkley & Linnakylä, 1997; Bruner, 1990; Dole, Duffy, Roehler, & Pearson, 1991) and to an even greater extent in the electronic medium (Fastre, 2001; Legros & Crinon, 2002; Leu, 2007; Reinking, 1994). The reader generates meaning in response to text by using previous knowledge and a range of text and situational cues that are often socially and culturally derived. While constructing meaning, the reader uses various processes, skills, and strategies to foster, monitor, and maintain understanding. These processes and strategies are expected to vary with context and purpose as readers interact with a variety of continuous and non-continuous texts in the print medium and (typically) with multiple texts in the electronic medium.

The PISA 2000 definition of reading literacy is as follows:

Reading literacy is understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.

The PISA 2009 definition of reading adds engagement in reading as an integral part of reading literacy:

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

Each part of the definition is considered in turn below, taking into account the original elaboration and some important developments in the defining of the domain which use evidence from PISA and other empirical studies, from theoretical advances and from the changing nature of the world.

Reading literacy . . .

The term “reading literacy” is preferred to “reading” because it is likely to convey to a non-expert audience more precisely what the survey is measuring. “Reading” is often understood as simply decoding, or even reading aloud, whereas the intention of this survey is to measure something broader and deeper. Reading literacy includes a wide range of cognitive competencies, from basic decoding, to knowledge of words, grammar and larger linguistic and textual structures and features, to knowledge about the world. It also includes metacognitive competencies: the awareness of and ability to use a variety of appropriate strategies when processing texts. Metacognitive competencies are activated when readers think about, monitor and adjust their reading activity for a particular goal.

Historically, the term literacy referred to a tool used to acquire and communicate written and printed information. This seems close to the notion that the term “reading literacy” is intended to express in this study: the active, purposeful and functional application of reading in a range of situations and for various purposes. PISA assesses a wide range of students. Some of these students will go on to a university, possibly to pursue an academic career; some will pursue further studies in preparation for joining the labour force; and some will enter the workforce directly upon completion of school education. Regardless of their academic or labour-force aspirations, reading literacy will be important to their active participation in their community and economic and personal life.

. . . is understanding, using, reflecting on . . .

The word understanding is readily connected with reading comprehension, a well-accepted element of reading. The word “using” refers to the notions of application and function – doing something with what we



read. “Reflecting on” is added to “understanding” and “using” to emphasise the notion that reading is interactive: readers draw on their own thoughts and experiences when engaging with a text. Of course, every act of reading requires some reflection, drawing on information from outside the text. Even at the earliest stages, readers draw on symbolic knowledge to decode a text and require a knowledge of vocabulary to make meaning. As readers develop their stores of information, experience and beliefs, they constantly, often unconsciously, test what they read against outside knowledge, thereby continually reviewing and revising their sense of the text. At the same time, incrementally and perhaps imperceptibly, readers’ reflections on texts may alter their sense of the world. Reflection might also require readers to consider the content of the text, apply their previous knowledge or understanding, or think about the structure or form of the text.

As it is not possible to include sufficient items from the PISA assessment to report on each of the five aspects as a separate subscale, for reporting on reading literacy, these five aspects are organised into three broad aspect categories. In PISA 2000, PISA 2003 and PISA 2006 these three broad aspects were called “Retrieving information”, “Interpreting texts” and “Reflecting and evaluating” respectively. The terms have been changed for PISA 2009 to better accommodate the aspects in relation to electronic texts.

... and engaging with ...

A reading literate person not only has the skills and knowledge to read well, but also values and uses reading for a variety of purposes. It is therefore a goal of education to cultivate not only proficiency but also engagement in reading. Engagement in this context implies the motivation to read and is comprised of a cluster of affective and behavioural characteristics that include an interest in and enjoyment of reading, a sense of control over what one reads, involvement in the social dimension of reading, and diverse and frequent reading practices.

... written texts ...

The phrase “written texts” is meant to include all those coherent texts in which language is used in its graphic form: hand-written, printed and electronic. These texts do not include aural language artefacts such as voice recordings; nor do they include film, TV, animated visuals, or pictures without words. They do include visual displays such as diagrams, pictures, maps, tables, graphs and comic strips, which include some written language (for example, captions). These visual texts can exist either independently or they can be embedded in larger texts. “Hand-written texts” are mentioned for completeness: although they are clearly part of the universe of written texts, they are not very different from printed texts in structure or in terms of the processes and reading strategies they require. Electronic texts, on the other hand, are distinguished from printed texts in a number of respects, including physical readability; the amount of text visible to the reader at any one time; the way different parts of a text and different texts are connected with one another through hypertext links; and consequent upon all these text characteristics, the way that readers typically engage with electronic texts. To a much greater extent than with printed or hand-written texts readers need to construct their own pathways to complete any reading activity associated with an electronic text.

Instead of the word “information”, which is used in some other definitions of reading, the term “texts” was chosen because of its association with written language and because it more readily connotes literary as well as information-focused reading.

... in order to achieve one’s goals, to develop one’s knowledge and potential, and to participate in society.

This phrase is meant to capture the full scope of situations in which reading literacy plays a role, from private to public, from school to work, from formal education to lifelong learning and active citizenship. To achieve one’s goals and to develop one’s knowledge and potential” spells out the idea that reading literacy enables the fulfilment of individual aspirations – both defined ones such as graduating or getting a job, and those less defined and less immediate which enrich and extend personal life and lifelong education. The word “participate” is used because it implies that reading literacy allows people to contribute to society as well as to meet their own needs: “participating” includes social, cultural, and political engagement. Literate people, for example, find it easier to navigate complex institutions such as health systems, government offices and legal agencies; and they can participate more fully in a democratic society by making informed decisions when they vote. Participation may also include a critical stance, a step for personal liberation, emancipation, and empowerment (Linnakylä, 1992; Lundberg, 1991, 1997; MacCarthey & Raphael, 1989).



Fifty years ago in his seminal work *Maturity in Reading* Gray wrote of the interests, attitudes and skills that enable young people and adults to meet effectively the reading demands of their current lives (Gray & Rogers, 1956). The PISA concept of reading literacy is consistent with Gray's broad and deep notion of maturity in reading, while simultaneously embracing the new challenges of reading in the 21st century. It conceives reading as the foundation for full participation in the economic, political, communal and cultural life of contemporary society.

ORGANISING THE DOMAIN

The previous section defined the domain of reading literacy and laid out the set of assumptions that were made in constructing this definition. This section describes how the domain is represented, a vital issue because the organisation and representation of the domain determines the test design and, ultimately, the evidence about student proficiencies that can be collected and reported.¹

Reading is a multidimensional domain. While many elements are part of the construct, not all can be taken into account and manipulated in an assessment such as PISA. In designing an assessment it is necessary to select the elements considered most important to manipulate in building the assessment.

For PISA, the two most important considerations are firstly, to *ensure broad coverage* of what students read and for what purposes they read, both in and outside of school; and secondly, to organise the domain to *represent a range of difficulty*. The PISA reading literacy assessment is built on three major task characteristics: *situation* – the range of broad contexts or purposes for which reading takes place; *text* – the range of material that is read; and *aspect* – the cognitive approach that determines how readers engage with a text. All three contribute to ensuring *broad coverage* of the domain. In PISA, features of the text and aspect variables (but not of the situation variable) are also manipulated to influence the *difficulty* of a task.

In order to use these three main task characteristics in designing the assessment and, later, interpreting the results, they must be operationalised. That is, the various values that each of these characteristics can take on must be specified. This allows test developers to categorise the materials they are working with and the tasks they construct so that they can then be used to organise the reporting of the data and to interpret results.

Reading is a complex activity; the components of reading therefore do not exist independently of one another in neat compartments. The assignment of texts and tasks to framework categories does not imply that the categories are strictly partitioned or that the materials exist in atomised cells determined by a theoretical structure. The framework scheme is provided to ensure coverage, to guide the development of the assessment and to set parameters for reporting, based on what are considered the marked features of each task.

Situation

A useful operationalisation of the situation variables is found in the Common European Framework of Reference (CEFR) developed for the Council of Europe (Council of Europe, 1996). Although this framework was originally intended to describe second- and foreign- language learning, in this respect at least it is relevant to mother-tongue language assessment as well. The CEFR situation categories are: reading for private use; reading for public use; reading for work and reading for education. They have been adapted for PISA to personal, public, occupational and educational contexts, and are described in the paragraphs below.

The *personal* category relates to texts that are intended to satisfy an individual's personal interests, both practical and intellectual. This category also includes texts that are intended to maintain or develop personal connections with other people. It includes personal letters, fiction, biography, and informational texts that are intended to be read to satisfy curiosity, as a part of leisure or recreational activities. In the electronic medium it includes personal e-mails, instant messages and diary-style blogs.

The *public* category describes the reading of texts that relate to activities and concerns of the larger society. The category includes official documents as well as information about public events. In general, the texts associated with this category assume a more or less anonymous contact with others; they also therefore include forum-style blogs, news websites and public notices that are encountered both on line and in print.



The content of *educational* texts is usually designed specifically for the purpose of instruction. Printed text books and interactive learning software are typical examples of material generated for this kind of reading. Educational reading normally involves acquiring information as part of a larger learning task. The materials are often not chosen by the reader, but instead assigned by an instructor. The model tasks are those usually identified as “reading to learn” (Sticht, 1975; Stiggins, 1982).

Many 15-year-olds will move from school into the labour force within one to two years. A typical *occupational* reading task is one that involves the accomplishment of some immediate task. It might include searching for a job, either in a print newspaper’s classified advertisement section, or on line; or following workplace directions. The model tasks of this type are often referred to as “reading to do” (Sticht, 1975; Stiggins, 1982). Texts written for these purposes, and the tasks based on them, are classified as occupational in PISA. While only some of the 15-year-olds who are assessed will currently have to read at work, it is important to include tasks based on texts that are related to work since the assessment of young people’s readiness for life beyond compulsory schooling and their ability to use their knowledge and skills to meet real-life challenges is a fundamental goal of PISA.

Situation is used in PISA reading literacy to define texts and their associated tasks, and refers to *the contexts and uses for which the author constructed the text*. The manner in which the situation variable is specified is therefore about supposed audience and purpose, and is not simply based on the place where the reading activity is carried out. Many texts used in classrooms are not specifically designed for classroom use. For example, a piece of literary text may typically be read by a 15-year-old in a mother-tongue language or literature class, yet the text was written (presumably) for readers’ personal enjoyment and appreciation. Given its original purpose, such a text is classified as *personal* in PISA. As Hubbard (1989) has shown, some kinds of reading usually associated with out-of-school settings for children, such as rules for clubs and records of games, often take place unofficially at school as well. These texts are classified as *public* in PISA. Conversely, textbooks are read both in schools and in homes, and the process and purpose probably differ little from one setting to another. Such texts are classified as *educational* in PISA.

It should be noted that the four categories overlap. In practice, for example, a text may be intended both to delight and to instruct (personal and educational); or to provide professional advice which is also general information (occupational and public). While content is not a variable that is specifically manipulated in this study, by sampling texts across a variety of situations the intent is to maximise the diversity of content that will be included in the PISA reading literacy survey.

One obvious way to distribute the reading literacy tasks in the assessment would be to do so evenly across the four situations. In the PISA 2000 framework however the occupational situation is given less weight for two reasons. First, it was considered important to reduce the potential dependence on specific occupational knowledge that can result when selecting occupational texts. Second, it was expected that the same type of questions and directives could be constructed from texts classified in one of the other situations, where 15-year-old students might have better access to the content. These considerations remain relevant in 2009. The distribution of tasks by situation for PISA 2009 print reading is therefore very similar to that for 2000. Table 1.1 shows the approximate distribution of tasks by situation for print and electronic reading tasks. It should be noted that the percentages given here and in all other tables in this section are approximate only, as distribution of tasks according to framework variables is not final at the time of publication.

Table 1.1 Approximate distribution of tasks by situation for PISA 2009

Situation	% of total tasks PISA 2009: print	% of total tasks PISA 2009: electronic
Personal	30	30
Educational	25	15
Occupational	15	15
Public	30	40
TOTAL	100	100



Text

Reading requires material for the reader to read. In an assessment, that material – a text (or a set of texts) related to a particular task – must be coherent within itself. That is, the text must be able to stand alone without requiring additional material to make sense to the proficient reader.² While it is obvious that there are many different kinds of texts and that any assessment should include a broad range, it is not so obvious that there is an ideal categorisation of kinds of texts. The addition of electronic reading in the 2009 framework makes this issue still more complex. For PISA 2009 there are four main classifications:

1. Medium: print and electronic
2. Environment: authored and message-based
3. Text format: continuous, non-continuous, mixed and multiple
4. Text type: description, narration, exposition, argumentation, instruction and transaction

The classification of medium – print and electronic – is applied to each text as the broadest distinction. Below that classification, the text format and text type categories are applied to all texts, whether print or electronic. The environment classification, on the other hand, is only applicable to electronic-medium texts. Each of these characteristics is discussed below.

In addition to the four major text characteristics – medium, environment, text format and text type – some additional terms are used in the following sections to describe characteristics of both print and electronic texts.

Text object is a term used to describe the familiar names given to texts when we refer to them in everyday contexts: terms such as report, novel, play, timetable, home page or e-mail message. Text objects vary according to both medium and text format. For example, timetables occur as non-continuous texts in both print and electronic media; home pages occur only in the electronic medium; reports may appear in either medium and in a variety of text formats.

Text features are characteristics of the text-based information that students have to work with in a task. Text features include the number of texts or pages students need to read in order to respond to individual items, the length of the texts to be read, the linguistic complexity of the texts, and the assumed familiarity the students have with the topics presented.

Navigation tools and features help readers to negotiate their way into, around and across texts. Navigation tools and features are discussed below in the context of electronic-medium texts. They include navigation icons, scroll bars, tabs, menus, embedded hyperlinks, text search functions such as Find or Search, and global content representation devices such as site maps. Many navigation tools and features are intrinsic and unique to the electronic medium, and make up some of its defining characteristics. However like many of the other electronic text elements, navigation tools and features have parallels in the print medium. In print they include tables of contents, indexes, chapter and section headings, headers and footers, page numbers and footnotes.

Medium

An important major categorisation of texts, new in the PISA 2009 framework for reading literacy, is the classification by medium: print or electronic.

Print-medium text usually appears on paper in forms such as single sheets, brochures, magazines and books. The physical status of the printed text encourages (though it may not compel) the reader to approach the content of the text in a particular sequence. In essence, printed texts have a fixed or static existence. Moreover, in real life and in the assessment context, the extent or amount of the text is immediately visible to the reader.

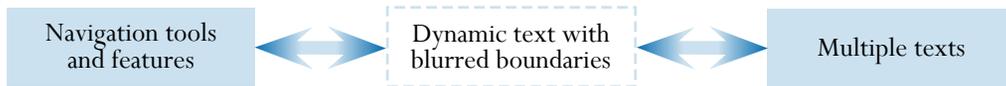
Electronic-medium text may be defined as the display of text through Liquid Crystal Display (LCD), plasma, Thin Film Transistor (TFT) and other electronic devices. For the purposes of PISA, however, electronic text is synonymous with *hypertext*: a text or texts with navigation tools and features that make possible and indeed even require non-sequential reading. Each reader constructs a “customised” text from the information encountered at the links he or she follows. In essence, such electronic texts have an unfixed, dynamic existence. In the electronic medium, typically only a fraction of the available text can be seen at any one time, and often the extent of text available is unknown.



Figure 1.1 ■ Print reading texts in PISA

Fixed text with
defined boundaries

Figure 1.2 ■ Electronic reading texts in PISA



The difference between texts in the print and electronic media, in the PISA assessment context, is illustrated in Figure 1.1 and Figure 1.2.

Navigation tools and features play a particularly important role in the electronic medium, for at least two reasons. Firstly, due to the reduced display size, electronic texts come with devices that let the reader move the reading window over the text page: scroll bars, buttons, index tabs and so forth. Skilled readers of electronic text must be familiar with the use of these devices. They must also be able to mentally represent the movement of the window over the text page, and the shifting from one window to another. Secondly, typical electronic reading activities involve the use of multiple texts, sometimes selecting from a virtually infinite pool. Readers must be familiar with the use of retrieval, indexing and navigation tools for linking between texts.

One of the earliest indexing techniques used in electronic documents was the menu or list of page headings from which the reader is invited to choose. The electronic menu resembles a table of contents except that there are usually no page numbers. Instead, the reader selects an option by typing in its number in the menu or by clicking directly the menu option or a symbol that represents it. This results in the display of the pages instead of, or sometimes (in multi-window displays) on top of, the menu page. A consequence of the lack of page numbers is that once the page is displayed, the reader has no direct clue about its position among the set that makes up the electronic book. Sometimes such clues are provided through analogical symbols (for example, a micro-page within a series of micro-pages at the bottom of the screen) or through path-type expressions. Menus can be made hierarchical, which means that selecting a menu item causes another, more specific menu to be displayed. Menus may be presented as separate pages, but they may also be presented as part of multi-text pages. They are often presented in a frame to the left of the display window. The rest of the window can be updated with the menu remaining constant, which is considered helpful for the reader to keep a sense of his or her “location” in the document. Skilled reading of electronic texts therefore requires an understanding of hierarchical and straight-list menus, as well as an ability to mentally represent non-sequential page arrangements, whether hierarchical or networked.

A major navigation tool that assists readers in finding their way around a number of texts, and one of the most distinctive features of electronic texts, is the hypertext link, a technique that appeared in the 1980s as a means to connect units of information in large electronic documents (Conklin, 1987; Koved & Shneiderman, 1986; Lachman, 1989; Weyer, 1982). The hypertext link or hyperlink is a piece of information (a word or phrase, or a picture or icon) that is logically connected to another piece of information (usually a page). Clicking a hyperlink results in the display of a new page instead of or on top of the page previously displayed, or the display of another location on the same page. Hyperlinks may be presented in separate lists (also called menus) or embedded within content pages. When embedded, hyperlinks are generally marked using a specific colour or typography. The use of hyperlinks allows the creation of multi-page documents with a networked structure. Unlike lists or hierarchies, the arrangement of pages in a networked structure is not regularised according to a systematic set of conventions. Rather, it follows the semantic relationships across pages. It is up to the author of a multi-page electronic document to determine how the pages are linked, through the insertion of hyperlinks.

