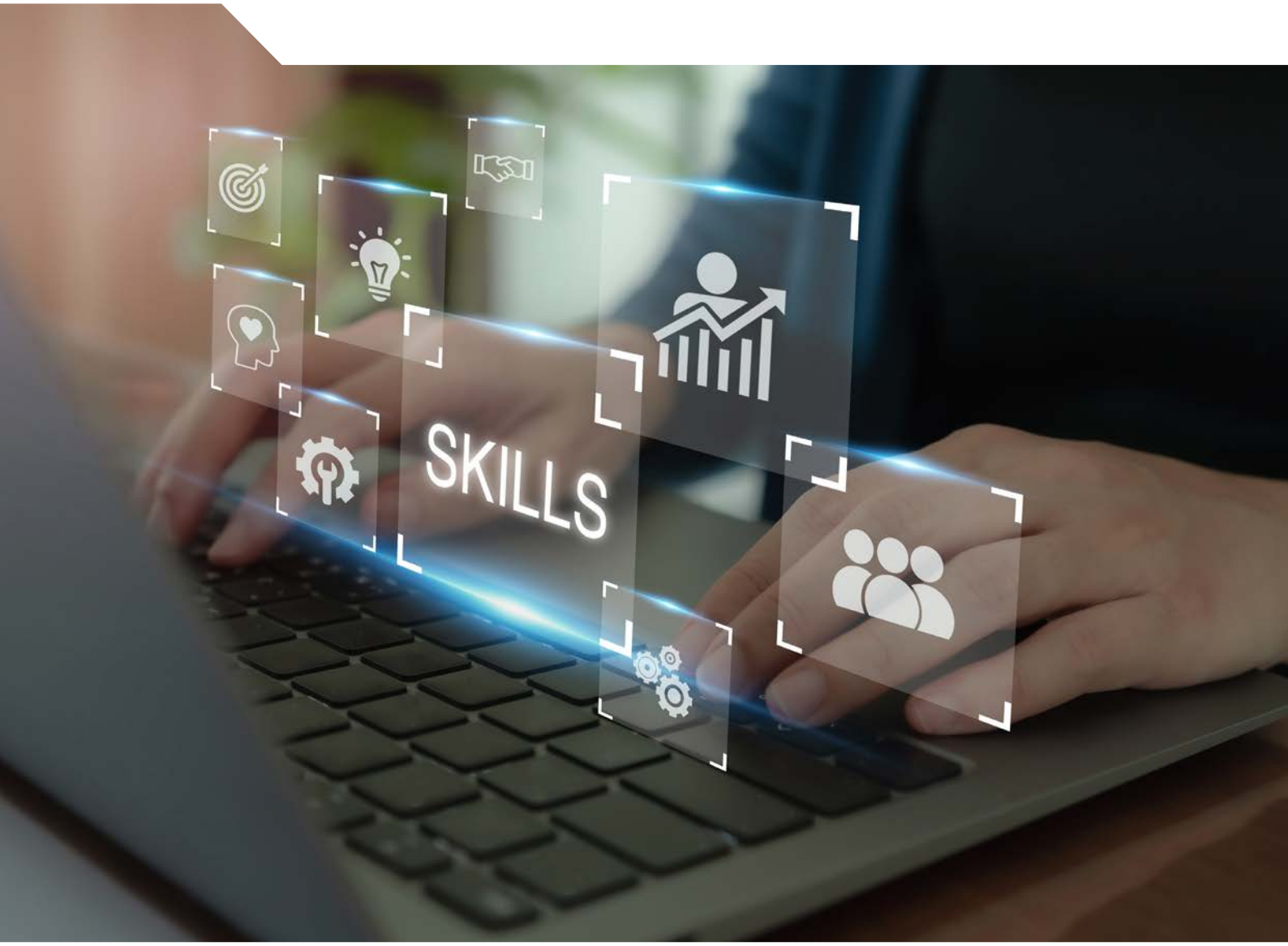
OECD Skills Studies

Survey of Adult Skills Reader's Companion



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BETTER POLICIES FOR BETTER LIVES

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Foreword

This volume is a companion to *Do Adults Have the Skills They Need to Thrive in a Changing World? Survey of Adult Skills 2023*, which presents results from the 2023 Survey of Adult Skills.

This volume offers an overview of the "what" and "how" of the 2023 Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Competencies (PIAAC). Its primary objective is to help readers understand and interpret the results of the survey. To this end, it summarises, in less technical ways, the methodologies underpinning the design of the survey and its operational aspects. A more comprehensive and technically oriented presentation of the methodological aspects of the survey and its implementation can be found in the *Survey of Adult Skills 2023 Technical Report (forthcoming)*.

This Reader's Companion addresses four topics:

- what the 2023 Survey of Adult Skills measures
- how the results from the survey are reported
- how the survey was designed and implemented
- how the 2023 Survey of Adult Skills is related to previous adult skills surveys and to the OECD Programme for International Student Assessment (PISA)

Chapter 1 discusses the concept of human capital and the extent to which the Survey of Adult Skills can be used to improve the measurement of some of its components. Chapter 2 describes the approach adopted in the survey to measure three key information-processing skills: literacy, numeracy and adaptive problem solving. An important goal of the survey is to identify differences in proficiency between different sub-groups of the population, to better understand how skills are developed, maintained and used, and to analyse how skills impact adults' life chances. These insights are possible because the survey includes an extensive background questionnaire, whose content is presented in Chapter 4, together with a discussion of the rationale behind its design.

Results of the Survey of Adult Skills are disseminated by reporting average proficiency scores in literacy, numeracy and adaptive problem solving, or the share of adults scoring at different levels of proficiency. But what exactly does it mean to have a particular score or to be at a particular level of proficiency? Chapter 3 provides an answer to these questions, describing in particular what adults with a given score (or at a given level of proficiency) can be expected to be able to do.

To correctly interpret the results from the Survey of Adult Skills, it is essential to understand not only what was measured but also how the survey was conducted. Chapter 5 presents the key aspects of the survey design and implementation and provides an overview of the quality of the resulting data.

The first cycle of the Survey of Adult Skills was conducted over three rounds between 2011 and 2017. It followed two previous adult skills surveys - the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL). And since 2000, the OECD assesses the skills of 15-year-old students through PISA. Chapter 6 describes how these surveys are related, the extent to which they assess the same or similar skills, and how similarities and differences in results should be interpreted.

Acknowledgements

The Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), is the outcome of a collaboration among participating countries and economies, the OECD Directorate for Education and Skills and the OECD Directorate for Employment, Labour and Social Affairs, and an international Consortium led by Educational Testing Service (ETS).

The PIAAC Board of Participating Countries (BPC) – co-chaired by Aviana Bulgarelli (Italy, until 2020), Ted Reininga (the Netherlands, until 2021), Katalin Zoltán (Hungary, since 2020) and James Davison (England, UK, since 2021) – steered the development of the project.