Navigation and orientation within non-sequential structures seem to rely on the reader’s ability to mentally represent the top-level structure of the hypertext. Global organisers that accurately represent the structure of pages and links (for example, structured menus and content maps) are usually of some help, provided that such organisers use symbols and metaphors that are already familiar to the reader (Rouet & Potelle, 2005).



Skilled reading, navigation and information search in hypertext requires the reader to be familiar with explicit and embedded hyperlinks, non-sequential page structures, and global content representation devices.

In the PISA 2009 assessment of electronic reading (ERA), a set of navigation tools and structures have been identified for systematic inclusion in the instruments, as one important component in measuring proficiency in electronic reading. This set includes 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; and embedded hyperlinks – that is, hyperlinks included in paragraphs, tables of information or a list of search results. Hyperlinks may take the form of icons or words.

The difficulty of a task is partly conditioned by the navigation tools and features associated with it. Tasks are more or less easy depending on the number of navigation tools that are required to be used, the number of operations or steps required, and the type of tools used. Generally, the larger the number of operations, and the more complex the tool type, the greater the item difficulty. The familiarity, transparency or prominence of navigation tools and features also affects difficulty. For example, a hyperlink labelled “click here” is typically easier to navigate than a drop down menu that only displays itself if the cursor passes over it. Some electronic reading tasks require little or even no navigation: for example, when students are required to locate or interpret information on a web page where the text is fully visible.

Environment

The *environment* classification is a new variable for the PISA 2009 reading framework. In PISA it applies only to electronic-medium texts.

Electronic texts exist in a number of environments, including the web environment, desktop and e-mail. There are other electronic environments that use written text such as mobile phone text messages and electronic diaries. For the purposes of PISA 2009, however, only computer-based environments are considered.

Two broad kinds of electronic environment have been identified for the assessment of reading of electronic texts. The distinction between them is based on whether or not the reader has the potential to influence the content of the site. An *authored* environment is one in which the reader is primarily receptive: the content cannot be modified. A *message-based* environment is one in which the reader has the opportunity to add to or change the content.

Texts in an *authored environment* have a fixed content that cannot be influenced by the reader. They are self-contained environments, controlled or published by a commercial company, a government department, an organisation or institution, or an individual. Readers use these sites mainly for obtaining information. Text objects within an authored environment include home pages, sites publicising events or goods, government information sites, educational sites containing information for students, news sites and online library catalogues.

In a *message-based environment*, on the other hand, the reader is invited to participate and contribute in some way. The content is to some extent fluid or collaborative, in that it can be added to or changed in some way by individuals. Readers use these sites not only for obtaining information, but also as a way of communicating. Text objects within a message-based environment include e-mail, blogs, chat rooms, web forums and reviews, and online forms.

Inevitably, the possible range of text object categories within each of the electronic environments is not completely represented given the limited number of tasks in the PISA 2009 instrument. Instead the assessment comprises a sample of the text objects likely to be encountered by 15-year-olds and young adults in educational, occupational, personal, and public contexts.

As with many of the variables in the reading framework, the environment classifications are not strictly partitioned. A given website, for example, may include some authored text and a section in which the reader is invited to add a comment. Nevertheless, an individual task generally draws predominantly upon either an authored or a message-based part of the stimulus, and is classified accordingly. Occasionally a task may require integrated use of both authored and message-based texts. Such tasks are classified as *mixed*. Table 1.2 shows the proportion of tasks in each environment category.



Table 1.2 Approximate distribution of electronic tasks by environment

Environment	% tasks in electronic reading assessment
Authored	70
Message-based	25
Mixed	5
TOTAL	100

The authored and message-based environments are not considered hierarchical in difficulty; nor are they intended to form the basis for reporting subscales. The distribution of tasks across the two broad environments has been used primarily to guide test development so that a range of reading situations is covered that is relevant to 15-year-olds both in and beyond school.

Text format

An important classification of texts, and one at the heart of the organisation of the PISA 2000 framework and assessment, is the distinction between continuous and non-continuous texts. Continuous texts are typically composed of sentences that are, in turn, organised into paragraphs. These may fit into even larger structures such as sections, chapters, and books. Non-continuous texts are most frequently organised in matrix format, based on combinations of lists.

Texts in continuous and non-continuous format appear in both the print and electronic media. Mixed and multiple format texts are also prevalent in both media, particularly so in the electronic medium. Each of these four formats is elaborated below.

Other non-text formatted objects are also commonly used in conjunction with print and particularly with electronic texts. Pictures and graphic images occur frequently in print texts and can legitimately be regarded as integral to such texts. Static images as well as videos, animations and audio files regularly accompany electronic texts and can, also, be regarded as integral to those texts. As a reading literacy assessment, PISA does not focus on non-text formatted objects independently, but any such objects may, in principle, appear in PISA as part of a (verbal) text. However in practice the use of video and animation is very limited in the current assessment. Audio is not used at all because of practical limitations such as the need for headphones and audio translation.

Continuous texts

Continuous texts are formed by sentences organised into paragraphs.

Graphically or visually, organisation occurs by the separation of parts of the text into paragraphs, by paragraph indentation, and by the breakdown of text into a hierarchy signalled by headings that help readers to recognise the organisation of the text. These markers also provide clues to text boundaries (showing section completion, for example). The location of information is often facilitated by the use of different font sizes, font types such as italic and boldface, or borders and patterns. The use of format clues is an essential subskill of effective reading.

Discourse markers also provide organisational information. Sequence markers (first, second, third, etc.), for example, signal the relation of each of the units introduced to each other and indicate how the units relate to the larger surrounding text. Causal connectors (therefore, for this reason, since, etc.) signify cause-effect relationships between parts of a text.

Examples of text objects in continuous text format in the print medium include newspaper reports, essays, novels, short stories, reviews and letters. In the electronic medium the continuous text format group includes reviews, blogs and reports in prose. Electronic continuous texts tend to be short because of the limitations of screen size and the need for piecemeal reading, which make long texts unattractive to many online readers.



Non-continuous texts

Non-continuous texts, also known as documents, are organised differently to continuous texts, and therefore require a different kind of reading approach. As the sentence is the smallest unit of continuous text, so all non-continuous texts can be shown to be composed of a number of lists (Kirsch & Mosenthal, 1990). Some are single, simple lists, but most consist of several simple lists combined. This analysis of non-continuous texts does not refer to their use or employ the common labels often attached to them, but does identify key structural features that are common to a number of different texts. Readers who understand the structure of texts are better able to identify the relationships between the elements and understand which texts are similar and which are different.

Examples of non-continuous text objects are lists, tables, graphs, diagrams, advertisements, schedules, catalogues, indexes and forms. These text objects occur in both print and electronic media.

The following two text format categories are new in the 2009 framework. Recognition of the importance of integrating information in different formats and across several texts, as part of the reader's repertoire, has led to the identification of *mixed* and *multiple* texts as distinct text formats.

Mixed texts

Many texts in both print and electronic media are single, coherent objects consisting of a set of elements in both a continuous and non-continuous format. In well-constructed mixed texts the components (for example, a prose explanation including a graph or table) are mutually supportive through coherence and cohesion links at the local and global level.

Mixed text in the print medium is a common format in magazines, reference books and reports, where authors employ a variety of presentations to communicate information. In the electronic medium authored web pages are typically mixed texts, with combinations of lists, paragraphs of prose and often graphics. Message-based texts such as online forms, e-mail messages and forums also combine texts that are continuous and non-continuous in format.

Multiple texts

For the purposes of the PISA reading framework multiple texts are defined as those which have been generated independently, and make sense independently; they are juxtaposed for a particular occasion or may be loosely linked together for the purposes of the assessment. The relationship between the texts may not be obvious; they may be complementary or may contradict one another. For example, a set of websites from different companies providing travel advice may or may not provide similar directions to tourists. Multiple texts may have a single "pure" format (for example, continuous), or may include both continuous and non-continuous texts.

Tasks in the print-medium assessment continue to be classified for the most part as either continuous or non-continuous, with about two-thirds of such tasks addressing continuous texts and one-third non-continuous texts. Although some mixed and multiple texts were used in the PISA 2000 assessment, they were not separately classified, but rather described in terms of their continuous or non-continuous elements. In the development of tasks for the PISA 2009 assessment there has been a more deliberate effort to include stimuli of mixed and multiple print texts, and to include tasks that require the reader to integrate information across differently formatted parts within a mixed text or across multiple texts. In previous administrations of PISA the few tasks that required integration within mixed texts or across multiple texts were classified according to text format on the basis of what was judged to be the part of the stimulus (continuous or non-continuous) that was the object of the more significant processing. The introduction of four categories of text format allows the still relatively small number of print-based tasks that require integration of information across formats or across texts to be classified respectively as *mixed* or *multiple*.

Table 1.3 Approximate distribution of tasks by text format for PISA

Text format	% of total tasks PISA 2009: print	% of total tasks PISA 2009: electronic
Continuous	60	10
Non-continuous	30	10
Mixed	5	10
Multiple	5	70
TOTAL	100	100

In comparison, in the electronic-medium assessment, the proportion of tasks based on multiple texts is much greater. Given the focus of the electronic reading assessment on hypertext, in almost all units the stimulus will consist of multiple texts, and the tasks will require users to read across several texts (which may be different websites or different pages belonging to the same website), each presented in a variety of formats including prose paragraphs, menu lists, diagrams and other graphics. A large majority of tasks is therefore categorised as multiple texts for the text format variable. The relatively small numbers of tasks in the electronic reading assessment that require only local processing of single texts – whether they are continuous, non-continuous or mixed – are classified accordingly.

Text type

A different categorisation of text is by text type: description, narration, exposition, argumentation, instruction and transaction. In previous versions of the reading framework, these text types were located as subcategories of the continuous text format. In this new version it is acknowledged that non-continuous texts (and the elements of mixed and multiple texts) also have a descriptive, narrative, expository, argumentative or instructional purpose.

Texts as they are found in the world typically resist categorisation, as they are usually not written with text type rules in mind, and tend to cut across categories. For example, a chapter in a textbook might include some definitions (exposition), some directions on how to solve particular problems (instruction), a brief historical account of the discovery of the solution (narration), and descriptions of some typical objects involved in the solution (description). The distinctions in the electronic medium are even more blurred, especially in the web environment where the definition of where the text begins and ends is itself contestable, and any page of material typically includes not only a range of text types, but also different representations that may include words, images, animations, video and audio files. Nevertheless, in an assessment like PISA it is useful to categorise texts according to the text type, based on the predominant characteristics of the text, in order to ensure that the instrument samples across a range of texts that represent different types of reading.

The following classification of texts used in PISA is adapted from the work of Werlich (1976).

Description is the type of text where the information refers to properties of objects in space. The typical questions that descriptive texts provide an answer to are *what* questions. Descriptions can take several forms. Impressionistic descriptions present information from the point of view of subjective impressions of relations, qualities, and directions in space. Technical descriptions present information from the point of view of objective observation in space. Frequently, technical descriptions use non-continuous text formats such as diagrams and illustrations. Examples of text objects in the text type category description are a depiction of a particular place in a travelogue or diary, a catalogue, a geographical map, an online flight schedule or a description of a feature, function or process in a technical manual.

Narration is the type of text where the information refers to properties of objects in time. Narration typically answers questions relating to *when*, or *in what sequence*. Why characters in stories behave as they do is another important question that narration typically answers. Narration can take different forms. *Narratives* present change from the point of view of subjective selection and emphasis, recording actions and events from the point of view of subjective impressions in time. *Reports* present change from the point of view of an



objective situational frame, recording actions and events which can be verified by others. *News stories* intend to enable the readers to form their own independent opinion of facts and events without being influenced by the reporter's references to his own views. Examples of text objects in the text type category *narration* are a novel, a short story, a play, a biography, a comic strip, and a newspaper report of an event.

Exposition is the type of text in which the information is presented as composite concepts or mental constructs, or those elements into which concepts or mental constructs can be analysed. The text provides an explanation of how the different elements interrelate in a meaningful whole and often answers questions about *how*. Expositions can take various forms. *Expository essays* provide a simple explanation of concepts, mental constructs, or conceptions from a subjective point of view. *Definitions* explain how terms or names are interrelated with mental concepts. In showing these interrelations, the definition explains the meaning of words. *Explications* are a form of analytic exposition used to explain how a mental concept can be linked with words or terms. The concept is treated as a composite whole which can be understood by being broken down into constituent elements and their interrelations with each being given a name. *Summaries* are a form of synthetic exposition used to explain and communicate texts in a shorter form than the original text requires. *Minutes* are a record of the results of meetings or presentations. *Text interpretations* are a form of both analytic and synthetic exposition used to explain the abstract concepts which are realised in a particular (fictional or non-fictional) text or group of texts. Examples of text objects in the text type category *exposition* are a scholarly essay, a diagram showing a model of memory, a graph of population trends, a concept map and an entry in an online encyclopaedia.

Argumentation is the type of text that presents the relationship among concepts or propositions. Argument texts often answer *why* questions. An important subclassification of argument texts is persuasive and opinionative texts, referring to opinions and points of view. *Comment* relates the concepts of events, objects, and ideas to a private system of thoughts, values, and beliefs. *Scientific argumentation* relates concepts of events, objects, and ideas to systems of thought and knowledge so that the resulting propositions can be verified as valid or non-valid. Examples of text objects in the text type category *argumentation* are a letter to the editor, a poster advertisement, the posts in an online forum and a web-based review of a book or film.

Instruction (sometimes called injunction) is the type of text that provides directions on what to do. *Instructions* present directions for certain behaviours in order to complete a task. *Rules, regulations, and statutes* specify requirements for certain behaviours based on impersonal authority, such as practical validity or public authority. Examples of text objects in the text type category *instruction* are a recipe, a series of diagrams showing a procedure for giving first aid, and guidelines for operating digital software.

Transaction represents the kind of text that aims to achieve a specific purpose outlined in the text, such as requesting that something is done, organising a meeting or making a social engagement with a friend. Before the spread of electronic communication, this kind of text was a significant component of some kinds of letters and, as an oral exchange, the principal purpose of many phone calls. This text type was not included in Werlich's (1976) categorisation, used until now for the PISA framework.

The term transactional is used in PISA not to describe the general process of extracting meaning from texts (as in reader-response theory), but the type of text written for the kinds of purposes described here. Transactional texts are often personal in nature, rather than public, and this may help to explain why they do not appear to be represented in some of the corpora used to develop many text typologies. For example, this kind of text is not commonly found on websites, which are frequently the subject of corpus linguistics studies (for example, Santini, 2006). With the extreme ease of personal communication using e-mail, text messages, blogs and social networking websites, this kind of text has become much more significant as a reading text type in recent years. Transactional texts often build on common and possibly private understandings between communicators – though clearly, this feature is difficult to explore in a large-scale assessment. Examples of text objects in the text type transaction are everyday e-mail and text message exchanges between colleagues or friends that request and confirm arrangements.

Narration occupies a prominent position in many national and international assessments. Some texts are presented as being accounts of the world as it is (or was) and therefore claim to be factual or non-fictional. Fictional accounts bear a more metaphorical relation to the world as it is, appearing either as accounts of how it might be or of how it seems to be. In other large-scale reading studies, particularly those for school students: the National Assessment of Educational Progress (NAEP); the IEA Reading Literacy Study (IEARLS); and the IEA Programme in International Reading Literacy Study (PIRLS), the major classification of texts is between



fictional or literary texts, and non-fictional texts (*Reading for literary experience* and *Reading for information or to perform a task* in NAEP; *Literary experience* and *Acquire and use information* in PIRLS). This distinction is increasingly blurred as authors use formats and structures typical of factual texts in creating their fictions. The PISA reading literacy assessment includes both factual and fictional texts, and texts that may not be clearly one or the other. PISA however does not attempt to measure differences in reading proficiency between one type and the other. In PISA, fictional texts are classified as narration. The proportion of narrative texts in the print medium in PISA 2009 is similar to that in PISA 2000, at about 15%. Narratives in the electronic medium tend to be non-verbal, with animation and film having filled the position. There is therefore no specification for narrative in the electronic reading assessment.

Aspect

Whereas navigation tools and features are the visible or physical features that allow readers to negotiate their way into, around and between texts, *aspects* are the *mental* strategies, approaches or purposes that readers use to negotiate their way into, around and between texts.

Five aspects guide the development of the reading literacy assessment tasks:

- retrieving information
- forming a broad understanding
- developing an interpretation
- reflecting on and evaluating the content of a text
- reflecting on and evaluating the form of a text

As it is not possible to include sufficient items in the PISA assessment to report on each of the five aspects as a separate subscale, for reporting on reading literacy these five aspects are organised into three broad aspect categories:

- access and retrieve
- integrate and interpret
- reflect and evaluate

Retrieving information tasks, which focus the reader on separate pieces of information within the text, are assigned to the *access and retrieve* scale.

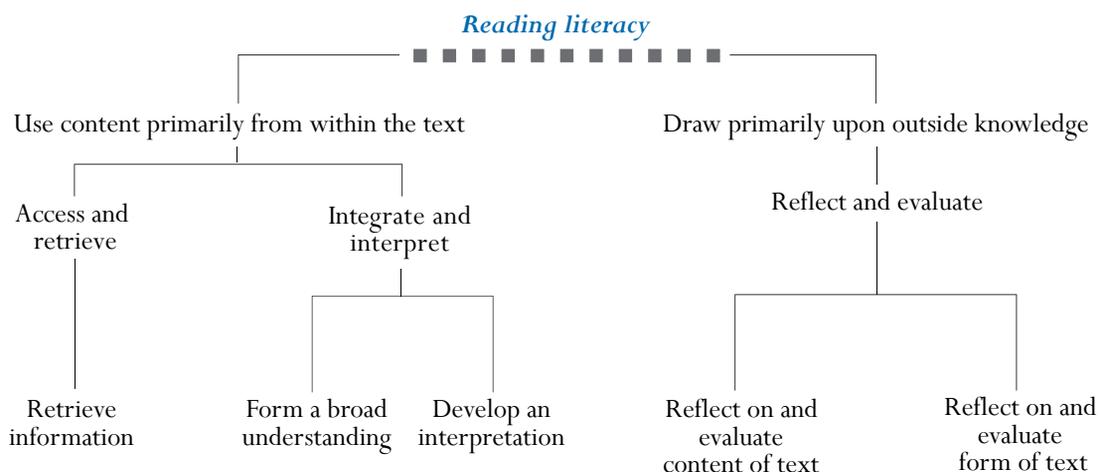
Forming a broad understanding and *developing an interpretation* tasks focus the reader on relationships within a text. Tasks that focus on the whole text require readers to form a broad understanding; tasks that focus on relationships between parts of the text require developing an interpretation. The two are grouped together under *integrate and interpret*.

Tasks addressing the last two aspects, *reflecting on the content of a text* and *reflecting on the form of a text*, are grouped together into a single *reflect and evaluate* aspect category. Both require the reader to draw primarily on knowledge outside the text and relate it to what is being read. *Reflecting on content* tasks are concerned with the notional substance of a text; *reflecting on form* tasks are concerned with its structure or formal features.

Figure 1.3 shows the relationship between the five aspects targeted in the test development and the three broad reporting aspects.



Figure 1.3 ■ Relationship between the reading framework and the aspect subscales



An elaboration of the three broad aspect categories, encompassing tasks in both print and electronic media, is given below.

Access and retrieve

Accessing and retrieving involves going to the information space provided and navigating in that space to locate and retrieve one or more distinct pieces of information. Access and retrieve tasks can range from locating the details required by an employer from a job advertisement, to finding a telephone number with several prefix codes, to finding a particular fact to support or disprove a claim someone has made.

In daily life, readers often need to retrieve information. To do so, readers must scan, search for, locate and select relevant information from some information space (for example, a page of continuous text, a table or a list of information). The required information is most frequently found in a single location, though in some cases the information may be in two or more sentences, in several cells of a table or in different parts of a list.

In assessment tasks that call for retrieving information, students must match information given in the question with either identically worded or synonymous information in the text and use this to find the new information called for. In these tasks, *retrieving information* is based on the text itself and on explicit information included in it. Retrieving tasks require the student to find information based on requirements or features explicitly specified in questions. The student has to detect or identify one or more essential elements of a question, such as characters, place/time and setting, and then to search for a match that may be literal or synonymous.

Retrieving tasks can involve various degrees of ambiguity. For example, the student may be required to select explicit information, such as an indication of time or place in a text or table. A more difficult version of this same type of task might involve finding synonymous information. This sometimes involves categorisation skills, or it may require discriminating between two similar pieces of information. Different levels of proficiency can be measured by systematically varying the elements that contribute to the difficulty of the task.

While *retrieving* describes the process of selecting the required information, *accessing* describes the process of getting to the place, the information space, where the required information is located. Some items may require retrieving information only, especially in the print medium where the information is immediately visible and where the reader only has to select what is appropriate in a clearly specified information space. On the other hand, some items in the electronic medium require little more than accessing: for example, clicking on an embedded link to open a web page (in a very limited information space), or clicking to select an item in a list of search results. However, both processes are involved in most *access and retrieve* tasks in PISA. In the print medium such items might require readers to use navigation features such as headings or captions to find their way to the appropriate section of the text before locating the relevant information. In the electronic medium



an *access and retrieve* item might involve navigating across several pages of a website, or using menus, lists or tabs to locate relevant information.

In both the print and electronic media, the process of accessing and retrieving information involves skills associated with selecting, collecting and retrieving information. Access and retrieve items in the electronic medium may additionally require students to navigate their way to a particular web page (for example) to find specified information, possibly using several navigation tools and traversing a number of pages. Students may be asked to click on a particular link or choose an item from a drop down menu. Examples include opening a website using a hyperlink; opening one or more new pages within a website; or scrolling down a page and clicking on a hyperlink. In accessing a particular item, students will need to make decisions about thematic interest. They will need to identify whether a link or site provides the information required, in terms of topical interest or relevance. Difficulty will be determined by several factors including the number of pages or links that need to be used, the amount of information to be processed on any given page, and the specificity and explicitness of the task directions.

Integrate and interpret

Integrating and interpreting involves processing what is read to make internal sense of a text.

Interpreting refers to the process of making meaning from something that is not stated. It may involve recognising a relationship that is not explicit or it may be required at a more local level to infer (to deduce from evidence and reasoning) the connotation of a phrase or a sentence. When interpreting, a reader is identifying the underlying assumptions or implications of part or all of the text. A wide variety of cognitive activities is included in this approach. For example, a task may involve inferring the connection between one part of the text and another, processing the text to form a summary of the main ideas, requiring an inference about the distinction between principal and subordinate elements, or finding a specific instance in the text of something earlier described in general terms.

Integrating focuses on demonstrating an understanding of the coherence of the text. It can range from recognising local coherence between a couple of adjacent sentences, to understanding the relationship between several paragraphs, to recognising connections across multiple texts. In each case, integrating involves connecting various pieces of information to make meaning, whether it be identifying similarities and differences, making comparisons of degree, or understanding cause and effect relationships.

Both interpreting and integrating are required to *form a broad understanding*. A reader must consider the text as a whole or in a broad perspective. Students may demonstrate initial understanding by identifying the main topic or message or by identifying the general purpose or use of the text. Examples include tasks that require the reader to select or create a title or assumption for the text, explain the order of simple instructions, or identify the main dimensions of a graph or a table. Others include tasks that require the student to describe the main character or setting of a story, to identify a theme of a literary text, or explain the purpose or use of a map or figure.

Within this aspect some tasks might require the student to identify a specific piece of text, when a theme or main idea is explicitly stated. Other tasks may require the student to focus on more than one part of the text – for instance, if the reader has to deduce the theme from the repetition of a particular category of information. Selecting the main idea implies establishing a hierarchy among ideas and choosing the one that is most general and overarching. Such a task indicates whether the student can distinguish between key ideas and minor details, or can recognise the main theme in a sentence or title.

Both interpreting and integrating are also involved in *developing an interpretation*, which requires readers to extend their initial broad impressions so that they develop a deeper, more specific or more complete understanding of what they have read. Many tasks in this category call for logical understanding: readers must process the organisation of information in the text. To do so, readers must demonstrate their understanding of cohesion even if they cannot explicitly state what cohesion is. In some instances, developing an interpretation may require the reader to process a sequence of just two sentences relying on local cohesion. This might even be facilitated by the presence of cohesive markers, such as the use of “first” and “second” to indicate a sequence. In more difficult instances (for example, to indicate relations of cause and effect), there might not be any explicit markings.



Other tasks include comparing and contrasting information, and identifying and listing supporting evidence. *Compare and contrast* tasks require the student to draw together two or more pieces of information from the text. In order to process either explicit or implicit information from one or more sources in such tasks, the reader must often infer an intended relationship or category.

As well as these integrative tasks, *developing an interpretation* tasks may involve drawing an inference from a more localised context: for example, interpreting the meaning of a word or phrase that gives a particular nuance to the text. This process of comprehension is also assessed in tasks that require the student to make inferences about the author's intention, and to identify the evidence used to infer that intention.

In traditional print environments, information might be located in a single paragraph, across different paragraphs or sections of text, or across two or more texts. In electronic environments, integration can be more complex. In a web environment, for example, information can be connected in a non-sequential way through a series of hyperlinks. While integration may take on increased complexity in electronic environments, those environments also provide tools that can facilitate the integration process. For example, views in a word processing program can be manipulated so that information in various locations can be viewed simultaneously, facilitating comparisons. Individuals take on an increased responsibility to know and understand which information can be used and which tools can be used to view it in order to facilitate the integration of information.

The way we synthesise information is also transformed in the electronic environment. We synthesise information in the print medium, of course, but typically this takes place within continuous text that has been constructed for us. Electronic reading is different in that readers actually construct the texts that they read by the choices they make in the links that they follow, collecting a series of texts and synthesising the essential aspects of each during the comprehension process. Synthesis is also different in that readers often skip more information than they read on any single page; the units of text that readers find useful on any single page are often quite small and they rarely read all of the information on a single web page.

An *integrate and interpret* task in the electronic medium may involve surfing several pages of a website or combining information from different sites, or it may require drawing inferences from information on a single page. As in print reading, tasks will include comparing, contrasting, finding evidence, determining influence, generalising and analysing subtleties of language. Difficulty will be determined by several factors including the number of pieces of information to be integrated and the number of locations where they are found, as well as the verbal complexity and the subject familiarity of the textual information.

As mentioned above, *interpreting* signifies the process of making meaning from something that is not explicitly stated. In recognising or identifying a relationship that is not explicit, an act of interpretation is required: thus interpretation is perhaps always involved somewhere in the process of *integration* as described above. The relationship between the processes of integration and interpretation may therefore be seen as intimate and interactive. Integrating involves first inferring a relationship within the text (a kind of interpretation), and then bringing pieces of information together, therefore allowing an interpretation to be made that forms a new integrated whole.

Reflect and evaluate

Reflecting and evaluating involves drawing upon knowledge, ideas or attitudes beyond the text in order to relate the information provided within the text to one's own conceptual and experiential frames of reference.

Reflect items may be thought of as those that require readers to consult their own experience or knowledge to compare, contrast or hypothesise. *Evaluate* items are those that ask readers to make a judgment drawing on standards beyond the text.

Reflecting on and evaluating the content of a text requires the reader to connect information in a text to knowledge from outside sources. Readers must also assess the claims made in the text against their own knowledge of the world. Often readers are asked to articulate and defend their own points of view. To do so, readers must be able to develop an understanding of what is said and intended in a text. They must then test that mental representation against what they know and believe on the basis of either prior information, or information found in other texts. Readers must call on supporting evidence from within the text and contrast it with other sources of information, using both general and specific knowledge as well as the ability to reason abstractly.



Assessment tasks representing this category of processing include providing evidence or arguments from outside the text, assessing the relevance of particular pieces of information or evidence, or drawing comparisons with moral or aesthetic rules (standards). The task might require a student to offer or identify alternative pieces of information to strengthen an author's argument, or evaluate the sufficiency of the evidence or information provided in the text.

The outside knowledge to which textual information is to be connected may come from the student's own knowledge or from ideas explicitly provided in the question. In the PISA context, any outside knowledge required is intended to be within the expected range of 15-year-olds' experiences. For example, it is assumed that 15-year-olds are likely to be familiar with the experience of going to the movies, a context that is drawn upon in the items related to the stimulus *Macondo*, discussed below.

Reflecting on and evaluating the form of a text requires readers to stand apart from the text, to consider it objectively and to evaluate its quality and appropriateness. Implicit knowledge of text structure, the style typical of different kinds of texts and register play an important role in these tasks. These features, which form the basis of an author's craft, figure strongly in understanding standards inherent in tasks of this nature. Evaluating how successful an author is in portraying some characteristic or persuading a reader depends not only on substantive knowledge but also on the ability to detect subtleties in language – for example, understanding when the choice of an adjective might influence interpretation.

Some examples of assessment tasks characteristic of *reflecting on and evaluating the form of a text* include determining the usefulness of a particular text for a specified purpose and evaluating an author's use of particular textual features in accomplishing a particular goal. The student may also be called upon to describe or comment on the author's use of style and to identify the author's purpose and attitude.

While the kinds of reflection and evaluation called for in the print medium assessment are also required in the electronic medium, evaluation in the electronic medium takes on a slightly different emphasis.

Printed texts are typically edited and filtered by many layers of the print publication process. On the web, however, anyone can publish anything. Moreover, the homogeneity of electronic text formats (windows, frames, menus, hyperlinks) tends to blur the distinctions across text types. These new features of electronic text increase the need for the reader to be aware of authorship, accuracy, quality and credibility of information. Whereas in the printed text clear indications of the source are usually available (for example, through the standard practice of mentioning author – sometimes with credentials, publisher, date and place of publication in the book), in electronic texts that important information is not always available. There is therefore a need for readers of electronic text to be more active in assessing and reasoning about source features. As people have access to a broadening universe of information in networked environments, evaluation takes on an increasingly critical role. While published print information carries a sense of legitimacy stemming from the assumed reviewing and editing process, sources for online information are more varied, ranging from authoritative sources to postings with unknown or uncertain authenticity. Such information must be evaluated in terms of accuracy, reliability and timeliness. It is important to recognise that the evaluation process happens continuously and therefore is a critical component of electronic reading. Once a reader has located information related to the question or problem, critical analysis of that information becomes important. While critical analysis of information takes place in the print medium, of course, it is even more important on line. Moreover, it is a skill that few adolescents appear to possess; they are easily fooled by false information appearing on the web and do not always possess strategies to analyse its accuracy (see for example Leu & Castek, 2006).

Skilled readers in the electronic medium know how to evaluate information that may be questionable. They also know how to use a search engine to gather additional information about a site by simply conducting a search for its title and additional words such as "hoax," "true?" or "accurate?" Critical analysis, a skill required during print reading comprehension, is transformed in important ways in the electronic medium, requiring new online reading skills. For instance, the availability of Internet resources in schools has encouraged teachers to include document search assignments in their instructional strategies. In order to complete those assignments, students need to be not only good at understanding what they read, but also at searching. This can be compared with a more traditional document-based teaching session where a single document would be pre-selected, copied and distributed by the teacher for in-depth reading and study.



Rieh (2002) identifies two distinct kinds of judgement that Internet users tend to make: predictive judgements and evaluative judgements. A *reflect and evaluate* item may involve making a predictive judgement about which site to go to from a range of possibilities, based on relevance, authenticity and authority. Once at a site, a reader completing a *reflect and evaluate* item may need to make an *evaluative* judgement: students may be asked to evaluate a site or link in terms of authority or reliability, credibility and trustworthiness of information. For example, they may need to assess whether the information is official and authoritative, unsupported personal opinion, or propaganda designed to influence the reader.

Some items may require reflection on and evaluation of the content of a site in similar ways to those currently used in print reading: for example, where students give a personal response to ideas and opinions, using background knowledge and experience. As with print assessment items, the difficulty of *reflect and evaluate* items is determined by several factors including the quantity and explicitness of information to support a reflection and evaluation and the extent to which the information is common knowledge.

To some extent every critical judgment requires the reader to consult his or her own experience; some kinds of reflection, on the other hand, do not require evaluation (for example, comparing personal experience with something described in a text). Thus evaluation might be seen as a subset of reflection.

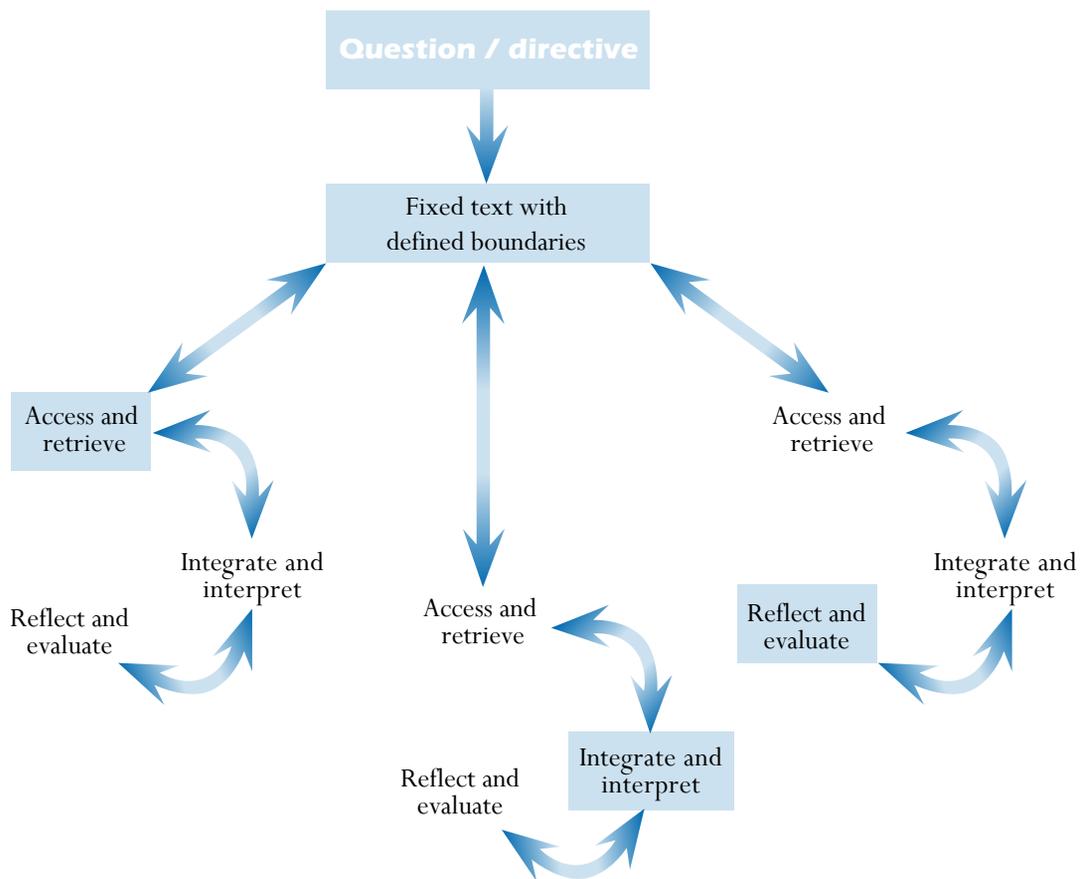
The aspects of reading in print and electronic media

The three broad aspects defined for PISA reading literacy are not conceived of as entirely separate and independent, but rather as interrelated and interdependent. Indeed from a cognitive processing perspective they can be considered semi-hierarchical: it is not possible to interpret or integrate information without having first retrieved it, and it is not possible to reflect on or evaluate information without having made some sort of interpretation. In PISA, however, the focus is on developing an *assessment* framework that will guide the construction of an assessment to operationalise and subsequently measure proficiency in different aspects of the reading domain. The framework description of reading aspects distinguishes approaches to reading that are demanded for different contexts and purposes; these are then reflected in assessment tasks that emphasise one or other aspect. All readers, irrespective of their overall proficiency, are expected to be able to demonstrate some level of competency in each of the reading aspects (Langer, 1995), since all are seen as being in the repertoire of each reader at every developmental level.

Given that the aspects are rarely if ever entirely separable, the assignment of a task to an aspect is often a matter of fine discrimination that involves judgements about the salient (most important) features of the task, and about the predicted typical approach to it. Figure 1.4 and Figure 1.5 represent the way the aspects are operationalised in different tasks, in print and electronic media respectively. The boxes around aspect names represent the emphasis of the task, while the presence of the other aspects at each task point acknowledge that all the aspects (as cognitive processes) are likely to play some role in each task.