This Reader's Companion was prepared by Marylou Lennon, Marco Paccagnella and Claudia Tamassia, with the assistance of François Keslair and Hajar Sabrina Yassine. Feedback and comments from Glenda Quintini and Anja Meierkord are gratefully acknowledged. Sally Hinchcliffe provided editorial assistance. Sabrina Leonarduzzi provided administrative support. Rachel Linden co-ordinated production.

Annex B includes a full list of the members of the BPC, together with the names of the National Project Managers, experts, members of the international Consortium and staff of the OECD Secretariat who have contributed to the project over the years.

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1 The Survey of Adult Skills and the measurement of human capital

This chapter discusses the concept of “human capital”, how it has evolved, and the extent to which the Survey of Adult Skills can be used to improve the measurement of some of its components. It also discusses the strengths and weaknesses of different approaches to measuring human capital.

A fundamental motivation for conducting a large-scale assessment like the Survey of Adult Skills within the Programme for the International Assessment of Adult Competencies (PIAAC) is the belief that what people know and can do are important determinants of economic and non-economic outcomes. The same motivation is behind large-scale student assessments like the Programme for International Student Assessment (PISA) or the Trends in International Mathematics and Science Study (TIMSS).

This idea is at the core of *human capital theory*, popularised by the seminal work of authors like Mincer (1958[1]) and Becker (1962[2]): investments in education and training increase human capital, making people more productive, and this in turn leads to higher earnings in the labour market (Deming and Silliman, 2024[3]).

Human capital theory has inspired a large body of literature linking education and skills with economic outcomes.[1] Mincer (1974[4]) popularised a method to estimate the percentage increase in wages associated with an additional year of education. Tinbergen (1974[5]) advanced the idea that returns to education are determined by the interplay between demand and supply of skills (the "race between education and technology"), a theory that received empirical support from the work of Katz and Murphy (1992[6]). Mankiw, Romer and Weil (1992[7]) showed how differences across countries in school enrolment rates can explain differences in economic growth, building on the seminal work of Solow (1956[8]).

The human capital literature has traditionally relied on educational attainment or years of schooling to measure human capital. Robust and internationally comparable measures of the proficiency of adults in cognitive skills such as literacy, numeracy and problem solving can arguably help provide more precise and nuanced measures of human capital. This was advocated back in 1998 by an OECD report arguing that "To achieve a better understanding and measurement of human capital, it is necessary to develop direct measures of skills, competency and aptitudes, as well as the broad social and economic impact of human capital" (OECD, 1998, p. 81[9]). This approach was later supported by the work, in particular, of Hanushek and Woessmann (Woessmann, 2003[10]; Hanushek and Woessmann, 2012[11]; Hanushek and Woessmann, 2011[12]), who argued that the results from international assessments of students and adults constitute good measures of human capital and have considerable advantages over quantity-based measures.

This chapter explores the extent to which the skills assessed in the Survey of Adult Skills can be interpreted as proxy measures of human capital, the advantages and disadvantages of direct measures of information-processing skills and of measures based on educational qualifications, the ways in which these two approaches can complement each other to enhance the quality of indicators of human capital, and the progresses that need to be made to measure other dimensions of human capital.

Defining human capital

To consider the relative merits of different proxy measures of human capital, it is first necessary to define more precisely what "human capital" is. A useful definition is provided by OECD (1998[9]), according to which human capital is "the knowledge, skills, competencies and other attributes embodied in individuals that are relevant to economic activity" (OECD, 1998, p. 9[9]). Table 1.1 describes in more detail the dimensions identified in this definition, drawing on the descriptions of similar concepts found in the literature.

Table 1.1. Dimensions of human capital

Component	Description
Knowledge	The body of facts, principles, theories and practices relevant to a field of work or study.
Skills	The ability to apply knowledge and use know-how to complete tasks and solve problems. Skills are commonly further classified into: • cognitive skills • technical skills • interpersonal and intrapersonal (or social and emotional) skills • communication skills
Competency/Application	The ability to use knowledge and skills appropriately in real-life contexts and situations. Competency is often conceived in terms of the capacity to exercise responsibility and act autonomously.
Personal attributes	The personality traits, behavioural dispositions and physical characteristics, such as strength, manual dexterity, height, or even personal appearance, which may have a value in the labour market.

While "competency" and "skills" are mentioned as two separate dimensions in the OECD definition, the distinction between the two is by no means universally shared in the literature. Many competency frameworks use "skill" in both a broad sense (the capacity to act appropriately in context) and in a narrower sense (as a technical capacity). The ACT21S framework (Binkley et al., 2011[13]), for example, identifies a number of 21st-century skills ("skills" in a broad sense) described in terms of "knowledge", "skills" (in the narrow sense) and "attitudes/values/ethics". Additionally, the concept of "competency" is used in different ways in different contexts, sometimes by the same author or organisation. The European Commission provides an example in the European Key Competencies for Lifelong Learning framework (European Commission, 2019[14]), where "competency" is defined as encompassing or combining "knowledge", "skills", and "attitudes" – i.e. "skill" is a dimension or aspect of "competency". In the European Qualifications Framework (European Commission, 2017[15]), "knowledge" and "skills" are treated as distinct categories of learning outcomes – i.e. "skill" is not conceived as a component of "competency". In this *Reader's Companion*, a pragmatic approach is adopted regarding the use of these two terms and "competencies" and "skills" are used interchangeably.

A further distinction can be made within the different dimensions of human capital. Knowledge, skills, competencies and attributes may be broadly transferable (or generic) when they are relevant in a wide variety of situations (e.g. in different occupations and firms); alternatively, they may be transferable to a limited extent or relevant in a limited set of situations (e.g. specific to an occupation or a particular enterprise) or related to a particular domain of knowledge or activity.

Educational attainment as a measure of human capital

Educational attainment (or years of schooling) represents the most commonly used summary measure of human capital. This is due to its ready availability (information on educational qualifications is collected in most social surveys) and the fact that educational qualifications provide a considerable amount of information regarding the breadth and depth of the knowledge, skills and competency of the individuals to which they have been awarded. Educational qualifications are also easily observable and are therefore commonly used (explicitly or implicitly) as a signal of skills and as a screening device in the labour market, particularly at the moment of hiring. Moreover, the large public investments in education make formal qualifications a natural policy target, and the effectiveness of education in raising earnings is an obviously relevant policy question.

A good overview, albeit at a necessarily high level of generality, of the information summarised by the award of different educational qualifications can be gained by examining the descriptors of qualifications offered by national (and cross-national) qualifications frameworks. First, qualifications certify a broad range of learning outcomes. A common "horizontal" classification of the types of learning outcomes that education programmes are expected to impart and that graduates of these programmes are expected to display used in qualifications frameworks is that of "knowledge", "skills", and "responsibility and autonomy" (European Commission, 2017[15]) or some variation of this. The concept of "responsibility and autonomy", for example, can be linked to the definition of "competency" in Table 1.1. Second, qualifications offer information on the depth of knowledge and skills that graduates are expected to have acquired. Typically, qualifications frameworks group qualifications in terms of "levels" that represent stages in an ordered progression of the complexity and depth of knowledge and skills different educational programmes are intended to impart and that their "graduates" are, therefore, expected to display.

Taking the descriptors used in national and cross-national frameworks as a guide, educational qualifications can be regarded as offering relatively comprehensive measures of human capital in that they provide information about individuals' stocks of both broadly transferable and less transferable knowledge, skills and competency. They also provide information on the complexity and depth of these skills. The extent to which they cover any particular dimension of human capital depend on the nature of the qualification. For example, vocationally oriented qualifications will certify the existence of skills with limited transferability to a far greater extent than will a general qualification, such as a certificate of senior secondary education.

While representing reasonably comprehensive measures of human capital, educational attainment has some well-documented limitations as a measure of an individual's level of skills:

- Educational qualifications certify only the knowledge and skills developed through a course of study. As a result, they provide information only about a subset of the skills of an individual. As noted above, this is by no means a negligible component of an individual's skills, particularly in the case of young adults.
- An educational qualification certifies the achievement of certain learning outcomes at a particular point in time. The currency of the measure will depend on how much time has elapsed since the qualification was awarded and the experience (professional and otherwise) of individuals during this period. Skills can be lost as well as maintained and enhanced over time.
- The quality of education and training offered at different levels of the education and training system can vary considerably between countries and, within countries, over time. Thus, the level of knowledge and skills certified by a qualification of ostensibly the same type and level may vary widely.

Coverage of the dimensions of human capital in the Survey of Adult Skills

The direct-assessment component of the Survey of Adult Skills focuses on measuring three cognitive skills (literacy, numeracy and adaptive problem solving) that are broadly transferable (generic) in nature. As clearly noted through their definitions in the frameworks (see Chapter 2), the assessment's interest is in the application of knowledge and know-how in contexts that are generally relevant to adults. Content knowledge and technical skills represent a secondary focus of the assessment. A relatively limited amount of information is provided concerning respondents' content knowledge (e.g. knowledge of basic mathematical concepts and operations in the case of numeracy).

Some information is also provided regarding the mastery of certain technical skills, but this is mostly done indirectly by asking respondents how often they perform tasks (at work and every day) requiring ICT skills

(see Chapter 4). Interpreting this information on "skills use" as "proficiency" requires making the (strong) assumption that performing certain tasks more often implies also being "better" at performing them.

The background questionnaire of the 2023 Survey of Adult Skills assesses social and emotional skills through the BFI-2-S instruments developed by Soto and John (2017[16]). The BFI-2-S instruments are designed to assess five traits commonly known as the "Big Five": open-mindedness, conscientiousness, extraversion, agreeableness, and emotional stability. These five traits are considered to represent personality at the broadest level of abstraction (John and Srivastava, 1999[17]). These inventories have been used to measure social and emotional skills in large-scale surveys such as the Household, Income and Labour Dynamics in Australia (HILDA) Survey, the German Socio-Economic Panel survey and the World Bank's STEP measurement study. As they are based on respondents' self-reports, it may be challenging to establish the cross-national and cross-cultural comparability of the scales derived from these instruments, as cultural and linguistic differences often result in similar questions being interpreted differently in different countries and economies. For this reason, the scales are standardised to have an equal mean and an equal variance within all countries. Such standardised scores can be used to compare the relationship between social and emotional skills and individual characteristics and outcomes within countries, but they are not suited to compare levels of these traits across countries (see Chapter 4).

Domain-specific skills (e.g. specific vocational or professional skills, firm-specific skills and knowledge related to fields of study) are instead completely outside the scope of the survey, as is the extent to which individuals can act autonomously (competency). Table 1.2 summarises the skills assessed directly by the Survey of Adult Skills in a matrix defined by the components of human capital and by the degree of their transferability.

Table 1.2. Coverage of the dimensions of human capital directly assessed in the Survey of Adult Skills

	Broadly transferable	Less transferable
Knowledge	Assessed to a limited extent (literacy and numeracy)	Not assessed
Skills (cognitive)	Assessed (literacy, numeracy and problem solving)	Not assessed
Skills (technical)	Assessed indirectly / to a limited extent (skills use)	Not assessed
Skills (social and emotional)	Assessed through self-reports	Not assessed
Competency/Application	Not assessed	Not assessed
Personal attributes	Not assessed	Not assessed

Comparing measures of human capital

Direct measures of literacy, numeracy, problem solving and educational qualifications have different strengths and weaknesses as proxies of human capital. A comparison of four criteria is presented in Table 1.3 below:

- Coverage: the extent to which the measure covers the different dimensions of human capital
- Context dependence: the extent to which the measure covers skills learned in a particular context, such as an educational institution
- Currency: the extent to which the measure is "up to date" as a measure of skills at the date information is collected
- Comparability: the extent to which the measure is comparable across countries and across time within countries.

Table 1.3. Comparison of direct measures from the Survey of Adult Skills and qualifications

	Direct assessment (Survey of Adult Skills)	Qualifications
Coverage (content)	Limited (only three cognitive skills tested)	Broad
Context dependence	Low	High
Currency	High	Variable (depends on the time elapsed since the respondent's highest qualification was completed)
Comparability	High	Variable both between and within countries

The Survey of Adult Skills' direct measures provide detailed information about a narrow range of skills that is highly current, not related to any particular context of acquisition, and is highly comparable within and between countries/economies. Qualifications provide information about most of the dimensions of human capital but cover only those skills developed through formal education and training, are of varying currency (most current for the young and least current for the old) and are of sometimes dubious comparability.

Recent empirical evidence and future directions to enhance the measurement of human capital

The increasing availability of data from large-scale international assessments of adults (the Survey of Adult Skills) and students (PISA, TIMMS and many others) has naturally spurred research providing empirical evidence that is relevant to the question of the value of direct measures of proficiency in information-processing skills and educational attainment as indicators of human capital.

Hanushek and Woessmann (2020[18]) argue that the cognitive skills of the population, as measured by international large-scale assessments ("knowledge capital"), are powerfully related to economic growth. This can be seen within the United States, using scores from the National Assessment of Educational Progress (NAEP) at the state level (Hanushek, Ruhose and Woessmann, 2017[19]), across the large number of countries that have participated in PISA (OECD, 2015[20]), and for a much broader set of countries, by linking results from a large set of different cognitive assessments into a common scale (Gust, Hanushek and Woessmann, 2024[21]; Angrist et al., 2021[22]).

Data from adult skills surveys provide additional insights into the relative merits of educational qualifications and direct measures of skills. Test scores from international assessments and educational qualifications do not appear to measure the same underlying traits. While educational attainment and literacy proficiency, for example, are closely correlated, there is considerable variation evident in literacy proficiency among individuals with similar levels of attainment (OECD, 2013[23]; OECD, 2016[24]; OECD, 2019[25]). Moreover, educational attainment and literacy and numeracy proficiency each have an independent and positive impact on earnings (OECD, 2013[23]; Hanushek et al., 2015[26]). These results support the idea that skills and qualifications complement each other and, together, provide a better measure of human capital.