For the most part, identifying the aspect for each PISA reading literacy task – the task being the question or directive that the student sees – will depend on the objective of the task. For example, retrieving a single piece of explicitly stated information from a web page (such as finding out the number of Internet users worldwide) may involve a complex series of steps requiring the evaluation of the relevance of several results on a search result page, comparing and contrasting descriptions and deciding which of several sources is likely to be most authoritative. Nevertheless, if the ultimate task, finding the number of Internet users worldwide, is stated explicitly once the target page has been reached, this task is classified as *access and retrieve*. This is the approach that has been taken in PISA print reading to classify each task by aspect.

Figure 1.4 ■ Relationship between task, text and aspects in the print medium

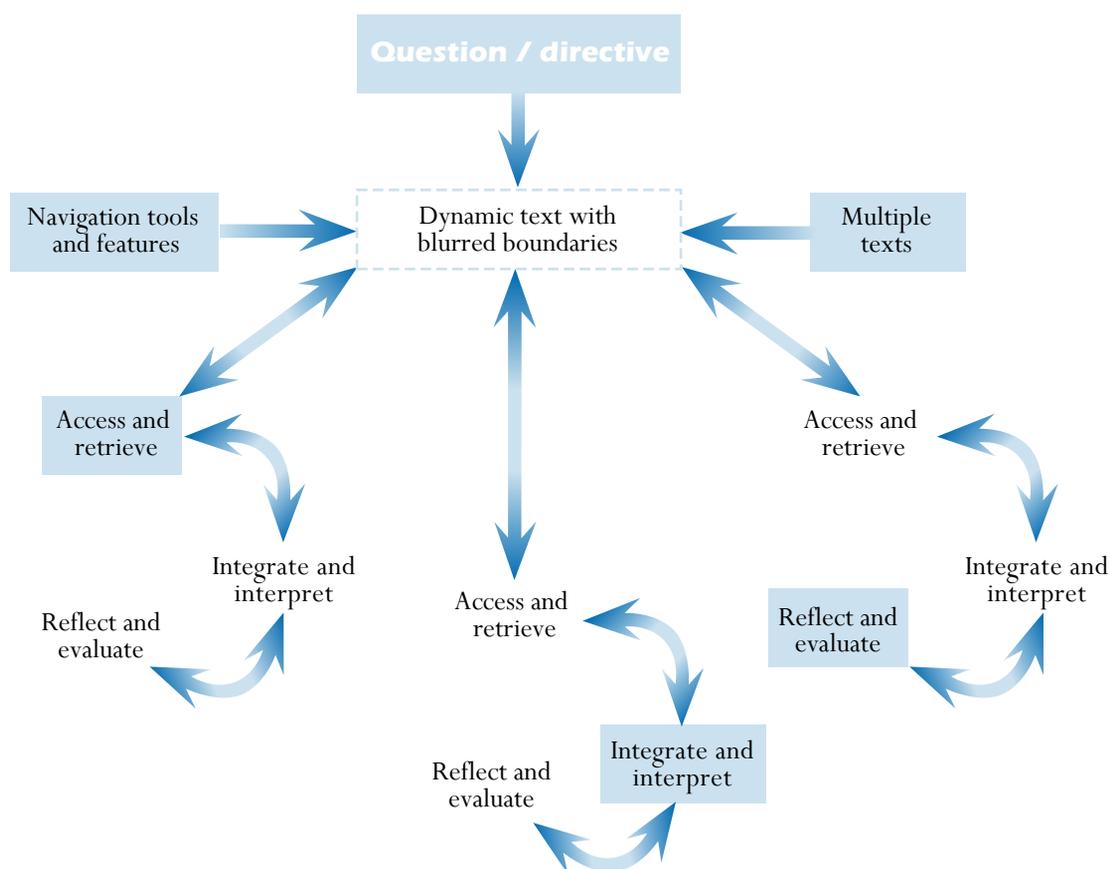


Complex electronic reading tasks – simulating the complexity of real-life reading

In both the print and electronic media, real-life reading tasks can typically involve searching for information in what is essentially an unlimited space. In the print world, we might go to a library, search a catalogue, browse on the library shelf, and then, having found what looks like the right book or books, scan the contents and flip through pages before making a selection of one or many resources. In the electronic medium, the parallel process is experienced sitting at a computer screen and accessing a database or the Internet. This is a much more contained task in geographical space and time, but the processes of sorting, selecting, evaluating and integrating are in many respects similar to searching for information in the print medium. Practical constraints have meant that reading assessments like PISA cannot measure students' proficiency in searching for print resources. Consequently, the large-scale assessment of reading has generally confined itself, until now, to tasks that involve reading rather short and clearly designated texts. By contrast, large scale assessments can, in the electronic medium, authentically measure proficiency in accessing, selecting and retrieving information from a wide range of possible resources. Therefore, insofar as the cognitive processing in the two media is parallel, an assessment of electronic reading makes it possible to measure something that has until now, not been measurable in a large-scale assessment.



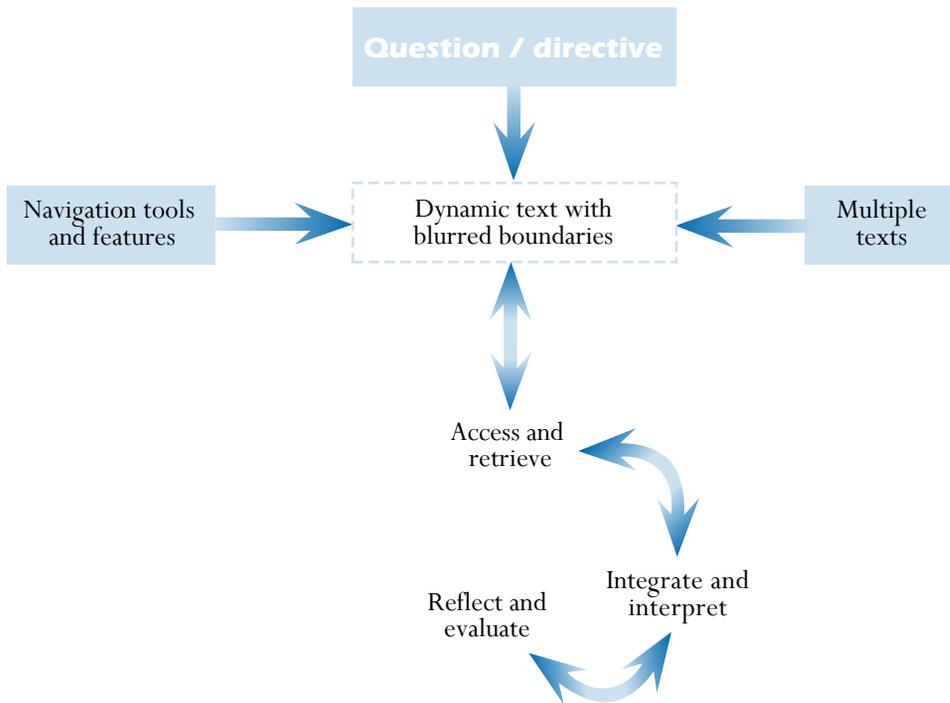
Figure 1.5 ■ Relationship between task, text and aspects in the electronic medium



One important point made about the difference between print and electronic reading is the lack of obvious direction provided to the reader in the electronic medium. In the print medium the arrangement and organisation of (a single) text is given to the reader by the author's ordering of pages, chapters or larger sections. The reader may choose to take a different path, but a path is nevertheless suggested by the physical arrangement of the text. In hypertext on the other hand the reader has no direction – or, to put it more positively, the reader has far greater control of the selection and sequence of reading. In effect, control is forced upon the reader.

In order to simulate the real-life freedom (or forced independence) of reading in the electronic medium, some part of electronic reading assessment is designed in the form of *complex reading tasks*. Here not only is the range of texts comparatively undefined, but also the optimal sequence of steps to be taken in completing the task is not pre-determined. These are tasks which take advantage of the compression and economy of electronic reading resources. They also require the use of the variety of skills: accessing and retrieving; interpreting and integrating; and reflecting and evaluating. The task cannot therefore be assigned to a single aspect. The equal status of the three aspects, and their relationship to dynamic reading texts, is represented in Figure 1.6.

Figure 1.6 ■ Relationship between task, text and aspects in complex reading tasks



While the three aspects do not usually operate entirely independently of one another in either print or electronic reading tasks, it is possible to construct relatively simple tasks in which there is a clear emphasis on one or the other aspect. In complex tasks, on the other hand, the process is not so well defined. The reader assimilates the task, and then confronts the problem of interpreting, extrapolating from and evaluating the immediately visible text (for example, the home page of a website) to find relevant information. In order to do this an experienced reader in the electronic medium uses knowledge about access structures and typical site structures (just as an experienced print reader uses knowledge about generic textual structures and features). It is not just a matter of knowledge however: a skilled reader of electronic texts also needs to theorise and construct logical and interpretive connections between seen and unseen multiple texts. In an authentic, complex task in the electronic medium, the reader needs to process the visible information immediately and extrapolate from it: making judgments, synthesising and accessing information in an integrated, recursive sequence.

In order to maintain trend and represent the balance of the aspects applicable in the assessment environment, the distribution by aspect across the print-based assessment remains similar to that of PISA 2000. In the electronic reading assessment, however, the tasks are spread more equally across the three traditional aspects and the new composite aspect, *complex*. The approximate distribution of tasks by aspect in print and electronic media is shown in Table 1.4.



Table 1.4 Approximate distribution of tasks by aspect for PISA 2009

Aspect	% of total tasks PISA 2009: print	% of total tasks PISA 2009: electronic
Access and retrieve	25	25
Integrate and interpret	50	35
Reflect and evaluate	25	20
Complex	0	20
TOTAL	100	100

Summary of the relationship between printed and electronic reading texts and tasks

Table 1.5 presents some of the essential similarities and differences between print and electronic reading. One purpose of the table is to describe intrinsic similarities and differences between print reading and electronic reading. In many cases the entries under Print reading and Electronic reading are identical. In other places, the descriptions highlight some essential differences between reading in the two media.

A second purpose of the table is to illustrate similarities and differences in what PISA assesses in the two media. In some cases it is a matter of prominence and emphasis: square brackets signify that a feature is given relatively little emphasis in the PISA assessment. In other cases the difference is more absolute. While some features exist in both media, they cannot be or are not assessed in PISA. These are represented in grey scale. One of the principles in constructing the PISA frameworks and the assessment tasks that operationalise them is to represent the domains authentically. There is no set way of doing this, and in a sense the decisions and selections made are arbitrary – though based on the best judgment of international reading experts. How the domain is described and operationalised, in this and other respects, is determined by a combination of conceptual, empirical and political considerations. The aim in the scoping of the domain outlined above is to explain the basis for building an assessment for PISA 2009 that captures the essence of reading literacy. Such an assessment will in turn yield an array of data from which to report 15-year-olds' reading proficiency in ways that are comprehensive, meaningful and relevant.

Table 1.5 Similarities and differences between print and electronic reading, by main framework characteristics

	Print reading	Electronic reading
Situations	Personal Public Occupational Educational	Personal Public Occupational Educational
Texts: Environments	not applicable	Authored Message based
Texts: Formats	Continuous Non-continuous [Mixed] [Multiple]	[Continuous] [Non-continuous] [Mixed] Multiple
Texts: Text type	Argumentation Description Exposition Narration Instruction Transaction	Argumentation Description Exposition Narration Instruction Transaction
Aspects (1)	Access and retrieve Search Orient and navigate in concrete information space <i>e.g. Go to library, search in a catalogue, find a book</i> Use navigation tools and structures <i>e.g. Table of contents; page numbers; glossary</i> Select and sequence information - low reader control - one sequence of linear reading	Access and retrieve Search Orient and navigate in abstract information space <i>e.g. Enter URL; user search engines</i> Use navigation tools and structures <i>e.g. Menus; embedded hyperlinks</i> Select and sequence information - high reader control - multiple sequences of linear reading
Aspects (2)	Integrate and interpret Integrate at a lower level of demand: larger portions of text are simultaneously visible (one or two pages) Develop an interpretation Form a broad understanding	Integrate and interpret Integrate at a higher level of demand: limited parts of text are simultaneously visible (limited by screen size) Develop an interpretation Form a broad understanding
Aspects (3)	Reflect and evaluate Pre-evaluate information <i>e.g. use table of contents; skim passages, checking for credibility and usefulness</i> [Evaluate credibility of source - usually less important due to filtering and preselection in the publishing process] Evaluate plausibility of content Evaluate coherence and consistency Hypothesise Reflect in relation to personal experience	Reflect and evaluate Pre-evaluate information <i>e.g. use menus; skim web pages, checking for credibility and usefulness</i> Evaluate credibility of source - usually more important due to lack of filtering and preselection in open environment Evaluate plausibility of content Evaluate coherence and consistency Hypothesise Reflect in relation to personal experience
Aspects (4)	Complex The range of sources to be consulted is relatively undefined The sequence of steps within the task is undirected <i>e.g. finding, evaluating and integrating information from multiple printed texts</i>	Complex The range of sources to be consulted is relatively undefined The sequence of steps within the task is undirected <i>e.g. finding, evaluating and integrating information from multiple electronic texts</i>



ASSESSING READING LITERACY

The previous section outlined the conceptual framework for reading literacy. The concepts in the framework must in turn be represented in tasks and questions in order to collect evidence of students' proficiency in reading literacy.

Building tasks in the print medium

The distribution of tasks across the major framework variables of situation, text and aspect was discussed in the previous section. In this section some of the other major issues in constructing and operationalising the assessment are considered: factors affecting item difficulty, and how difficulty can be manipulated; the choice of response formats; and some issues around coding and scoring.

Factors affecting item difficulty

The purpose of the PISA reading literacy assessment is to monitor and report on the reading proficiency of 15-year-olds as they approach the end of compulsory education. Each task in the assessment is designed to gather a specific piece of evidence about that proficiency by simulating a reading activity that a reader might carry out either inside or outside school, as an adolescent or as an adult.

The PISA reading literacy tasks range from very straightforward comprehension activities to quite sophisticated activities requiring deep and multiple levels of understanding. The difficulty of any reading literacy task depends on an interaction amongst several variables. Drawing on Kirsch and Mosenthal's work (see for example Kirsch, 2001; Kirsch & Mosenthal, 1990), we can manipulate the difficulty of items by applying knowledge of the following aspect and text format variables.

In *access and retrieve* tasks, difficulty is conditioned by the number of pieces of information that the reader needs to locate, by the amount of inferencing required, by the amount and prominence of competing information, and by the length and complexity of the text.

In *integrate and interpret* tasks, difficulty is affected by the type of interpretation required (for example, making a comparison is easier than finding a contrast); by the number of pieces of information to be considered; by the degree and prominence of competing information in the text; and by the nature of the text: the less familiar and the more abstract the content and the longer and more complex the text, the more difficult the task is likely to be.

In *reflect and evaluate* tasks, difficulty is affected by the type of reflection or evaluation required (from least to most difficult, the types of reflection are: connecting; explaining and comparing; hypothesising and evaluating); by the nature of the knowledge that the reader needs to bring to the text (a task is more difficult if the reader needs to draw on narrow, specialised knowledge rather than broad and common knowledge); by the relative abstraction and length of the text; and by the depth of understanding of the text required to complete the task.

In tasks relating to *continuous texts*, difficulty is influenced by the length of the text; the explicitness and transparency of its structure; how clearly the parts are related to the general theme; and whether there are text features such as paragraphs or headings, and discourse markers such as sequencing words.

In tasks relating to *non-continuous texts*, difficulty is influenced by the amount of information in the text; the list structure (simple lists are easier to negotiate than more complex lists); whether the components are ordered and explicitly organised, for example with labels or special formatting; and whether the information required is in the body of the text or in a separate part, such as a footnote.

Response formats

The form in which the evidence is collected – the *response format* – varies according to what is considered appropriate given the kind of evidence that is being collected, and also according to the pragmatic constraints of a large-scale assessment. As in any large-scale assessments the range of feasible item formats is limited, with multiple-choice and short constructed-response items (where students write their own answer) being the most manageable formats.



Several studies based on PISA data suggest that response format has a significant effect on the performance of different groups: for example, students at different levels of proficiency (Routitsky & Turner, 2003); students in different countries (Grisay & Monseur, 2007); and boys and girls (Lafontaine & Monseur, 2006). Given this variation, Lafontaine and Monseur caution that in measuring trends over time, it is important to maintain a similar proportion of tasks in multiple choice and constructed response formats from one administration to the next. A further significant consideration in the context of reading literacy is that open constructed response items are particularly important for the reflection and evaluation aspect, where the intent is often to assess the quality of thinking rather than the conclusion itself. Finally, students in different countries are more or less familiar with various response formats. Including items in a variety of formats is likely to provide some balance between more and less familiar formats for all students, regardless of nationality.

In summary, to ensure proper coverage of the ability ranges in different countries, to ensure fairness given the inter-country and gender differences observed, and to ensure a valid assessment of the reflect and evaluate aspect, both multiple choice and open constructed response items continue to be used in PISA reading literacy assessments. Any major change in the distribution of item types in print reading might also impact on the measurement of trends. In the interests of economy, however, and to take advantage of the capacity for automated coding that the electronic medium offers, for the electronic reading assessment a higher proportion of items requiring no coder judgement has been included.

Table 1.6 and Table 1.7 show coding requirements for print and electronic tasks respectively. The distribution is shown in relation to the three aspects of reading literacy for print literacy and the four aspects described for the electronic reading assessment. Items that require expert judgement consist of open constructed and short constructed responses. Items that do not require coder judgement consist of multiple choice, complex multiple choice and closed constructed response items. The closed constructed response items are those that require the student to generate a response, but require minimal judgment on the part of a coder. For example, a task in which a student is asked to copy a single word from the text, where only one word is acceptable, would be classified as a closed constructed response item. Such items impose a minor cost burden in operational terms and therefore from a pragmatic perspective, these closed constructed response items can be grouped with multiple choice items.

Table 1.6 Approximate distribution of tasks by coding requirement for PISA 2009: print medium

Aspect	% of tasks requiring expert judgment in coding	% of tasks not requiring expert judgment in coding	% of test
Access and retrieve	11	14	25
Integrate and interpret	14	36	50
Reflect and evaluate	18	7	25
TOTAL	43	57	100



Table 1.7 Approximate distribution of tasks by coding requirement for PISA 2009: electronic medium

Aspect	% of tasks requiring expert judgment in coding	% of tasks not requiring expert judgment in coding	% of test
Access and retrieve	0	25	25
Integrate and interpret	0	35	35
Reflect and evaluate	15	5	20
Complex	15	5	20
TOTAL	30	70	100

The tables indicate that while there is some distribution of items that require coder judgement and those that do not across the aspects, they are not distributed evenly. The reflection and evaluation aspect in both media and the complex tasks in the electronic reading assessment are assessed through a larger percentage of constructed response items, which require expert coder judgment.