Some recent work has explicitly tried to combine qualification and direct measure of skills into a synthetic measure of human capital. Filmer et al. (2020[27]) estimate "learning-adjusted years of schooling" by combining "quantity" measures of education (years of schooling) with "quality" (a relative measure of learning based on test scores). Botev et al. (2019[28]) combine years of schooling with estimates of economic returns to schooling to construct a measure of human capital, which is more strongly linked to productivity. Egert, de la Maisonneuve and Turner (2022[29]) combine instead years of schooling with scores from PISA and the Survey of Adult Skills.

Therefore, direct assessments can usefully complement years of schooling by providing information that, as explained above, is highly current, not related to any particular context of acquisition, and is highly comparable. However, large-scale assessments only provide information on a narrow set of skills and are unable to cover all dimensions of human capital. The traditional focus of the Survey of Adult Skills (and of

other large-scale assessments) on assessing a small number of broadly transferable cognitive skills certainly reflects the importance attributed to measuring literacy, numeracy and adaptive problem solving as key information-processing skills but also the limits on what can be measured in a large-scale, international adult assessment given the current state of measurement science, the need to minimise the burden on respondents, and the level of resources that can be reasonably be devoted to this type of exercise.

The 2023 Survey of Adult Skills made an important step forward in enriching the set of skills covered in the survey by administering scales that measure social and emotional skills. This was motivated by the rapidly growing literature showing that social and emotional skills (often also referred to as "non-cognitive skills") have economic returns comparable to those estimated for cognitive skills (Lindqvist and Vestman, 2011[30]) and that such returns have increased in recent years (Edin et al., 2022[31]; Deming, 2017[32]). However, such self-reported scales have their shortcomings, as argued above. The OECD Survey of Social and Emotional Skills, targeted at 10- and 15-year-old students, improves on simple self-reports by triangulating information collected from students, parents and teachers, which could help in reducing or better controlling for self-report bias (Kankaraš and Suarez-Alvarez, 2019[33]). The OECD International Early Learning and Child Well-being Study, targeted at 5-year-old children, contains direct assessments of empathy and trust and also collects information from parents and teachers on children's social and emotional skills (Phair, 2021[34]). Not all methods that can be used to assess skills for students and children directly are, however, suitable for inclusion in adult surveys. More direct and "objective" (or "performance-based") measurement of such skills poses, in general, considerable methodological challenges in large-scale, cross-country surveys. Such performance-based measures should importantly be connected to a theory about why they matter and in which context (Deming and Silliman, 2024[3]).

This is a very active area of research. For example, Weidmann and Deming (2021[35]) developed an experimental method for identifying individual contributions to group performance, which they then interpreted as a measure of "teamworking skills". Linzarini and Catarino da Silva (2024[36]) survey a large number of behavioural tools (like tasks and digital games) that can be used to directly measure social and emotional skills, as well as new technological approaches that could improve existing tools.

In the context of large-scale assessments, there is an ongoing discussion on the possibility of exploiting information on test-taking behaviour as a proxy for social and emotional skills. Borgonovi, Ferrara and Piacentini (2023[37]) use a number of indirect and direct indicators from PISA to estimate socio-emotional and motivational skills. Borgonovi and Biecek (2016[38]) also rely on data from PISA to estimate students' ability to endure fatigue and maintain motivation during the assessment. The move from paper-based to computer-based assessments has enlarged the realm of possibilities as computers can record traces of all the actions that test takers perform when they interact with the device during the assessment. This information is normally referred to as "process data", which are stored in "log files". While attempts have been made in the past to exploit information contained in log files from the Survey of Adult Skills (OECD, 2019[39]), more effort is needed to better integrate process data and technological advancements more broadly into the survey and assessment designs (OECD, 2023[40]).

Technical, domain-specific skills are another dimension of human capital normally not covered in large-scale surveys. Attempts have been made in this direction, though (Baethge et al., 2009[41]). More recently, the OECD has developed a framework to assess the professional knowledge and skills of students enrolled in vocational education and training (OECD, 2024[42]). As far as the skills of adults are concerned, the OECD completed a feasibility study on the Assessment of Higher Education Learning Outcomes (AHELO) in 2013, which investigated the feasibility of conducting an international assessment of university students that focuses on discipline-specific skills in economics and engineering as well as a set of generic skills (critical thinking, analytical reasoning, problem solving and written communication). The main issue regarding the measurement of domain-specific skills is less whether they can be validly and reliably measured in a cross-country context – which the AHELO feasibility study demonstrated to be possible – than the practicality and costs of measurement using household-survey methods, given their number and variety.

To conclude, human capital is inherently a multidimensional concept. However, it has traditionally been modelled as unidimensional in much of the theoretical economic literature, and empirically, it has traditionally been proxied only by years of schooling or educational qualifications. Over the last couple of decades, though, considerable efforts have been put into providing more nuanced and more accurate measures of human capital. International large-scale assessments like the Survey of Adult Skills have played and will continue to play an important role in enhancing our understanding of human capital and how it affects economic and social well-being.

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Notes

[1] Readers are referred to Deming and Silliman (2024[3]) for a recent overview of this literature.

2 Measuring cognitive skills in the 2023 Survey of Adult Skills

This chapter describes the approach taken by the 2023 Survey of Adult Skills to measure proficiency in literacy, numeracy and adaptive problem solving. It discusses the content, cognitive processes and contexts applicable to the assessment and provides some examples of assessment items.

A unique feature of the Survey of Adult Skills is its inclusion of a direct assessment of the information-processing skills of participating adults. The information gathered through this assessment allows us to estimate the distribution of skills among the adult population in participating countries and economies.

The 2023 Survey of Adult Skills assessed adults in three domains: literacy, numeracy and adaptive problem solving. These skills are deemed essential for full participation in the economic and social life of modern societies. Results from past adult skills surveys – such as the International Adult Literacy Survey (IALS, conducted in the mid-1990s), the Adult Literacy and Life Skills Survey (ALL, conducted in the mid-2000s) and the first cycle of the Survey of Adult Skills (conducted between 2012 and 2018) – have repeatedly demonstrated the importance of literacy and numeracy skills for economic and non-economic outcomes.[1] Adaptive problem solving is a new domain assessed for the first time in the 2023 Survey of Adult Skills.

This chapter provides an overview of the approach to assessing adult skills. It then describes in greater detail how the skills to be measured were conceptualised and how assessment items were developed. The chapter also provides examples of some assessment items.

Some key features of the assessment

A focus on key information-processing skills

The assessment tasks in the Survey of Adult Skills focus on respondents' ability to draw on information-processing strategies to perform tasks in real-world contexts. Whereas large-scale assessments of school-age populations may focus on the sets of skills that students are expected to have mastered at key stages of their education (without being linked specifically to any particular curriculum), the assessment tasks in the Survey of Adult Skills are designed to measure a broad set of foundational skills required to successfully interact with the range of real-life tasks and materials that adults encounter in everyday life.

Successful completion of these tasks does not require specialised knowledge or more specific skills: in this sense, the skills assessed in the Survey of Adult Skills can be considered "foundational" or, more appropriately, the general skills required for a very broad range of situations and domains. In no way should they be seen as basic skills that are less complex than other higher-order or specialised' skills. The Survey of Adult Skills does not take a prescriptive approach in defining a minimum level of skills that adults are supposed to achieve to "fully function" in modern societies.

Reflecting the changing nature of information

Data-intensive, complex digital environments are more and more pervasive in both the workplace and everyday life, and it has become increasingly important for adults to be able to navigate, critically analyse and solve problems in these new environments. The conceptual frameworks underlying the three assessment domains all emphasise this changing nature of information as a critical feature that had to be reflected in the assessment tasks if the survey results were to be truly informative about the skills adults need in today's societies.

To meet this goal, the literacy and numeracy frameworks used in the first cycle of the Survey of Adult Skills have been updated, and a number of innovative aspects introduced to reflect the types of tasks found in digital environments. For example, some literacy tasks require participants to consult multiple sources of information, including both static and dynamic texts, in order to respond. Similarly, some numeracy tasks include dynamic applications that require interactive, digitally based tools. The new domain of adaptive problem solving was also developed to account for the digital environments adults now routinely navigate.

Accounting for very high and very low levels of proficiency

As well as the inclusion of tasks that focus on the more sophisticated strategies required in digital environments, it was equally important to be able to assess the skills of those with more limited proficiency. In all domains, care has been taken to design items of varying levels of difficulty to provide as much coverage as possible across the entire ability distribution in all participating countries.

For example, the adaptive problem solving domain includes a set of "static" tasks with no dynamic features that require the application of adaptive strategies in order to obtain some measure of basic problem solving ability among those with more limited skills. In the case of literacy and numeracy, the assessment includes two types of tasks specifically designed to measure skills at the lower end of the proficiency distribution. These include the locator tasks and the component measures. The locator tasks are among the easier tasks in the assessment and consist of eight numeracy and eight literacy items. All respondents take these 16 items.[2] The component tasks provide information about the basic reading and numeracy skills that support proficient performance in each domain. Respondents who struggle with the locator tasks are asked to complete the component tasks in order to collect some information about their foundational reading and numeracy skills.

An overview of literacy, numeracy and adaptive problem solving

Panels of subject-matter experts developed the conceptual frameworks for each domain, guided the development and selection of items, and informed the interpretation of results[3]. The complete domain frameworks can be found in OECD (2021[1]). The frameworks define and describe the underlying latent skills the assessment aims to measure. To inform item development, they identify the key task dimensions that should be used to build the assessment and report results. Across the domains, the dimensions focus on:

- Content: the various representations of information, or types of materials and tools, that adults use to complete tasks.
- Cognitive processes: the information-processing strategies required to use specific materials to meet task demands successfully.
- Contexts: the social and situational contexts in which tasks are embedded.

Table 2.1 provides an overview of the definition, content, cognitive processes and contexts for each of the three domains. The remainder of this chapter describes these dimensions in greater detail for each domain.

Table 2.1. Summary of assessment domains in the 2023 Survey of Adult Skills

	Literacy	Numeracy	Adaptive problem solving (APS)
Definition	Literacy is accessing, understanding, evaluating and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.	Numeracy is accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life.	Adaptive problem solving involves the capacity to achieve one's goals in a dynamic situation, in which a method for reaching a solution is not immediately available. It requires engaging in cognitive and metacognitive processes to define the problem, search for information, and apply a solution in a variety of information environments and contexts.

Content	Content within the literacy domain includes both static and interactive texts. These texts are characterised by their source (single or multiple) and by their format: • continuous texts, where information is presented in sentences and paragraphs • non-continuous texts, such as charts and tables • mixed texts. In addition, texts reflect a range of genres (e.g. narrative, descriptive and argumentative). They can be organised using a variety of layout features, content representations and digital tools such as scrolling and hyperlinks.	Mathematical content associated with numeracy tasks includes a variety of representations of information: • text or symbols • images of physical objects • structured information (e.g. tables, graphs and charts) • dynamic applications. Additionally, numeracy content reflects four key areas of mathematical content, comprising quantity and number, space and shape, change and relationships, and data and chance.	Aspects of the environment in which adaptive problem solving tasks are embedded include: • problem configuration – the elements presented in the problem and the available resources or operators • dynamics of the situation – the change (or absence of change) in the problem situation and constraints • features of the environment – the information and resources that are available. There are three types of information sources for APS tasks: • physical resources, which are hands-on and can be manipulated • social resources, which include interpersonal and social interactions • digital resources, including digital features or devices.
Cognitive processes	• accessing texts • understanding • evaluating.	• accessing and assessing situations mathematically • acting on and using mathematics • evaluating, critically reflecting and making judgements.	APS involves both cognitive and metacognitive processes. Both processes may be required in each of the three states of problem solving: • defining the problem • searching for information relevant to the solution of the problem • applying a solution.
Contexts	• work and occupation • personal • community and citizenship • education and training.	• work • personal • social/community.	• work • personal • social/community.

Literacy

The conceptual framework for the literacy domain is largely based on the one used in the first cycle of the Survey (OECD, 2012[2]). For this cycle, the Literacy Expert Group suggested updates to reflect the growing importance of reading in digital environments, which pose different cognitive demands and challenges to the reader. In particular, the new framework emphasises that readers increasingly need to effectively interact with the multiple texts that they often encounter on line.

Definition

The framework used in the 2023 Survey of Adult Skills defines literacy as "accessing, understanding, evaluating and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society" (Rouet et al., 2021[3]).

The framework further elaborates on the key aspects of this definition:

- The term *literacy* is used in its broadest, but also most literal, sense to describe the ability to read written language presented in the form of texts and documents.

- Readers engage in *accessing texts* when they search for texts, or passages within texts, that are relevant to their purpose.
- Any literate activity requires some level of *understanding*. This can range from the most basic skills, such as the literal comprehension of words and sentences, to more complex inferential skills, such as understanding the dispute between two authors making conflicting claims about an argument.
- *Evaluating* involves making judgements about a text, which may include deciding whether it is appropriate for the task at hand or whether it presents accurate and reliable information.
- *Written texts* are defined as including both static and interactive materials. The latter, which are reflective of digital environments, may include features such as hyperlinks.

In line with this definition, the framework defined three core dimensions of literacy: content, cognitive processes and social contexts.

Content

In everyday life, readers engage with a variety of content and read for a range of purposes. As noted in the definition, the literacy assessment focuses on the comprehension of written texts. Texts are further classified by:

- source
- format
- type (or genre)
- organisation.

Source: texts can be single or multiple. Single texts originate from a single source – e.g. a single author, publication medium and date of publication. Multiple texts have different authors or are published by different authors or at different times.