Coding and scoring

Codes are applied to test items, either by a more or less automated process of capturing the alternative chosen by the student for a multiple choice answer, or by a human judge (expert coder) selecting a code that best captures the kind of response given by a student to an item that requires a constructed response. The code, of either type, is then converted to a score for the item. Scoring is relatively simple with multiple-choice items or other closed response format items such as selecting an item from a drop down menu in the electronic medium: the student has either chosen the designated correct answer or not, so the item is scored as 1 or 0 respectively.

Partial-credit models allow for more complex scoring of constructed response items. Some answers, even though incomplete, are better than others. Given that incomplete answers indicate a higher level of reading literacy than inaccurate or incorrect answers, they receive partial credit. Such items are then scored polytomously – that is, there is a full credit score, one or more partial credit scores, and a no credit score. Psychometric models for such polytomous scoring are well established and in some ways are preferable to dichotomous scoring (full credit or no credit), as they use more of the information in the responses. Interpretation of polytomous scoring is more complex, however, as each task will have several locations on the difficulty scale: one for the full-credit answer and others for each of the partial-credit answers. Partial-credit scoring is used for some of the more complex constructed response items in PISA.

There is a great range of constructed response tasks. Some require little judgement on the coder's part; these include tasks that ask the reader to simply mark parts of the text to indicate an answer or to list a few words. Others require considerable judgement on the part of coder, as for example when the reader is asked to explain the main idea of a text in his or her own words.

The following three examples illustrate some of the salient variables addressed in the construction of print reading items, including situation, text format, text type, and aspect. They also illustrate a range of response formats and coding and scoring features. The three items were part of the PISA reading literacy instrument administered in the field trial for PISA 2009. The first and third were also administered in the PISA main survey in the year 2000.



PRINT READING UNIT 1

MACONDO

Dazzled by so many and such marvellous inventions, the people of Macondo did not know where their amazement began. They stayed up all night looking at the pale electric bulbs fed by the plant that Aureliano Triste had brought back when the train made its second trip, and it took time and effort for them to grow accustomed to its obsessive toom-toom. They became indignant over the living images that the prosperous merchant Don Bruno Crespi projected in the theatre with the lion-head ticket windows, for a character who had died and was buried in one film, and for whose misfortune tears of affliction had been shed, would reappear alive and transformed into an Arab in the next one. The audience, who paid two centavos apiece to share the difficulties of the actors, would not tolerate that outlandish fraud and they broke up the seats. The mayor, at the urging of Don Bruno Crespi, explained by means of a proclamation that the cinema was a machine of illusions that did not merit the emotional outburst of the audience. With that discouraging explanation many felt that they had been the victims of some new and showy gypsy business and they decided not to return to the movies, considering that they already had too many troubles of their own to weep over the acted-out misfortunes of imaginary beings.

Macondo is a piece of prose from the novel *One Hundred Years of Solitude* by the Colombian author Gabriel García Márquez. It is classified as belonging to the personal situation because it was written for readers' interest and pleasure. The Macondo unit in PISA is introduced with a brief paragraph to orientate the reader: "The passage on the opposite page is from a novel. In this part of the story, the railway and electricity have just been introduced to the fictional town of Macondo, and the first cinema has opened." The people's reaction to the cinema is the focus of the passage. While the historical and geographical setting of the extract is exotic for most readers, going to the movies is within the experience of 15-year-olds, and the characters' responses are at the same time intriguing and humanly familiar. Within the *continuous* text format category, *Macondo* is an example of narrative writing in that it shows, in a manner typical of this text type, why characters in stories behave as they do, recording actions and events from the point of view of subjective impressions.

The Macondo unit comprises tasks covering the aspects of *integrate and interpret* and *reflect and evaluate*. One of the tasks is reproduced below. Further tasks can be found in Annex A1. The numbering of the tasks is identical to the numbering used in the test booklets given to students.

Question 3: MACONDO

At the end of the passage, why did the people of Macondo decide not to return to the movies?

- A. They wanted amusement and distraction, but found that the movies were realistic and depressing.
- B. They could not afford the ticket prices.
- C. They wanted to save their emotions for real-life occasions.
- D. They were seeking emotional involvement, but found the movies boring, unconvincing and of poor quality.

The correct answer is C.

This task requires integrating and interpreting to form a broad understanding. In order to gain credit, students need to synthesise elements across the text to identify the reason that the characters in the story behaved as they did at the end. In selecting option C, they must reject some reasons that could plausibly explain why people might decide not to go to the movies, represented by distractors that are based on preconceptions rather than on the text.



Table 1.8 summarises the framework characteristics of the *Macondo* question.

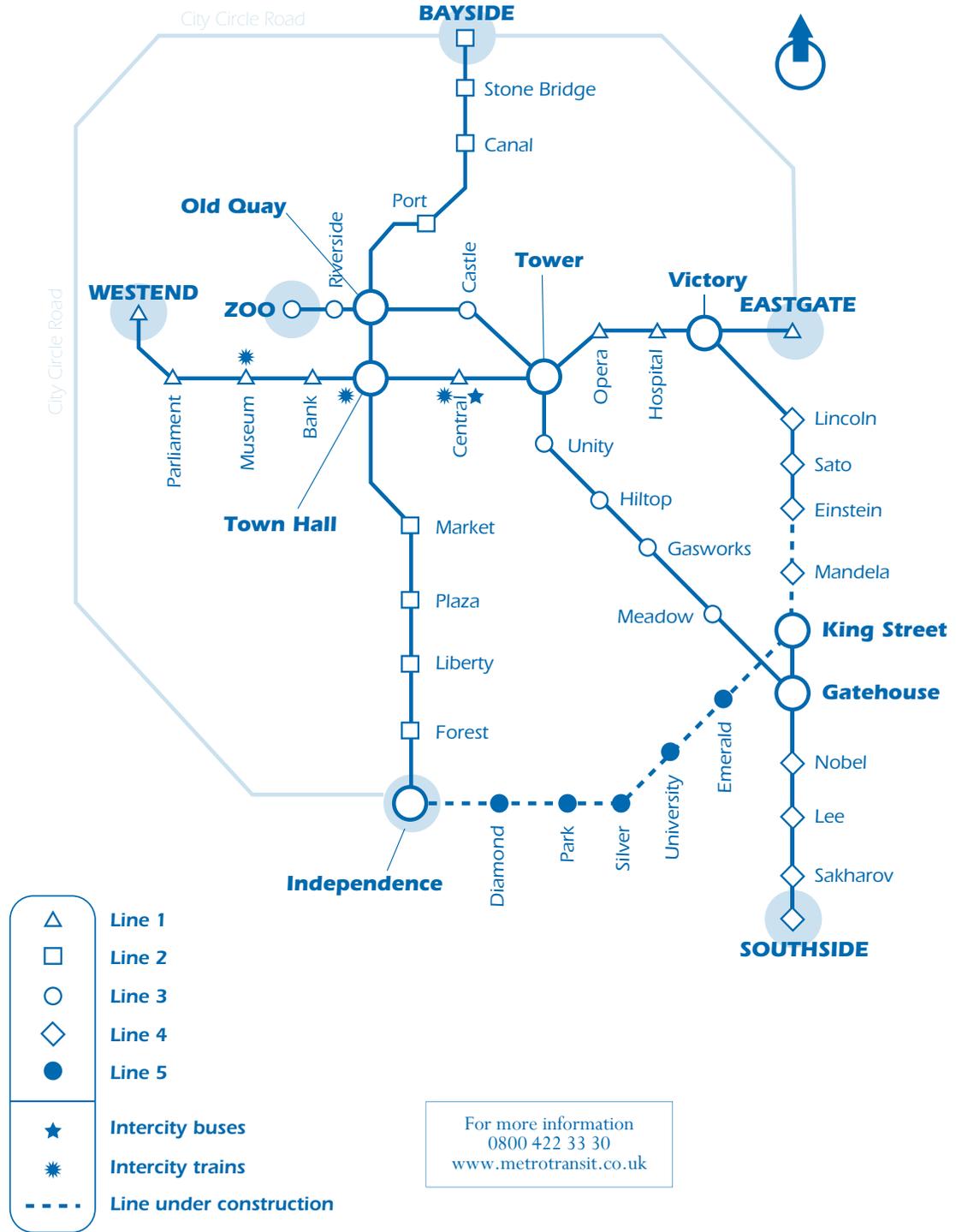
Table 1.8 Framework characteristics of sample task: Macondo

Situation	Personal
Text format	Continuous
Text type	Narration
Aspect	Integrate and interpret: Form a broad understanding
Item format	Multiple choice



PRINT READING UNIT 2

METROTRANSIT





The Metrotransit unit from the PISA 2009 field trial presents a graphic from a public document, a map of an urban transport network in the form of a diagram. It uses fictional place names that participating countries were invited to adapt for their national versions. The text is non-continuous; it could be presented as a combined list of stations categorised according to line, features and grid locations. Though relatively simple, it includes a complicating element – a key of symbols – the application of which is required to gain full credit for the question reproduced below.

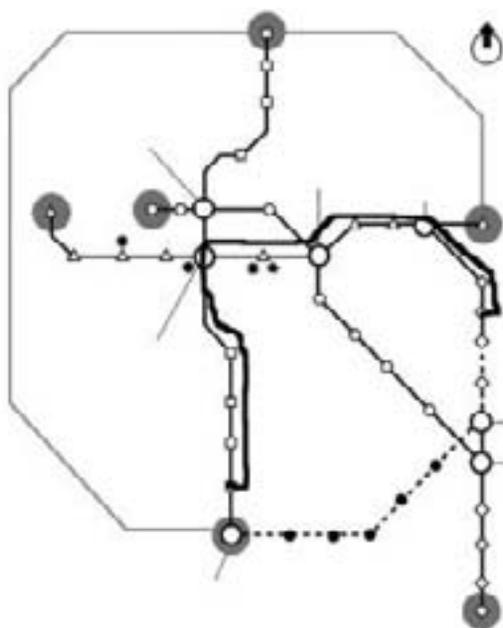
Question 4: METROTRANSIT

You need to find the shortest route by underground rail from Sato Station to Forest Station.

Draw on the map the route that you would take.

This *access and retrieve* task requires students to locate and sequence multiple pieces of information – the names of stations – to plan a route. The task simulates a real-life experience that demands careful reading of a non-continuous text. The item was constructed to ensure that use of conditional information – that is, information external to the main part of a text – must be processed in order to complete the task successfully. For full credit, students therefore need to use the information provided in the key: that part of the system that is under construction. Students who take account of this conditional information realise that what is apparently the shortest route is currently unusable. The requirement to use conditional information increases the difficulty of items significantly. Only about one-third of students in the field trial gained full credit for this item. However more than half of the other students, who plotted a route using stations on Line 5, were given partial credit, as they demonstrated that in all but one respect (albeit a crucial one, in practical terms) they had understood and could use information that they had retrieved. Examples of full and partial credit responses are shown below.

Full credit response





Partial credit response



Most of the items in PISA print reading require a multiple choice or text response. The short response format of this question, involving the drawing of a route on a map, illustrates that the range of response types can nevertheless vary to some extent, according to the format that seems most appropriate for the particular task. This is bounded, of course, by the practical limitations of a large-scale paper and pen test.

Table 1.9 summarises the framework characteristics of the *Metrotransit* question.

Table 1.9 Framework characteristics of sample task: Metrotransit

Situation	Public
Text format	Non-continuous
Text type	Description
Aspect	Access and retrieve: Retrieve information
Item format	Short response



PRINT READING UNIT 3

STUDENT OPINIONS

There are so many people out there dying from hunger and disease, yet we are more concerned about future advancements. We are leaving these people behind as we attempt to forget and move on. Billions of dollars are poured into space research by large companies each year. If the money spent on space exploration was used to benefit the needy and not the greedy, the suffering of millions of people could be alleviated.

Ana

The challenge of exploring space is a source of inspiration for many people. For thousands of years we have been dreaming of the heavens, longing to reach out and touch the stars, longing to communicate with something we only imagine could exist, longing to know... Are we alone?

Space exploration is a metaphor for learning, and learning is what drives our world. While realists continue to remind us of our current problems, dreamers stretch our minds. It is the dreamers' visions, hopes and desires that will lead us into the future.

Beatrice

We ruin rain forests because there is oil under them, put mines in sacred ground for the sake of uranium. Would we also ruin another planet for the sake of an answer to problems of our own making? Of course!

Space exploration strengthens the dangerous belief that human problems can be solved by our ever-increasing domination of the environment. Human beings will continue to feel at liberty to abuse natural resources like rivers and rain forests if we know there is always another planet around the corner waiting to be exploited.

We have done enough damage on Earth. We should leave outer space alone.

Dieter

The earth's resources are quickly dying out. The earth's population is increasing at a dramatic rate. Life cannot be sustained if we continue to live in such a way. Pollution has caused a hole in the ozone layer. Fertile lands are running out and soon our food resources will diminish. Already there are cases of famine and disease caused by over-population.

Space is a vast empty region which we can use to our benefit. By supporting exploration into space, one day we may find a planet that we can live on. At the moment this seems unimaginable, but the notion of space travel was once thought of as impossible. Discontinuing space exploration in favour of solving immediate problems is a very narrow-minded and short-term view. We must learn to think not only for this generation but for the generations to come.

Felix



To ignore what the exploration of space has to offer would be a great loss to all mankind. The possibilities of gaining a greater understanding of the universe and its beginnings are too valuable to waste. The study of other celestial bodies has already increased our understanding of our environmental problems and the possible direction Earth could be heading in if we don't learn to manage our activities.

There are also indirect benefits of research into space travel. The creation of laser technology and other medical treatments can be attributed to space research. Substances such as teflon have come out of mankind's quest to travel into space. Thus new technologies created for space research can have immediate benefits for everyone.

Kate

The stimulus for the unit *Student Opinions* consists of five short argumentative texts that offer opinions about space research. Because it is based on writing by students in their final year of school, the text is classified as *educational* in terms of situation. All of the short pieces that make up the stimulus for this unit are continuous, but they were generated independently, and are juxtaposed for the purposes of the assessment, the format category is *multiple* texts. The stimulus is classified as *argumentation*, as the texts set forth propositions and attempt to persuade the reader to a point of view.

Several of the tasks that were based on this stimulus were *integrate and interpret* questions that represent typical active reading, as they simulate the processes that readers might engage in as they compare and contrast the opinions of different authors on a topic. Another typical active reading approach in encountering one or more written arguments is to compare one's own position with those of the writers. The sample task that follows represents that kind of reflective and evaluative reading activity. Further tasks can be found in Annex A1. The numbering of the tasks is identical to the numbering used in the test booklets given to students.

Question 6: STUDENT OPINIONS

Thinking about the main ideas presented by the five students, which student do you agree with most strongly?

Student's name:

Using your own words, explain your choice by referring to your own opinion **and** the main ideas presented by the student.

.....

.....

.....

.....

This task requires students to draw on their own knowledge and beliefs to evaluate the arguments put forward by the writers, comparing the substance rather than the form of the texts. In the five-aspect categorisation, this task is therefore classified as *reflecting on the content of a text*. In order to gain credit for this item, students needed to demonstrate implicitly or explicitly that they understood the main thrust of the argument advanced by their chosen writer, as well as justifying their position, either by introducing their own supporting argument or by summarising or interpreting the argument given by the writer.

Full credit was available regardless of which writer was nominated by the student, as long as the criteria outlined above were satisfied. Some typical answers that earned full credit were:

- ◇ Ana – I feel that we should take care of what is going on in our own world before we blow all our money on space exploration. I understand the importance of some exploration but I think disease and famine need to be helped out of this world first.



- ◇ Dieter – I agree with him because he is concerned with the environment and he thinks that we should leave outer space alone.
- ◇ Felix – I agree with Felix because unless we are willing to face extinction, there is no other place to go after we have wrecked the earth.

Answers that were not given credit often quoted from one of the texts without addition, whereas the task directed students to use their own words. Other responses that gained no credit were vague, or offered a general opinion without substantiating it with reference to one of the texts (for example, “Dieter. Let’s look at the realities.).

Table 1.10 summarises the framework characteristics of the *Student Opinions* question.

Table 1.10 Framework characteristics of sample task: Student Opinions

Situation	Educational
Text format	Multiple
Text type	Argumentation
Aspect	Reflect and evaluate: Reflect on and evaluate the content of a text
Item format	Open constructed response

Extending the descriptive power of the PISA scales by manipulating item difficulty

In PISA 2000, PISA 2003 and PISA 2006 it has been noted that, while the level of proficiency of students can be located accurately, there is a shortage of descriptive information about what students at the extremes – particularly at the lower end of the distribution – know and can do as readers. This is because there are few existing PISA tasks at the very easy end and the difficult end, where the proficiency level of significant numbers of students in all participating countries is located. In developing tasks for PISA 2009, therefore, there was an emphasis on including some very easy and some very difficult items. In addition to enhancing the descriptive power of the scale, better matching of the item difficulties to the student achievement distributions in each country may improve the reliability of the population parameter estimates. Moreover, the test experience for individual students, particularly those performing at very low levels, will become more satisfying.

Developing items for the lower levels of proficiency was achieved by manipulating elements from PISA’s descriptive framework as follows:

- using shorter and simpler texts
- ensuring closer literal match of terms between the item and the text
- providing more direction about the location in the text of the information relevant for solving the item
- addressing personal and familiar experiences in reflecting on and evaluating content items, rather than remote, abstract issues
- addressing concrete features in reflecting on and evaluating form items

The following two examples illustrate tasks designed explicitly to address the extremes of the difficulty continuum in PISA reading. The first is a very easy item, the second a very difficult one. These two items were administered in the PISA 2009 field trial.



PRINT READING UNIT 4

SUPERMARKET NOTICE

Peanut Allergy Alert Lemon Cream Biscuits

Date of alert: 04 February

Manufacturer's Name: Fine Foods Ltd

Product Information: 125g Lemon Cream Biscuits (Best before 18 June and Best before 01 July)

Details: Some biscuits in these batches may contain pieces of peanut, which are not included in the ingredient list. People with an allergy to peanuts should not eat these biscuits.