Format: texts can be continuous, non-continuous or mixed. Continuous texts have sentences organised into paragraphs. Examples include newspaper articles, essays, brochures and announcements. *Non-continuous* texts include tables, graphs, forms and diagrams, where information is often displayed in lists. Examples include restaurant menus, tables showing interest rates or sports rankings, and lists of navigation links shown on a web page. *Mixed* texts include both continuous and non-continuous elements. A web page or article with paragraphs of information supported by a table or graph is an example of a mixed text.

Type: texts can be divided into six types – description, narration, exposition, argumentation, instruction and transaction – which cover most texts adults will encounter in everyday life.

Organisation: the devices used to present content and facilitate access to information often affects how texts are organised. These include layout features and content representation, such as titles, headings and, in the case of longer texts, chapters and indices. Digital texts may include tools such as windows, scroll bars, tabs and hyperlinks.

Cognitive processes

The framework identifies three cognitive processes that support the range of adult reading activities that are the focus of the literacy assessment:

- accessing
- understanding
- evaluating.

Accessing texts involves identifying one or more texts that are relevant to a presented task and locating information within them. Readers must navigate across texts or passages, or within texts, as a function or task demands. In an assessment context, the complexity of an access task is driven by the interaction between the question posed to the test taker and the features of the presented texts.

Understanding consists of constructing meaning and representations. This aspect includes both literal and inferential comprehension of material with a single text, as well as across multiple texts.

Evaluating involves assessing the accuracy and credibility of information in a text; evaluating the soundness of a text (i.e. the completeness and consistency of the information); evaluating the relevance of one or more texts for a given task; and reflecting on the author's intent, purpose and effectiveness.

Contexts

Adult reading typically occurs within a social setting. The context may influence both the motivation to read and the interpretation of content. As a result, the texts in the literacy assessment derive from four contexts that will be familiar to a broad range of participants. These are:

- work and occupation
- personal
- community and citizenship
- education and training.

Texts related to *work* contexts include general workplace materials associated with finding employment, finance and being on the job. Examples include job listings, workplace policies and employment practices. The framework notes that specialised job-specific texts are not appropriate for inclusion in the assessment due to the background knowledge required.

Materials in the *personal* context include texts associated with interpersonal relationships, personal health and safety, home and family, consumer economics, and leisure and recreation. Examples include articles on disease prevention, safety and accident prevention, housing, and personal finance.

Texts in the *community* context are associated with community resources, public services and staying informed. They include official documents, community announcements, blog posts, bulletin boards and news.

Finally, materials related to *education and training* focus on opportunities for further learning and personal or professional goals.

Distribution of test items by task characteristics

A total of 80 literacy items were included in the final item pool. Items were selected from this pool to construct the assessments administered to adults for the 2023 Survey of Adult Skills. Selected items should:

- provide accurate and reliable measurement of the construct across a range of difficulties
- meet the target distribution of the key dimensions of literacy as defined in the framework
- include enough items used in previous surveys to ensure comparability of results
- fulfil the requirements of the adaptive main study assessment design.

Table 2.2 describes the item pool according to the characteristics presented above.

Table 2.2. Distribution of literacy items across the framework dimensions

	Number (80 items)	Percent
Cognitive process		
Accessing text	30	38%
Understanding	35	44%
Evaluating	15	19%
Text source		
Single	51	64%
Multiple	29	36%
Text format		
Continuous	40	50%
Non-continuous	25	31%
Mixed	15	19%
Context		
Work and occupation	9	11%
Personal	33	41%
Community and citizenship	28	35%
Education and training	10	13%

Sample literacy items

This section presents three example literacy items. The items are shown using screenshots of the displays that appear on the tablet used to deliver the assessment. To view and interact with the full set of sample items, see https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html.

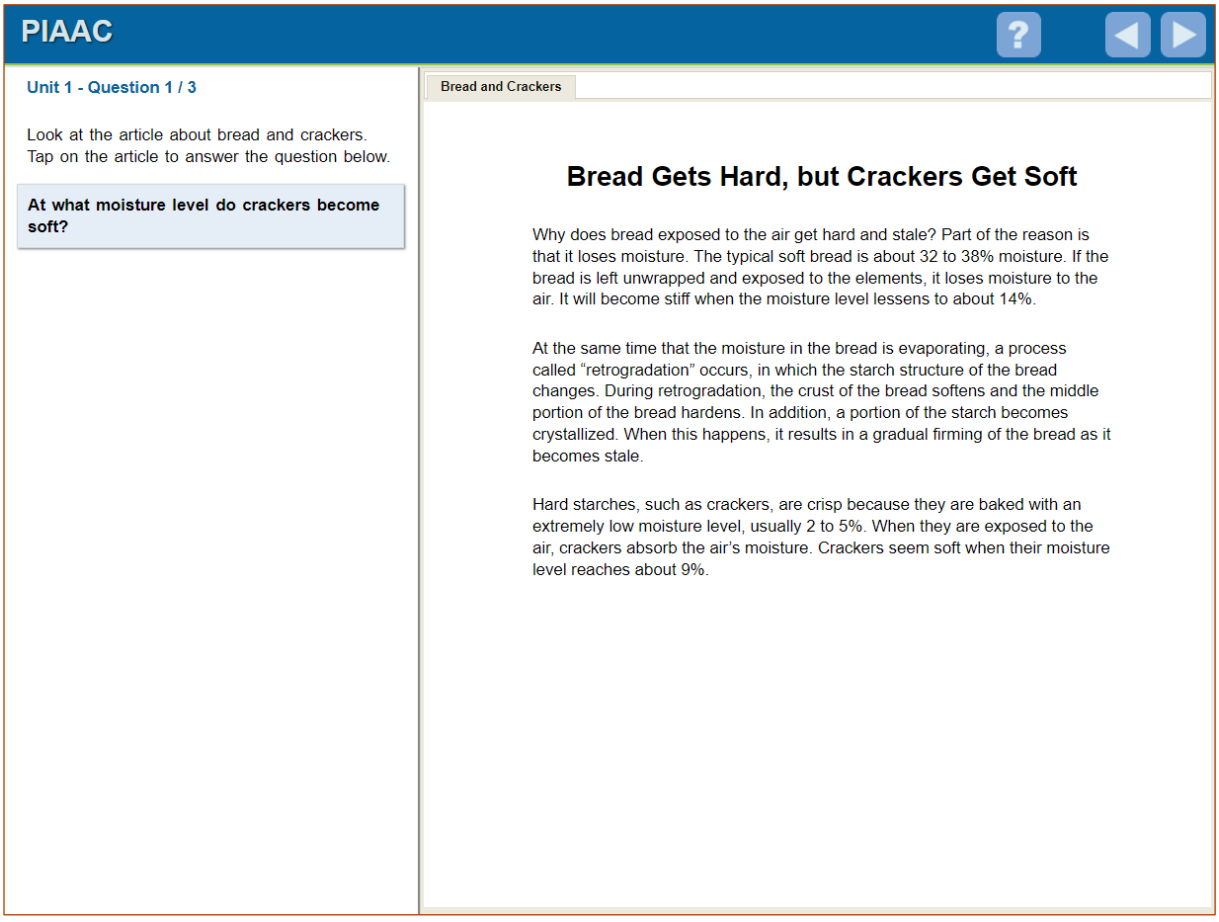
Sample item 1: Bread, question 1

This first example, the first of three items in this unit, represents an easy item and focuses on the following aspects of the literacy construct:

- process: accessing text
- source: single
- text format: continuous
- text display: static
- context: personal.

Participants must locate and tap on the sentence that states the moisture level at which crackers become soft. Each sentence in the passage can be selected, or deselected, by tapping on it. This item is relatively easy because crackers are only addressed in the last paragraph of this short passage and only one sentence mentions “soft” crackers.

Figure 2.1. Sample literacy item 1: Bread



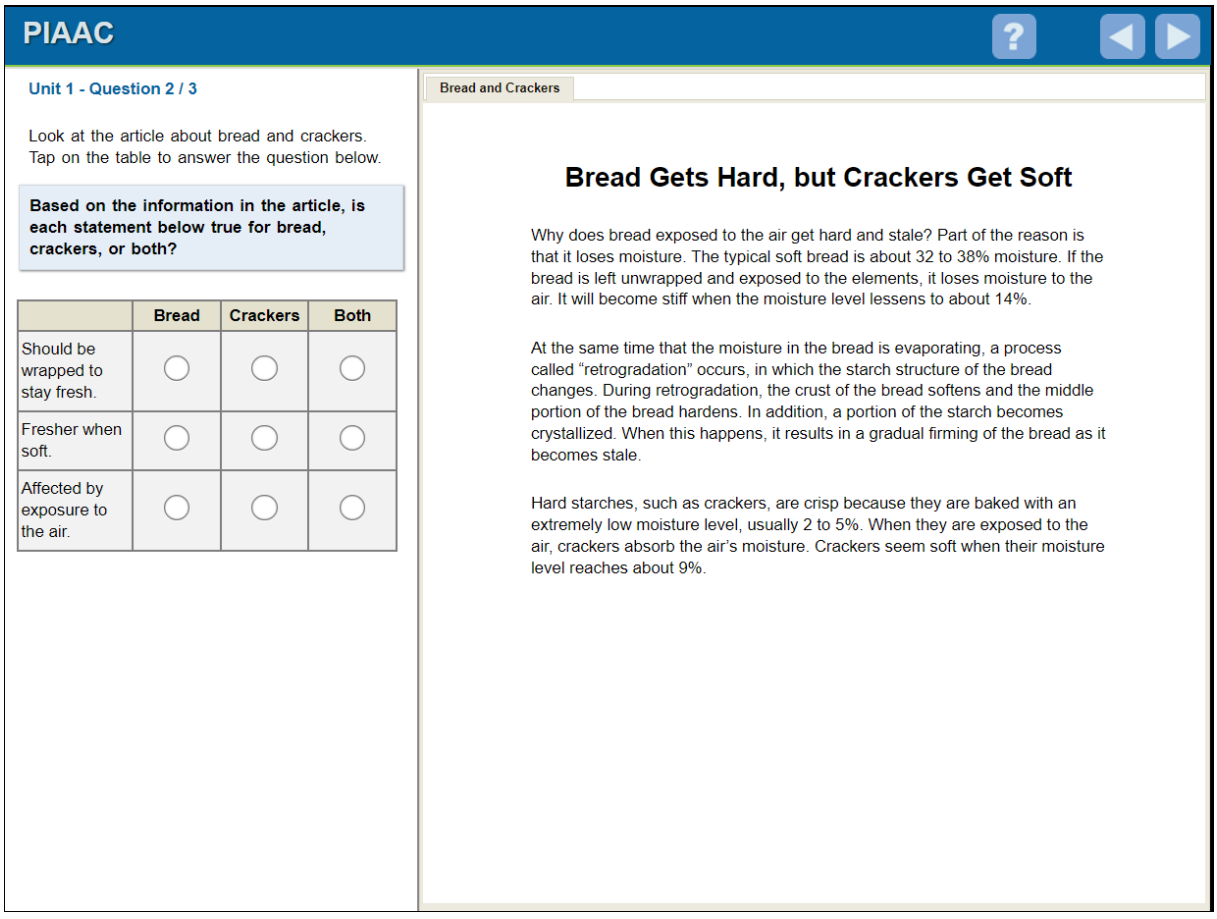
Sample item 2: Bread, question 2

This second item is somewhat more difficult. Readers must make inferences based on the information presented in the text in order to determine if a set of statements is true for bread, crackers or both. Respondents are asked to tap on a response for each of the presented statements. Only one response can be selected for each row.

The item focuses on the following aspects of the literacy construct:

- process: understanding
- source: single
- text format: continuous
- text display: static
- context: personal.

Figure 2.2. Sample literacy item 2: Bread



Prior to the next item in this unit, a second text is introduced for respondents to read. Respondents see a transition screen that says, "You look on the web and find a short article with more information about retrogradation. Tap on the NEXT arrow to read the article."

This staged presentation of stimuli is used throughout the literacy assessment in cases where multiple texts are included in a unit.

Sample item 3: Bread, question 3

As shown in the image below, the second text displays on its own tab on the right side of the screen. While respondents can tap on the tabs at the top of the screen to toggle back and forth between the available texts, only the information presented in the second text is required to answer this third question. Note that if the question required respondents to use information in both the first and second texts, the source would be classified as multiple.