Consumer action: If you have bought these biscuits you may return the product to the place of purchase for a full refund.

Or call 1800 034 241 for further information.

This public notice consists of a very short text that has an everyday function: to warn about the possible danger of a product to consumers and to give advice to return the product for a refund. While the formatting of the stimulus reflects the international standard for product recall notices, many students may not have seen this kind of notice. Nevertheless, the content of the warning is clearly set out and a minimum number of words is used. Lemon biscuits were chosen as the product because of their familiarity and likely appeal. As mentioned above, in developing very easy items, short simple pieces of stimulus with familiar content were sought. This was not only to make the cognitive load of the items lighter, but also to present texts that were unlikely to intimidate students with low reading proficiency, since such readers can easily be discouraged from even attempting to read something that they believe looks too hard or too long. The text format classification of the supermarket notice is non-continuous, as it consists of a list of described features. In terms of text type, the notice is instructional: it provides directions on what to do if you have bought the product.



Of the five questions addressing this stimulus that were administered in the field trial, four were successfully completed by more than 80% of students. The one reproduced below was the easiest of all, with well over 90% of students gaining full credit. Further questions can be found in Annex A1. The numbering of the questions is identical to the numbering used in the test booklets given to students.

Question 3: SUPERMARKET NOTICE

What is the name of the company that made the biscuits?

To answer this question successfully the student needs to locate a single explicitly stated piece of information in the text, using a synonymous match between the task direction and the text (company/manufacturer). The fact that the whole text is very short, and that the needed information is near the beginning of the text, adds to the easiness of the task. The response format for the task is described as a closed constructed response, since only one answer (with a small range of variants: Fine Foods or Fine Foods Ltd.) is given full credit.

Table 1.11 summarises the framework characteristics of the *Supermarket Notice* question.

Table 1.11 Framework characteristics of sample task: Supermarket Notice

Situation	Public
Text format	Non-continuous
Text type	Instruction
Aspect	Access and retrieve: Retrieve information
Item format	Closed constructed response

Example 5, the last of the examples of reading items included in this section, was designed to help elaborate the description of student proficiency at the top end of the scale.



PRINT READING UNIT 5

DEMOCRACY IN ATHENS

Part A

Thucydides was a historian and military man who lived in the fifth century BC, during the Classical Greek period. He was born in Athens. During the Peloponnesian War (431 BC to 404 BC) between Athens and Sparta he was in command of a fleet whose mission was to protect the city of Amphipolis in Thrace. He failed to reach the city in time. It fell into the hands of Brasidas, the Spartan general, which forced Thucydides into a twenty-year exile. This granted him the opportunity of collecting detailed information from the two warring factions and the possibility of doing research for his work *History of the Peloponnesian War*.

Thucydides is regarded as one of the great historians of Ancient times. He focuses on natural causes and the behaviour of each individual rather than on fate or the intervention of divinities to explain the evolution of History. In his work, facts are not presented as mere anecdotes; rather, they are explained in an attempt to find out the reasons that led the main characters to act as they did. Thucydides' emphasis on the behaviour of individuals is why he sometimes introduces fictitious speeches: these help him explain the motivations of the historical characters.

Part B

Thucydides attributes to Pericles (fifth century BC), the Athenian ruler, the following speech in honour of the soldiers who fell in the first year of the Peloponnesian War.

Our system of government does not copy the laws of neighbouring states; we are rather a pattern to others than imitators ourselves. Our system is called democracy, since its administration depends on the many instead of the few. Our laws afford equal rights to all in their private affairs, whereas the prestige in public life depends on merit rather than on social class.

Social class does not prevent a person from holding any public position either (). And, at the same time that we do not interfere in private affairs, we do not break the law as regards public matters. We give our obedience to those whom we put in positions of authority, and we obey the laws themselves, especially those which are for the protection of the oppressed, and those unwritten laws which it is an acknowledged shame to break.

Furthermore, we provide plenty of means for the pleasure of the mind. The games and sacrifices we celebrate all the year round, and the elegance of our private places of residence, form a daily source of pleasure that helps to banish any worry; while the many inhabitants of the city draw the produce of the world into Athens, so that to the Athenian the fruits of other countries are as familiar as those of his own.

Democracy in Athens consists of two fairly short but dense texts. The first is classified as expository, although the first paragraph if considered alone could better be described as narration, since it gives an account of when something happened, referring to a sequence of events in a person's life. However, in the context of the whole of Part A, the biographical paragraph serves as an introduction to the more substantial second paragraph, which places Thucydides in the context of ideas, describing his originality as an historian. Part A as a whole, then, provides an explanation of concepts or mental constructs, which is a marker of expository texts.

Part B presents a sample of one of the "fictitious speeches" written by Thucydides that are referred to in Part A. Part B is an argumentative text, words imagined as having been spoken by Pericles in a speech of political persuasion. Part of the challenge of reading the stimulus as a whole is understanding the relationship between the two texts: it is not stated explicitly but can be inferred from the last sentence of Part A and the introduction to Part B. Other features that make this stimulus likely to be relatively difficult for 15-year-olds are its remoteness from their everyday experience, the abstractness of the language and the formal register, particularly of the rendition of Thucydides' writing. On the other hand it is reasonable to suppose that most students at the end of their compulsory schooling are fairly familiar with history as a concept, and have some notion – even if not necessarily articulated – of what democracy might be. This assumed background was judged to provide sufficient context for students to approach the *Democracy in Athens* material.



The questions related to this stimulus that were administered in the PISA 2009 field trial reflect two of the aspects: *access and retrieve* and *integrate and interpret*. Some of the questions focus on one or other of the two Parts, and some are designed to draw on an integrated understanding of the two. The one shown here draws mostly on Part B. Further questions can be found in Annex A1. The numbering of the questions is identical to the numbering used in the test booklets given to students.

Question 3: DEMOCRACY IN ATHENS

One purpose of the speech in Part B was to honour soldiers who fell in the first year of the Peloponnesian War.

What was ANOTHER purpose of this speech?

.....

.....

This is one of the most difficult items administered in the PISA 2009 field trial. It is coded as a partial credit item, with full credit typically gained only by the most proficient readers in the field trial sample. To gain full credit, the response needs to identify the purpose of Pericles' speech by linking it to its context, which is partly provided in the expository text as well as more directly by the speech itself and by its introduction. The full credit response therefore needs to be underpinned by a full and detailed understanding of both texts, and to use a high level of inference in an unfamiliar context, dealing with some ambiguity (about the authorship of the speech). Responses in this category refer to Pericles' political motivation, possibly by mentioning such purposes as persuading soldiers to continue the struggle; consoling the families of the dead; fostering pride in the citizens of Athens; or stressing the virtues of Athens compared to Sparta or other cities. The following are examples of full credit responses:

- ◇ *to make people proud of Athens*
- ◇ *to promote the benefits of the Athenian democracy*
- ◇ *making people think Athens is still ok, despite the fact that they are in trouble right now*
- ◇ *to reinforce positive thinking and positive attitudes*
- ◇ *to make people aggressive against Spartans*

Alternatively full credit answers could refer to the more abstract level of meaning implied in Part A: Thucydides' purpose of understanding Pericles' psychology or way of thinking for example;

- ◇ *to explain the motivation of Pericles as an historical character.*

Full-credit answers do not need to be long or elaborate; yet just over a quarter of responses in the field trial were in this category. About one-fifth of participants in the field trial were able to demonstrate a partial understanding of the text, indicating that its substantial content was about democracy but without registering the persuasive intent. Responses such as the following were assigned a partial credit:

- ◇ *to introduce democracy*
- ◇ *to explain democracy to the people*



Building tasks in the electronic medium

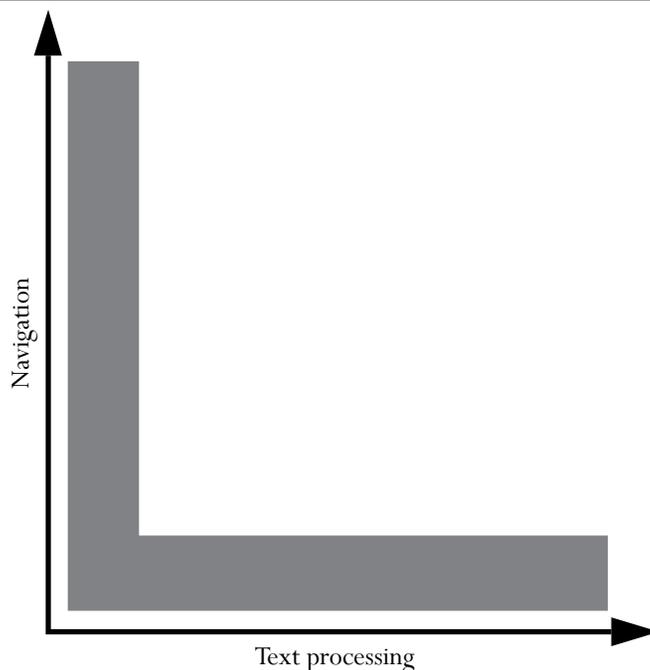
In this section some of the major issues in constructing and operationalising the electronic reading literacy assessment are considered: the relationship between navigation and text processing; analysis of tasks with a view to controlling for item difficulty; response formats; and some issues around coding and scoring. The section ends with a note on the way the students' progress through the electronic reading assessment is controlled.

Relationship between navigation and text processing in the electronic reading assessment

Reading electronic texts requires many of the same skills and understanding as reading in the print medium, but reading in each medium also requires unique skills and knowledge, particularly about the conventions that are part of the reading context. Just as knowing how to turn a page and which way up to hold a book are essential pieces of knowledge for print readers, knowledge of some techniques of navigation and some navigation features are part of being literate in the electronic medium. Such skills and knowledge should be regarded as "ICT skills" that are in conjunction with reading literacy. Both reading of text, as it is conventionally understood, and the ability to navigate within the electronic medium are conceived of as integral to proficiency in electronic reading.

All tasks in the electronic reading assessment require students to read, but individual tasks require varying proportions of text processing (for example, interpreting a paragraph of prose) and navigation. The relationship within electronic reading tasks between the mental processing devoted to navigation decisions, and that devoted to textual processing, is represented in Figure 1.7 below.

Figure 1.7 ■ Relationship between navigation and text processing in electronic reading tasks



Any individual task should be imagined as occupying a space somewhere within the field of the graph. The horizontal axis represents the cognitive load that is imposed by *processing the text* and the vertical axis represents the cognitive load imposed by the *navigation*. In any given reading task in the electronic medium, there will be more or less loading on the navigation and on the text processing elements. Some tasks will be very straightforward and require little of either. This kind of task would appear at the bottom left of the graph, near the origin. A second kind of task will require the reader to deal with a text that is immediately fully visible to the reader on the screen; therefore little or no navigation is required. This kind of task, with a heavy loading on text processing and light loading on navigation, would appear along the lower shaded area of the graph. A third type of task might demand one or more steps in navigation across a number of sites, with just a few



words on each page. This kind of task, requiring mainly navigation and minimal negotiation of text, would be located somewhere on the shaded area of the graph along the vertical axis. Finally, a fourth type of task, involving substantial navigation and the necessity to process a substantial piece of text (in terms of quantity and/or complexity) would be mapped in the unshaded area of the graph, indicating significant loading in terms of both navigation and text processing. The further from the origin of the graph, the more difficult the task.

As the unshaded area of Figure 1.7 indicates, most electronic reading tasks load significantly on both navigation and text processing proficiency. A relatively small number of tasks do not depend much, if at all, on navigation, but focus on straight text processing. It is considered necessary to include some tasks reflecting this type of reading in the electronic reading assessment since they represent one kind of real-life reading demand in the electronic environment. Failure to include this kind of task would artificially distance what is involved in electronic reading from print reading. Conversely, a small percentage of tasks depend mainly on navigation processing and require little, if any, text processing. Inclusion of a few such tasks, in which the reader needs to move around the electronic environment using a repertoire of knowledge and skills about the conventions of the medium and thinking about the relationships between the text objects and the navigation tools, is also seen as a valid contribution to a measure of electronic reading.

Analysis of electronic reading tasks

In order to capture the complexity of the steps that the reader needs to perform in the process of arriving at an explicitly called-for response, a system of analysis was used by the test developers to describe the text processing and navigation components of each task.

For any task with a moderate degree of complexity in the electronic medium, the reader is likely to have several possible ways of proceeding. For the purposes of describing and analysing subtasks, the test developers imagined an optimally efficient, but comprehensive, sequence of steps, where each step was marked by an *action*. The action could be a click on a specified link or function button; a text response in the browser area or the task area; selection from a set of alternatives in a multiple-choice format; or simply scrolling.

In the analysis, for each subtask completed with an action, the following variables were tabulated: text complexity; navigation tool/text used; aspect and description; and action. Each part of the task could therefore be described and, potentially, the difficulty of the whole task predicted. An example of an electronic reading task from the field trial showing this kind of analysis is provided below.



ELECTRONIC READING UNIT: LET'S SPEAK

SCREEN 1A

Let's Speak - Education Network Forums - E022P01 - Internet Browser

Address <http://www.educationnetworkforums.org>

Education Network Forums

Education Network Forums

Education Network > Study > Tips

Public speaking

Welcome, student.
You last visited: Today.
Private Messages: Unread 0, Total 0.

[Write a Reply](#)

Mischa **March 10 15:32**

Thanks to everyone who contributed, and for Mark's link to Dr. N. The only thing is, now I'm confused about what to believe. Julie, Tobias, Psych OL and Dr. Nauckunaite all said different things. Which one of these four people really knows the most about this issue?

Posts: 83

Julie **March 7 10:14**

I think that the ability to speak in public depends on each person's personality. Some

This unit was based on an online discussion forum on the subject of the challenges of speaking in public. The discussion is initiated by Mischa, whose blog entry at the bottom of the discussion forum screen (shown below in screen 1e) refers to her terror of speaking in public, to a classroom audience, and asks for help and advice. The theme of the discussion, set in an educational situation, is an example of a context that would be familiar to most of the PISA students. In terms of text format and text type, it bears some similarity to the *Student Opinions* text illustrated earlier, in that it is categorised as a multiple text, from a number of authors, and argumentative in rhetorical structure. However, unlike *Student Opinions*, *Let's Speak* presents an interactive situation in which the contributors are responding directly to each other. This is a new, or at least much accelerated kind of exchange that is an increasingly prevalent form of communication. In this kind of multiple text, understanding of each text is partly dependent on following the chain of contributions.

The discussion forum page is quite long, comprised of eight entries. In order to read the initiating entry, it is necessary to scroll down. Screens 1b to 1e show what the reader sees when scrolling down.



SCREEN 1B

Let's Speak - Education Network Forums - E022P01 - Internet Browser

Address <http://www.educationnetworkforums.org>

Education Network Forums

<p>Julie</p>  <p>Posts: 22</p>	<p>March 7 10:14</p> <p>I think that the ability to speak in public depends on each person's personality. Some people seem completely incapable of public speaking. When they have to do it, their hands shake and their voice trembles. Others, on the other hand, can discuss a subject fluently, in a way that makes the topic interesting for the audience. These people seem to be able to perform brilliantly, even if they have not had time to prepare! I'd say, there's no point in trying to change what you are.</p>
<p>Psychologist O.L.</p>  <p>Posts: 41</p>	<p>February 28 22:51</p> <p>Our attitude to speaking in public depends a lot on our age. The easiest age at which to speak in public is when we are three years old. At this time we naturally talk incessantly, using various newly coined words of our own. We create and experiment with language, not caring about vocabulary. The emotional part of speech is also very fluent – no-one laughs, cries or shows despair as expressively as a kindergartener. Why are we so bold at that age? It is because we do not judge ourselves, we do not reflect upon ourselves and we do not have the baggage of painful experience. It is when we go to high school that we suddenly find that we are incapable of speaking, when called up to speak in front of the whole class.</p>

SCREEN 1C

Let's Speak - Education Network Forums - E022P01 - Internet Browser

Address <http://www.educationnetworkforums.org>

Education Network Forums

	<p>not have the baggage of painful experience. It is when we go to high school that we suddenly find that we are incapable of speaking, when called up to speak in front of the whole class.</p>
<p>Andrew</p>  <p>Posts: 82</p>	<p>February 3 21:07</p> <p>I am a normal person. I do not suffer from any physiological or psychological problems. So why is it that the second I have to speak in public, my heart starts fluttering and sinks into my boots? Of course I try to pull myself together, but it does not work very well. I am afraid that if I do not face and conquer this problem it will stay with me for the rest of my life.</p>
<p>Mark</p>  <p>Posts: 24</p>	<p>January 28 13:28</p> <p>Yes I agree with everything you say. You can't avoid it. I found a helpful online article by a Doctor Nauckunaite. Take a look.</p>



SCREEN 1 D

Let's Speak - Education Network Forums - E022P01 - Internet Browser

Address <http://www.educationnetworkforums.org>

Education Network Forums

<p>Mark</p>  <p>Posts: 24</p>	<p>January 28 13:28</p> <p>Yes I agree with everything you say. You can't avoid it. I found a helpful online article by a Doctor Nauckunaite. Take a look.</p>
<p>Lauren</p>  <p>Posts: 3</p>	<p>January 27 13:12</p> <p>I don't think avoiding public speaking is a good idea – it is better to try it, and conquer your fear in the process. You can't run away from speaking in public all your life. Even if you are very scared of speaking in public, there are things you can do to overcome your fear.</p>
<p>Tobias</p> 	<p>January 15 16:40</p> <p>I rehearse important speeches at home. I read them out loud using the visual aids I will use when I make the speech in public. That way, not only is my mind less likely to go blank when I'm talking, but my speech will also be supported by the visuals. It is important that you do not just read your speech straight from your notes. You need to be able to speak</p>

SCREEN 1 E

Let's Speak - Education Network Forums - E022P01 - Internet Browser

Address <http://www.educationnetworkforums.org>

Education Network Forums

<p>Tobias</p>  <p>Posts: 82</p>	<p>January 15 16:40</p> <p>I rehearse important speeches at home. I read them out loud using the visual aids I will use when I make the speech in public. That way, not only is my mind less likely to go blank when I'm talking, but my speech will also be supported by the visuals. It is important that you do not just read your speech straight from your notes. You need to be able to speak fluently, just glancing at your notes every once in a while. Practice will help you conquer your fear. So will the knowledge that you know your subject very well.</p>
<p>Mischa</p>  <p>Posts: 18</p>	<p>January 15 15:32</p> <p>I have spoken in front of my whole class a few times. Last time was awful. I forgot everything and mumbled the whole speech off as fast as I could. Next week I have to do another speech in front of my whole class. I cannot stand the idea of all those people focusing their attention solely on me. How can I avoid public speaking?</p>

[Write a Reply](#)



In addition to the starting page, the unit includes only one other piece of stimulus, which is accessed by clicking on an embedded link in one of the blogs that recommends it as “expert advice”. The second screen, advice from Doctor Nauckunaite, also requires some scrolling.

SCREEN 2A

Let's Speak - Tips on Public Speaking - E022P04 - Internet Browser

Address <http://www.unikl.lit/philology/nauckunaite/public-speaking.html>

Education Network Forums Tips on Public Speaking

Dr. Zita Nauckunaite
Tips on Public Speaking

It is natural to be nervous when you have to give a speech. Concentrate. Try not to think about how you appear to others or how nervous you are, but only about the subject of your speech.

People become most nervous when they feel that others can see their lack of confidence. Knowing how to conceal your sense of fear diminishes the fear itself.

Since people are most nervous at the beginning of the speech, one practical way to overcome fear is to learn the beginning of your speech by heart. Before commencing the speech, look around at your audience. If you know exactly who it is you are speaking to, you will feel more at ease.

If you are feeling overcome by fear during your speech, try not to look

SCREEN 2B

nervous you are, but only about the subject of your speech.

People become most nervous when they feel that others can see their lack of confidence. Knowing how to conceal your sense of fear diminishes the fear itself.

Since people are most nervous at the beginning of the speech, one practical way to overcome fear is to learn the beginning of your speech by heart. Before commencing the speech, look around at your audience. If you know exactly who it is you are speaking to, you will feel more at ease.

If you are feeling overcome by fear during your speech, try not to look at a particular audience member. Instead, direct your gaze toward the middle of the audience as a whole. When you use that technique, both those sitting in front and those towards the back of the audience will feel that you are, in fact, looking at them. Enunciate each word clearly. Nothing will soothe you more than your own voice sounding clear, and in control.

Extract from
Teaching of Oratory, by Dr. Z. Nauckunaite, Faculty of Philology,
 Vilnius Pedagogical University, Lithuania.



This electronic reading unit, which was administered in the field trial for PISA 2009, included several tasks that required students to understand the organisation of the website, to identify main ideas both across the blog entries and within an individual entry, and to recognise the existence of conflicting opinions. The final task directed students to read the last entry (at the top of the discussion forum page) in which Mischa has, in an imagined scenario, read all the information provided and is now requesting some final summary advice. This task is reproduced below.

Task: LETS SPEAK

Look at Mischa's post for March 10. Click on "Write a Reply" and write a reply to Mischa. In your reply, answer her question about which writer, in your opinion, knows the most about this issue. Give a reason for your answer.

Click "Post Reply" to add your reply to the forum

This is a task that requires access and integration of several pieces of information. Mischa's second blog entry asks the reader to consider and compare four short texts (those of Julie, Tobias, Psych OL and Dr. Nauckunaite). It also requires an evaluation of the contributions, in terms of either their professional credentials, or in terms of the intrinsic quality and persuasiveness of the arguments. It is classified as a *complex* item because it draws significantly on all three aspects: *access and retrieve*, *integrate and interpret* and *reflect and evaluate*.

An added dimension of the demand of the task is that the student needs to demonstrate some proficiency in handling the formal structure and navigational conventions of the message-based environment by scrolling, clicking on a link that is embedded in the text, and finally clicking on another link (a button) to write a reply. Once the student has clicked on *Write a reply*, the screen below appears, with an area in which the response can be entered.

SCREEN 3

The coding of this item for the PISA 2009 field trial was based on the text response that the student enters in the Write a Reply area. (Note that full credit could be obtained for the response without clicking on Post Reply – that detail was added in the interest of authenticity.) However, in developing the item, both the text processing requirements and the navigational requirements were deliberately manipulated to shape the task for maximum contribution in populating the information space of the assessment. Table 1.12 shows a simplified version of how this *Let's Speak* task can be analysed in terms of its text processing and navigation components.



Table 1.12 Analysis of a task from electronic reading assessment, Let's Speak

Step	Start page / Required text processing / Text complexity rating	Required navigation tools / features	Aspect / text processing description	Action
1	Screen 1a One short argumentative text Rating: medium	Scrollbar	Interpret: form an understanding of the question posed in Misha's message of March 10. Access: infer that the messages of the four entries referred to in Misha's message can be accessed by scrolling, with the first blogger's name ("Julie") already visible.	Scroll down
2	Screen 1b Two short argumentative texts Rating: medium	Scrollbar	Retrieve: match on two names in Mischa's message ("Julie" and "Psychologist OL"). Interpret: form a broad understanding of the main ideas expressed in Julie's and in Psychologist OL's entries. Access: infer that entries of other required bloggers are accessible by scrolling	Scroll down
3	Screen 1c Two words highlighted in a short argumentative text Rating: low	Embedded link	Access and retrieve: locate Dr Nauckunaite's link embedded in Mark's blog.	Click on embedded link in Mark's blog
4	Screen 2a Formal text comprising expository and instructional elements Rating: medium to high	Scrollbar	Interpret: form a broad understanding of the main ideas expressed in first part of Dr Nauckunaite's page. Access: infer that article continues below bottom of screen	Scroll down
5	Screen 2b Formal text comprising expository and instructional elements Rating: medium to high	Back button	Interpret: form a broad understanding of the main ideas expressed in second part of Dr Nauckunaite's page. Access: return to discussion forum page using back button (navigation direction provided explicitly in task)	Click on Back button
6	Screens 1a to 1e Eight short argumentative texts (skim) Screen 1e One of two short argumentative texts Rating: medium	Scrollbar	Access: infer that further scrolling is required to locate the last entry named in Mischa's post. Retrieve: match on name in Mischa's message (Tobias). Interpret: form a broad understanding of the main idea expressed in Tobias's entry.	Scroll down
7	Screen 1e Write a Reply button Rating: very low	Write a Reply button	Access: access page to write a reply to Mischa	Click on Write a Reply
8	Screen 3 Text box with Write a Reply button [recall of 3 short argumentative texts from Screens 1a, 1b and 1c and formal text comprising expository and instructional elements from Screens 2a and 2b] Rating: very high	None	Reflect and evaluate: generate an evaluation of the most authoritative text, combining prior knowledge with information from three short argumentative texts and one longer expository/instructional text	Text entry response
9 (Optional)	Screen 3 Post Reply button	Post Reply button	Not applicable	Click on Post Reply



For this task, nine distinct steps are described (the last one optional). However, except for step 8, the order of the steps could be changed to achieve exactly the same result. For example, step 1 could be followed by step 3; or the sequence could begin with step 7 (but using the “Write a Reply” button shown in screen 1a, and then the “Back” button to return to the main page of the forum). There are many other possible variations in the sequence. As this task illustrates, even with this relatively restricted set of linked pages, readers in the electronic medium, to a degree, construct their own text in terms of the order in which they access and process information. The completion of step 8, for full credit, implies good navigation skills in reading electronic text (steps 1 to 7), and also strong text processing skills, since the response requires processing, integration and evaluation of multiple texts, at least one of which is quite demanding (see steps 4 and 5).

An analysis of tasks at this level of detail serves at least four functions. First, the analysis assists test developers in ensuring that the elements of the framework are reflected in the tasks and reflected in the appropriate proportions. Second, it helps in predicting the difficulty of tasks in a systematic fashion so that an appropriate range of item difficulties across the instrument is achieved. Third, the analysis is used to underpin the construction of a described proficiency scale (or scales) for reporting the results of the electronic reading assessment for PISA 2009. Fourth, the analysis will potentially contribute to research in the field by articulating what proficiency in electronic reading means, based on empirical evidence.

A fifth function, analytical scoring of text processing and navigational components, remains a potential for computer-based assessment that will not be operationalised in the main PISA 2009 analysis. The combination of data from the eight steps described in Table 1.12 could be used to determine a partial credit coding scheme for the task, where subscores could be given simply for accessing (for example) the Doctor Nauckunaite page, even if the student gained no credit for the final text-entry response. Conversely, one might consider giving full credit only to those responses with all eight steps completed (in whatever sequence).

In its present form and coding, this task could arguably be completed with minimal effort of both text processing and navigation (say, by completing only steps 1, 7 and 8). However, by the same logic, the *Student Opinions* task could be completed by reading only the last sentences of Ana’s piece. We are often in the position of speculating about how test-takers actually deal with tasks cognitively. Computer-based testing offers the potential to understand much more precisely the cognitive processes – indicated by the pathways taken in navigating across the texts – that readers engage in. The technology used for the electronic reading assessment in PISA 2009 has the potential to provide information about which pages are visited and which navigation tools are used, the sequence of actions and the time spent on each item. The data collected from the electronic reading assessment will no doubt provide a rich base for research. However, given that computer-based assessment on a large-scale is at an early stage of development, scoring for this cycle will be confined to established methods.

In the electronic reading assessment, items may be coded automatically, or by experts. Considering practicality, reliability and (above all) cost, it is preferable to maximise the proportion of items that can be automatically coded, and to minimise those that require expert coding. On the other hand, since electronic reading is being conceptualised as part of the general reading framework, it is important to maintain some parallels in item format between the electronic and print instruments. Accordingly, about 30% of the electronic reading items require expert coding. See Table 1.7 for the distribution of electronic reading tasks by coding requirement and aspect.

Automatically coded items include multiple-choice items, selection of links from drop down menus, and clicks on radio buttons in the browser area.

Expert-coded items include any item involving a generated response where a degree of judgement is needed for coding. The item format for this kind of response in PISA 2009 is a text response, either within a simulated environment such as an e-mail message or blog (as in the example from *Let’s Speak* shown above), or in the more transparently test-based task response area. Responses that require coding by expert coders include those for which students are asked to compare and contrast information across texts, to justify a choice by demonstrating that it satisfies prescribed conditions, or to evaluate the credibility of a source. Such items are generally used only when there is no satisfactory alternative (that is, no appropriate machine-scored alternative).

Control of the delivery of tasks in the electronic reading assessment

As the screen shots for the task from *Let’s Speak* show, the interface for an electronic reading unit (a set of items related to common stimulus) has two distinct areas: a task area in the lower part of the screen, where



the question or instruction is located, and a browser area in the upper part of the screen, where the stimulus is located. The task in the task area remains fixed for the duration of an item while the student can navigate around the browser area to access different simulated web pages or applications in the course of completing a task.

In the electronic reading assessment, both units and items within units are delivered in a fixed order, or lockstep fashion. The lockstep procedure means that the students are not able to return to an item or unit once they have moved to the next item/unit. Each time students click the Next button on the test, a dialog box displays a warning that they are about to move to the next item and will be unable to return to the previous item. At this point students can either confirm they want to move on, or cancel the action and return to the item they had been viewing.

An advantage of this approach is that it maximises the independence of items within and across units, since students cannot find clues in later tasks that might help them answer earlier ones. Put more positively, later items can reveal the answers to earlier items without enabling previous answers to be changed. This feature therefore allows optimum use of a stimulus that is expensive to produce.

A further feature of the task delivery design is that the page that is visible in the browser area at the beginning of each item is fixed: that is, every student sees the same page at the beginning of a given item, regardless of where they finished the previous item. This feature contributes to item independence by ensuring that students are not given any advantage or disadvantage in relation to a new item because of where they happened to be at the end of the previous item. This design feature has also been implemented to reduce frustration, both for those students who might be lost in a simulated web environment, and for those who would otherwise have needed to retrace their steps.

Although only 19 of the PISA participating countries and economies have administered the 2009 international option of reading of electronic texts, what we have learnt about the nature of the domain and about the operational challenges and opportunities encountered in implementing a large-scale computer-delivered assessment will be shared by all OECD countries and partner economies, and will contribute to building more refined understandings that can be applied to future PISA assessments.

MOTIVATIONAL AND BEHAVIOURAL CONSTITUENTS OF READING LITERACY

Reading engagement and metacognition, which were discussed very briefly in earlier versions of the framework, are now, in the PISA 2009 cycle, given a more prominent position and more elaborated discussion, in recognition of their importance in relation to reading proficiency.

Reading engagement

Why reading engagement matters

The development of reading literacy is not confined to the development of skills and knowledge. It also involves motivation, attitude, and behaviour. Current research recognises these elements as key factors relating to reading achievement (see Guthrie & Wigfield, 2000; McKenna, Kear, & Ellsworth, 1995). Empirical studies have documented the link between reading practices and reading achievement in both adult and student populations (Campbell, Voelkl, & Donahue, 1997; Guthrie & Wigfield, 2000; OECD and STATCAN, 2000). Results from PISA 2000 show that, in every participating country, students' levels of reading engagement were positively and significantly correlated with their reading proficiencies. In fact, engagement in reading had the largest median correlation with achievement, exceeding even the median correlation between reading literacy and socio-economic status (OECD, 2002). Collectively, these and other findings point to the important role that engagement in reading can play in reducing some of the gaps seen in performance between the various subgroups in each participating country. They argue for the inclusion and even expansion of such a measure in PISA 2009.

The PISA 2009 framework for reading literacy includes the reading of electronic texts as an important part of the construct. To address the goal of measuring engagement in both paper and electronic reading, a unified framework is proposed. This framework includes two constructs: individual engagement and educational context.



The foundations of the concept of engagement lie in the self-determination theory (Ryan & Deci, 2000). This theory proposes that individuals are most well developed when they are self-determining. In this state they possess values and goals that are in tune with their culture while still being competent and confident in directing their own actions. A self-determining reader is intrinsically motivated, which refers to reading for its own sake and value. He or she reads widely for a variety of interests and purposes, and takes ownership of favourite topics or authors. A self-determining reader holds values, beliefs and goals for reading that enable him or her to pursue educational, occupational, personal and societal aims and activities.

Defining and measuring individual reading engagement in PISA

The PISA 2009 definition of individual reading engagement is as follows:

Individual Reading Engagement refers to the motivational attributes and behavioural characteristics of students' reading.

Prominent constructs in the empirical literature on individual reading engagement include interest, perceived autonomy and social interaction. The behavioural characteristics include the amount and breadth of reading activities.

Current research suggests that engaged readers possess well-formed interests and favourite topics or types of reading material (interest); they value being in control of their reading, and self-initiate reading activities (autonomy); they rely on a social network to extend their competencies and share their knowledge and experience (social disposition); and they read frequently and widely (behaviour).

In PISA 2009, these four characteristics (each broadly interpreted) are operationalised:

- *interest in reading* – disposition to read literature and information texts for enjoyment and the satisfaction of curiosity
- *perceived autonomy* – perceived control and self-direction of one's reading activities, choices, and behaviours
- *social interaction* – social goals for reading and interactive competence
- *reading practices* – behavioural engagement referring to the amount and types of reading activities

Specifically, reading practices are defined as *the self-reported frequencies of participating in reading activities with diverse content in various media*. Importantly, readers may engage with different types of texts in different ways. They might read to gain knowledge or information; for literary experience; to perform a specific task such as retrieving a piece of information; or for social communication. While these experiences are not necessarily mutually exclusive, they can reflect real differences in how students might interact with a particular text and whether they engage with either print or electronic texts. For example, very few people acknowledge “cuddling up” with a laptop to read fiction – they much prefer to use printed materials for this type of reading. On the other hand, many people report using computer technologies for social purposes. They place a high priority on e-mail, text messaging, chat rooms, correspondence, list servers, blogs and community bulletin boards. Electronic texts seem to be used largely for social purposes.

At the lowest levels of reading engagement, as defined in PISA, students spend little time reading for pleasure or interest, read a narrow range of texts, and have little motivation to read either independently or in a social context.

Highly engaged readers, on the other hand, spend substantial amounts of time reading for enjoyment. They read a wide variety of texts in both print and electronic media, though the particular kinds of texts they read will typically vary according to gender and nationality (OECD, 2002). Such individuals not only consider reading to be valuable and interesting by nature; they also acknowledge the significant role it plays in their social relations.

The importance of educational context for reading engagement

As PISA 2009 is intended to inform educational policy, it is important to include variables that are responsive to policy decisions. One important policy-relevant variable is the classroom and school context for reading engagement.



Development of self-determination in reading evolves when individuals enjoy support for the values and behaviours of reading from significant others: people who are important to them. Initially, the parents convey the value of reading to the developing child. Reading is externally guided. Gradually, individuals internalise the goals and values that have been communicated to them by others and become convinced that reading is valuable. They may identify reading as being beneficial to their schooling and their future participation in society, although reading may not be a favourite pastime. Eventually, reading attains the status of having personal significance and becomes a preferred source of mental stimulation and emotional satisfaction.

The pathway to self-determination in reading for students depends on support from significant others. A favourable context assures competence in reading and expands autonomy in directing one's own reading activities. When the family and school context give the individual a sense of confidence (perceived competence) and autonomy (being in charge of one's self) in reading, the individual grows towards intrinsically motivated and self-determined reading.

The teacher is a "significant other" for reading literacy. A host of studies show that teachers who improve students' sense of ownership and competence enable students to become active readers who are high achievers in reading. By contrast, teachers who neglect these instructional practices undermine students' efforts to become self-directing, resulting in students who are disengaged from reading and fail to progress in reading achievement (Guthrie, 2008).

In summary, the educational context of instructional practices significantly determines students' levels of reading engagement. Given the demonstrated relation between engagement and achievement, the collection of information about classroom support for reading engagement is therefore of significant policy relevance.

Defining and measuring the educational context for reading engagement in PISA

The PISA 2009 definition of classroom support for reading engagement is as follows:

Classroom Reading Engagement refers to the students' perceptions of support from the teacher, classroom and school for the motivational attributes and behavioural characteristics of their reading.

Two characteristics of classroom reading engagement that are operationalised in the PISA 2009 survey are relevance and autonomy support. These characteristics are aligned respectively with the characteristics of interest in reading and autonomy in the construct of individual reading engagement.

Relevance. Interest in reading is facilitated by classroom and school contexts that emphasise the relevance of texts to student background knowledge and experience (Assor, Kaplan, & Roth, 2002). When students read material that is presented as directly related to their personal interests, their comprehension is higher than if their reading is driven by a desire for test scores only (Vansteenkiste, Lens&Deci, 2006). Reading materials that are linked to immediate experience or laboratory activities are understood better than materials that are not as relevant (Guthrie, *et al.*, 2006). Likewise, texts rated as "interesting" are read more thoroughly than other texts (Schiefele, 1999).

Autonomy support. Perceived autonomy, which is the major element of intrinsic motivation, is increased by classroom opportunities for choice and control (Skinner, Furrer, Marchand, & Kindermann, 2008). Teachers have a wide range of possible ways to share control with students (Flowerday & Schraw, 2000). When teachers are trained to share control, such as giving text choice or inviting input into decisions, students' classroom engagement increases (Reeve, 2004).

Collecting information about reading engagement

Items contributing to the measurement of individual reading engagement are distributed amongst questions relating to reading motivation (interest, autonomy, and social interaction) and to reading practices in both print and electronic media. Items contributing to the measurement of the educational context for reading engagement are framed in the context of questions about classroom activities.

Items measuring reading engagement appear in the Student Questionnaire, and the construct is therefore also referred to in the Questionnaire Framework (Chapter 4). The items are listed in Annex B. They are in the form



of general questions in which students report on their behaviour in described contexts. A Likert scale format (Agree/Disagree) or a question about frequency of occurrence (Never/Several times a week) is used to collect student responses.

Metacognition in reading

Why metacognition matters

Like engagement, metacognition has both a significant correlation with reading proficiency and is responsive to teaching and learning. A number of studies have found an association between reading proficiency and metacognition (Artelt, Schiefele, & Schneider, 2001; Brown, Palincsar, & Armbruster, 2004). Explicit or formal instruction of these strategies is believed to lead to an improvement in text understanding and information use. More specifically, it is assumed that the reader becomes independent of the teacher after these text processing strategies have been acquired and are applied without much effort. By using these strategies, the reader can effectively interact with the text by conceiving reading as a problem-solving task that requires the use of strategic thinking, and by thinking strategically about solving reading comprehension problems.

The general finding of the report of the U.S. National Reading Panel (2000) was that remediating poor reading literacy is possible through explicit teaching of metacognitive skills. That is, when readers are given cognitive and metacognitive strategy instruction, they make more significant gains on measures of reading comprehension than students only trained with conventional instruction procedures (Pressley, Graham, & Harris, 2006; Pressley, *et al.*, 1989; Rosenshine & Meister, 1994; Rosenshine, Meister, & Chapman, 1996).

Gathering information in PISA 2009 on those aspects of metacognition that have a demonstrated association with reading proficiency can provide the kind of information used for improving reading literacy and therefore meet one of PISA's aims: to provide policy makers with strategies for improving the educational outcomes of their students.

Defining metacognition in reading

Metacognition in reading refers to the awareness of and ability to use a variety of appropriate strategies when processing texts in a goal oriented manner. Learning from texts requires the reader to take an active role in their reading by making inferences, filling in gaps, and generating macrostructures (conceptualisations of the large-scale structure of a text) and elaborations. Engagement in such strategic activities implies an awareness of text structure and how it facilitates understanding. It is important to use both knowledge about language and texts and topic knowledge in a strategic way in order to: identify relevant information; selectively reinstate previous text information; retrieve or reinstate information from long term memory; or perform all three tasks (Baker & Brown, 1984; Borkowski & Turner, 1990; Körkel & Schneider, 1992). It also involves an understanding of the different processing demands associated with various kinds of tasks, and how to apply this understanding.

Overall, cognitive and metacognitive knowledge concerning the use of cognitive strategies in general and reading strategies in particular can be defined as mental or behavioural activities that help the learner to achieve cognitive purposes. Typically, these strategies are effort-consuming, potentially conscious, and controllable (Flavell, Miller, & Miller, 1993). For example, a reader may be taught to generate questions about a text as it is read. These questions are of the why, what, how, when, or where variety. By generating such questions and trying to answer them, the reader processes the text more actively. Other strategies relevant to different purposes of reading are various forms of highlighting and summing up important text information (identifying main ideas); frequent comprehension monitoring and self-checking; and a repertoire of approaches for dealing with text difficulties (clarifying).

Measuring metacognition in reading in PISA

The concept of reading literacy in PISA encompasses a wide variety of texts, contexts and approaches to reading that aim to give broad coverage to the many ways in which reading is important to individuals and societies in the 21st century. The focus of the metacognition construct and the items proposed for inclusion in PISA 2009 is specifically on reading to learn – that is, on reading in the educational situation (See *educational texts* under *Situation*).



A person who intelligently uses a particular strategy should have some metacognitive knowledge of that strategy, and a person who does not use the strategy is expected to be less knowledgeable. In other words, there is a correlation between appropriate pieces of metacognitive knowledge and the effective use of strategies. Metacognitive knowledge is a prerequisite for reflective and strategic learning. Not surprisingly therefore, consistent and substantial relationships among metacognitive knowledge, strategic behaviour in a text processing task, and text recall have been found (e.g. Baker & Brown, 1984; Borkowski & Turner, 1990; Körkel & Schneider, 1992). Nevertheless, the relationship between metacognitive knowledge and the understanding of text in a given situation is moderated by students' actual motivation to read or to invest effort.

There is empirical evidence to suggest that there is a correlation between appropriate pieces of metacognitive knowledge and the effective use of related strategies on the one hand, and proficiency in reading on the other. An instrument measuring metacognitive knowledge about text comprehension was administered to students who took part in the PISA 2000 assessment in Germany. A correlation of $r = 0.51$ between the combined reading literacy scale and the measure of students' metacognitive knowledge was found (Artelt, Schiefele, & Schneider, 2001). Research based on PISA 2003, where such an approach was also implemented, revealed a similar correlation between metacognitive knowledge and reading literacy (Schlagmüller & Schneider, 2006). A similar measurement instrument is being administered in PISA 2009.

Collecting information about metacognition

In the PISA 2009 assessment, a number of reading scenarios (short vignettes) are presented to students. For each scenario, students are asked to evaluate the quality and usefulness of different reading and text comprehension strategies for reaching the intended goal.

The rank order of strategies for each scenario is compared with an "optimal" rank order developed by experts in the field of text processing (reading researchers, teachers and educational psychologists). The correspondence between the rankings of experts and students is reflected in a metacognition score indicating the degree to which students are aware of the best ways of storing text information and understanding memory and comprehension goals. In order to achieve high scores on the metacognition test, students must activate knowledge about cognitive resources, the nature of the task, and strategies that facilitate understanding, remembering and recalling of information.



An example of a metacognition task that was administered in the field trial for PISA 2009 is provided below.

- Q Reading task: You want to help a 12-year-old student to understand a three-page text about animals and plants of the forest.

How do you rate the usefulness of the following strategies for helping the 12-year old student to understand the three-page text?

Possible strategy	Score					
	Not useful at all				Very useful	
	(1)	(2)	(3)	(4)	(5)	(6)
a) First the 12-year-old student writes a summary of the text. After that we check together whether the summary covers the most important points	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
b) I ask the 12-year-old student to read the text out loud twice, and then to copy it out	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
c) After the 12-year-old student has read the text aloud, we discuss difficult words that he did not understand	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
d) I provide a second text about the same topic which we read together immediately after reading the first one.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
e) I read the text aloud while the 12-year-old student underlines words he doesn't understand. I then try to help him clear up what he doesn't understand. Then he writes a summary.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
f) The 12-year-old student reads the text aloud and I correct him whenever he makes a mistake. Then I explain the meaning of the words that he did not read correctly.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

Expert raters judge strategies a), c) and e) to be more effective than strategies b), d) and f) in helping a younger student to understand information in a text book. Accordingly, the more closely a student approximated the experts' ratings of the strategies in this item – a), c), e) > b), d), f) – the higher the student scored. For example, if a student rated the six strategies respectively as a)6; b)3; c)5; d)3; e)6 and f)1, that student would receive a high score for the item. Conversely a student who, for example, gave the highest rating to strategy f) would receive a low score for this item. In the field trial, performance on this item showed a strong correlation with performance in the cognitive reading assessment. In other words, students who achieved a high score on this metacognition item tended to do well overall on the PISA reading assessment.



REPORTING PROFICIENCY IN READING

PISA reports in terms of proficiency scales which are interpretable in policy terms. In PISA 2000, when reading was the major domain, the results of the reading literacy assessment were first summarised on a single composite reading literacy scale having a mean of 500 and a standard deviation of 100. In addition to the composite scale, student performance was also represented on five subscales: three process (aspect) subscales (retrieving information, interpreting texts and reflection and evaluation) and two text format subscales (continuous and non-continuous) (OECD, 2001, 2002). These five subscales make it possible to compare mean scores and distributions among subgroups and countries by various components of the reading literacy construct. Although there is a high correlation between these subscales, reporting results on each subscale reveals interesting interactions among the participating countries. Where such interactions occur, they can be examined and linked to the curriculum and teaching methodology used. In some countries, the important question may be how to teach the current curriculum better. In others, the question may not only be how to teach but also what to teach.

In both PISA 2003 and 2006, when reading was a minor domain, and fewer reading items were administered to participating students, a single reading literacy trend scale was reported based upon the overall composite scale (OECD, 2004). In PISA 2009, reading is again the major domain, as it was in 2000. A reporting scheme using a number of subscales as well as a composite scale can therefore be anticipated.

Interpreting and using the data

The reading literacy tasks are constructed and administered to nationally representative samples of 15-year-old students in participating countries to ensure that the assessment provides the broadest possible coverage of the domain as defined here. However, no individual student can be expected to respond to the entire set of tasks. Accordingly, the survey is designed to give each student participating in the study a subset of the total pool of tasks, while at the same time ensuring that each of the tasks is administered to nationally representative samples of students.

Reading literacy tasks are arranged along a scale that indicates progressively the level of difficulty for students and the level of skill required to answer each item correctly. The scale summarises both the proficiency of a person in terms of his or her ability and the complexity of an item in terms of its difficulty.

Reading literacy tasks used in PISA vary widely in situation, text format, and task requirements, and they also vary in difficulty. This range is captured through what is known as an item map. The item map provides a visual representation of the reading literacy skills demonstrated by students at different points along the scale. The map contains a brief description of a selected number of released assessment tasks along with their scale values. These descriptions take into consideration the specific skills that the item is designed to assess and, in the case of open-ended tasks, the criteria used for judging the item correct. An examination of the descriptions provides some insight into the range of processes required of students and the proficiencies they need to demonstrate at various points along the reading literacy scale. An item map (or maps) will be built to illustrate what progress means along the scale (or scales) developed for PISA 2009.

Levels of reading literacy proficiency

Just as students within each country are sampled to represent the national population of 15-year-old students, each reading literacy task represents a class of tasks from the reading literacy domain. Tasks at the lower end of the reading scale and subscales differ from those at the higher end. Difficulty is in part determined by the length, structure and complexity of the text itself. However, while the structure of a text contributes to the difficulty of an item, what the reader has to do with that text, as defined by the question or instruction, interacts with the text and affects the overall difficulty. A number of variables that can influence the difficulty of any reading literacy task have been identified, including the complexity and sophistication of the mental processes integral to the aspect of the task (retrieving, interpreting or reflecting), the amount of information to be assimilated by the reader and the familiarity or specificity of the knowledge that the reader must draw on both from within and



from outside the text. In an attempt to capture this progression of complexity and difficulty in PISA 2000, the composite reading literacy scale and each of the subscales were divided into five levels:

Level	Score points on the PISA scale
5	More than 625
4	553 to 625
3	481 to 552
2	408 to 480
1	335 to 407
Below level 1	Less than 335

These levels appear to be a useful way to explore the progression of reading literacy demands within the composite scale and each subscale.

The scale summarises both the proficiency of a person in terms of his or her ability and the complexity of an item in terms of its difficulty. The mapping of students and items on one scale represents the idea that students are more likely to be able to successfully complete tasks mapped at the same level on the scale (or lower), and less likely to be able to successfully complete tasks mapped at a higher level on the scale.

It is expected that these levels as they were defined for PISA 2000 will be kept for the composite scale used to measure trends. For PISA 2009, newly constructed items will help to improve descriptions of the existing levels of performance and, ideally, furnish descriptions of levels of performance above and below those established in PISA 2000.

Given the top of the reading literacy scale currently has no bounds, there is arguably some uncertainty about the upper limits of proficiency of extremely high performing students. However such students are likely to be capable of performing tasks characterised by the highest level of proficiency. For students who are at the bottom end of the reading literacy scale there is a greater issue. Although it is possible to measure the reading proficiency of students performing below Level 1, at this stage their proficiency cannot be described. Level 1 begins at 335, yet a certain and significant percentage of students in each country is estimated to be below this point on the scale. In developing new material for PISA 2009 an effort has been made to design items that measure reading skills and understandings located below the current Level 1. The intention will be to describe what those skills and understandings are, and possibly to define one or more levels below Level 1. (See the first two paragraphs under *Extending the descriptive power of the PISA scales by manipulating item difficulty*).

Reporting PISA 2009 reading literacy

The new framework for reading literacy extends the domain to include both printed and electronic texts. Reporting therefore becomes a little more complicated. It will be important to maintain both the original composite scale and subscales to measure trends based on printed texts. These will be the same scales that were used to report PISA 2000 data and they will be relevant to all participating countries.

Table 1.13 below shows the proposed scales and subscales for print reading that will provide trend data for PISA 2000, 2003, 2006 and 2009. The cells are numbered 1 to 5 to facilitate discussion. Note that each task will be classified both by aspect and by text format.



Table 1.13 Reporting results on print reading instruments

Aspect	Access and retrieve (previously called Retrieving information)	1
	Integrate and interpret (previously called Interpreting texts)	2
	Reflect and evaluate (previously called Reflection and evaluation)	3
Text format	Continuous	4
	Non-continuous	5

The cells numbered 1 to 3 represent groups of tasks categorised by aspect. These three cells together include all the print reading tasks. A composite scale (1+2+3) will be built to describe performance on the full set of print items, and subscales will be extracted based on the tasks for each of the aspects (separate subscales based on 1, 2 and 3 respectively).

The cells numbered 4 and 5 represent tasks classified as continuous and non-continuous respectively. Subscales will be extracted from the composite scale (1+2+3) based on these two text formats. A small number of print reading tasks will be classified as mixed or multiple by text format; however there are too few of these tasks to constitute separate subscales (see Table 1.2). Mixed- and multiple-text tasks will therefore not contribute to the text-format subscales, though they will contribute to the print composite scale and aspect subscales.

The composite scale based on 1+2+3, and the subscales 1, 2, 3, 4 and 5 will be statistically equated with scales and subscales developed for PISA 2000, and will therefore form the basis for reporting trends. Though they will have different names, the aspect subscales will be directly comparable with the aspect subscales reported in PISA 2000.

For those countries that have chosen to implement the assessment of electronic reading an additional scale based only on electronic reading tasks will be created, therefore starting a new trend line. In addition, the possibility of constructing an overall PISA reading literacy scale combining information from the print and electronic reading assessments will be investigated through analysis of the main survey data. Should it be demonstrated that it is valid to combine data from the print and electronic reading assessments, the possibility of constructing aspect subscales across the media will also be considered within countries. It may become apparent, however, that performances on print and ERA tasks are not highly enough correlated to support the construction of an overall scale and subscales. This kind of result will also be of great interest to participating countries, suggesting further investigation of which elements of reading in the two media draw on different understandings and knowledge, and perhaps pointing to differential levels of proficiency among subgroups (for example, males and females).

Table 1.14 represents the components of print and electronic reading assessments that might be combined in different ways to form scales and subscales.

Table 1.14 Reporting results across print and electronic reading instruments

Aspect	Print reading	Electronic reading
Access and retrieve	1	6
Integrate and interpret	2	7
Reflect and evaluate	3	8
Complex		9



The cells numbered 1 to 3 represent the same sets of items as those numbered 1 to 3 in Table 1.13. Cells 6 to 8 represent the set of electronic reading items that can be classified according to a single aspect: access and retrieve, integrate and interpret, or reflect and evaluate. The cell numbered 9 represents complex electronic reading tasks: those that combine all three aspects inextricably.

As well as the composite print scale and the five print subscales described above, for countries participating in the electronic reading international option, a scale based on tasks from cells 6 to 9 will be constructed. In addition, the following will be investigated: a composite reading scale across print and electronic media (1+2+3+6 +7+8+9); a composite access and retrieve subscale (1+6); a composite integrate and interpret scale (2+7) and a composite reflect and evaluate scale (3+8). The construction of the cross-media scale and subscales will depend on empirical support for the theory that there is a high correlation between proficiency in print reading and electronic reading, and within each aspect of reading across the two media.

Separate subscales for electronic reading independent of print reading will not be constructed, as there will be too few items in the electronic reading assessment instrument on which to base meaningful subscale reporting.

CONCLUSION

An essential concern of PISA is to provide information to policy makers about trends over time. In light of that, the analysis of trends must be given priority in any reporting plans, and this will be ensured in PISA 2009 by the construction of a scale and subscales that are based entirely on print reading tasks. A different set of scales will be built to report on the electronic reading assessment and, where possible, to report the combined results of print and electronic reading assessments, therefore providing the basis for establishing new trend lines for future cycles. In anticipating a range of options for reporting, the PISA reading literacy framework and assessment are designed to provide an array of data capable of richly informing the work of policy makers, educators, and researchers.

The construct of reading literacy that has been described in this document preserves many of the principles and operational features of PISA 2000, while also introducing new perspectives on reading literacy. An important addition for PISA 2009 is the inclusion of motivational and behavioural components in the definition and description of reading literacy. The notion of reading literacy in PISA therefore goes beyond the simple measurement of a student's capacity to decode and understand literal information. Reading literacy in PISA also involves understanding, using, reflecting on and engaging with written texts, both to achieve personal goals and to participate actively in society.



Notes

1. The discussion in this section refers to reading in both the print and electronic media, unless otherwise stated.
2. This does not preclude the use of several texts in a single task, but each of the texts should itself be coherent.



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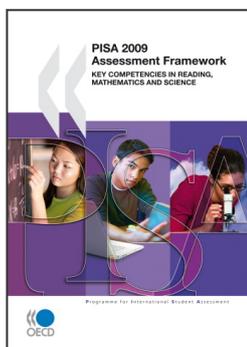
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