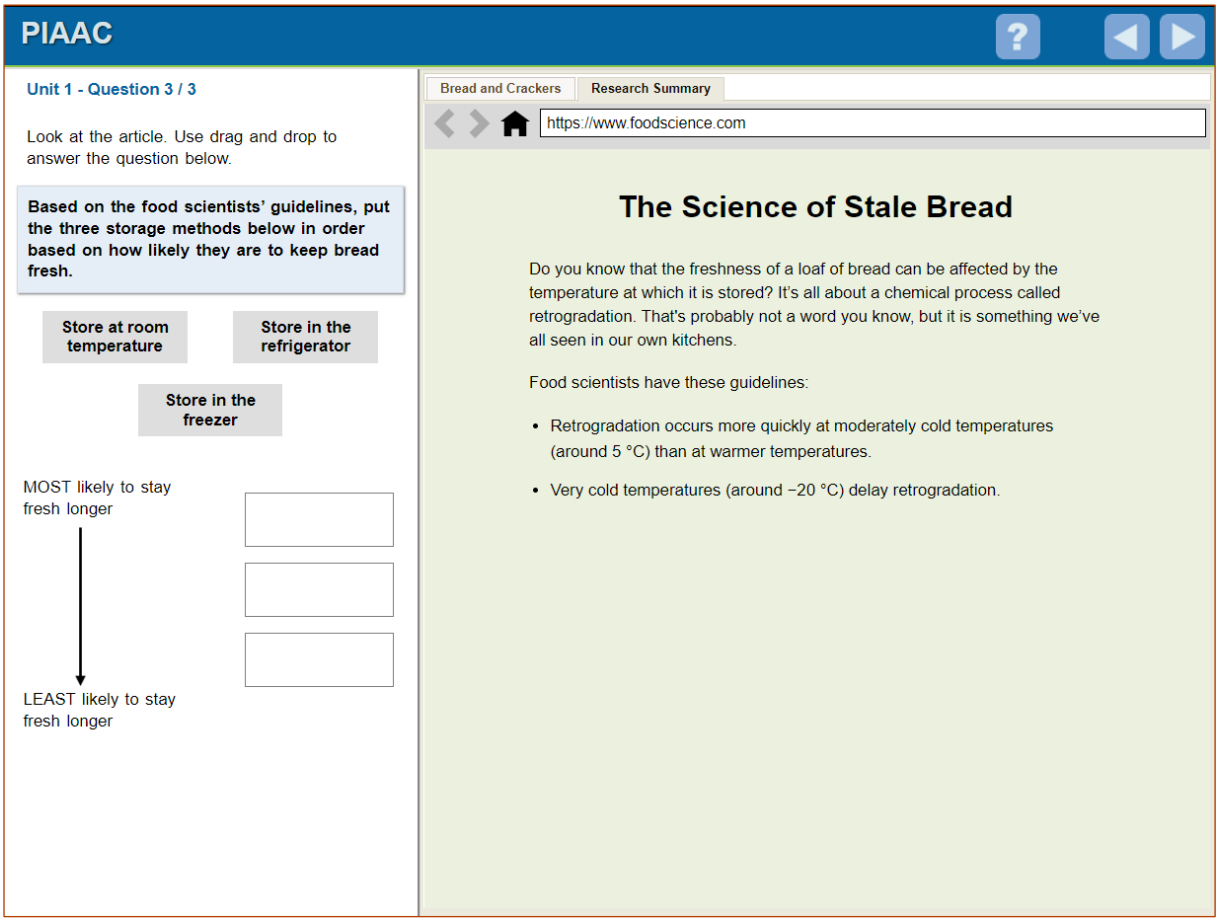
This item is of medium difficulty. As in Sample item 2, readers must make inferences based on the information presented in the text in order to put three storage methods in order. Respondents must drag and drop each method into one location in order to answer.

The item focuses on the following aspects of the literacy construct:

- process: understanding
- source: single
- text format: continuous

- text display: static
- context: personal.

Figure 2.3. Sample literacy item 3: Bread



Reading components

Reading components represent the basic set of decoding skills that are essential for extracting meaning from written texts. As in the first cycle of the Survey of Adult Skills, the assessment of reading components has been included to provide more information about the skills of adults at the lower end of the literacy proficiency scale.

Two types of reading component tasks are included in the 2023 Survey of Adult Skills: sentence comprehension and passage comprehension. *Sentence comprehension* tasks ask respondents to identify if a sentence does or does not make sense. *Passage comprehension* tasks ask respondents to read a short passage as it displays on screen sentence by sentence. For each sentence with a pair of underlined words, respondents are asked to identify the word that gives meaning to the sentence.

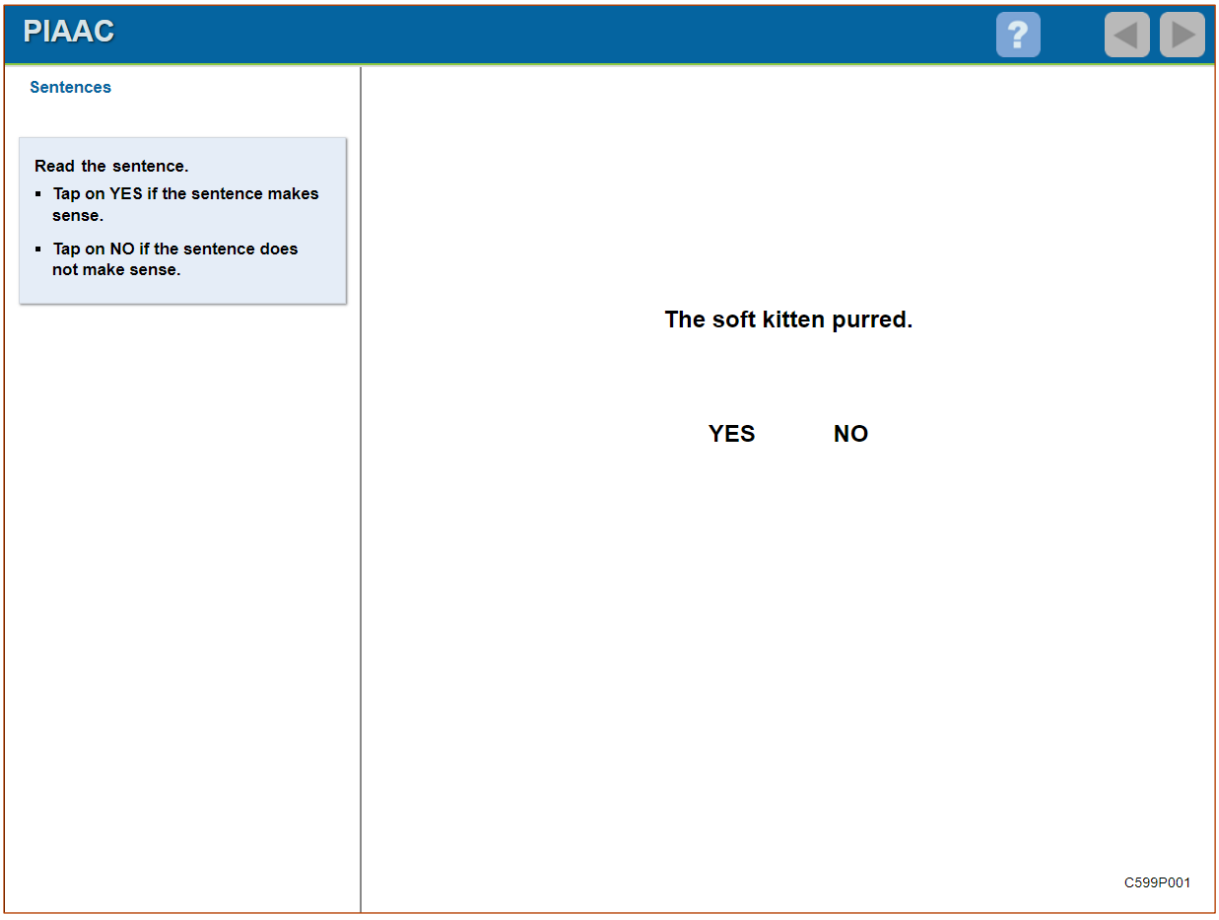
For both types of tasks, timing data are collected as well as the answers respondents give to the items. Timing data are useful as they provide a measure of fluency, but they do not contribute to the estimation of literacy proficiency.

Sample reading component items

Sentence comprehension

A single sentence is displayed on the screen, and the respondent is asked to indicate whether the sentence makes sense. As soon as the respondent taps on “YES” or “NO”, the screen displays the next sentence.

Figure 2.4. Sample reading component item: Sentence comprehension



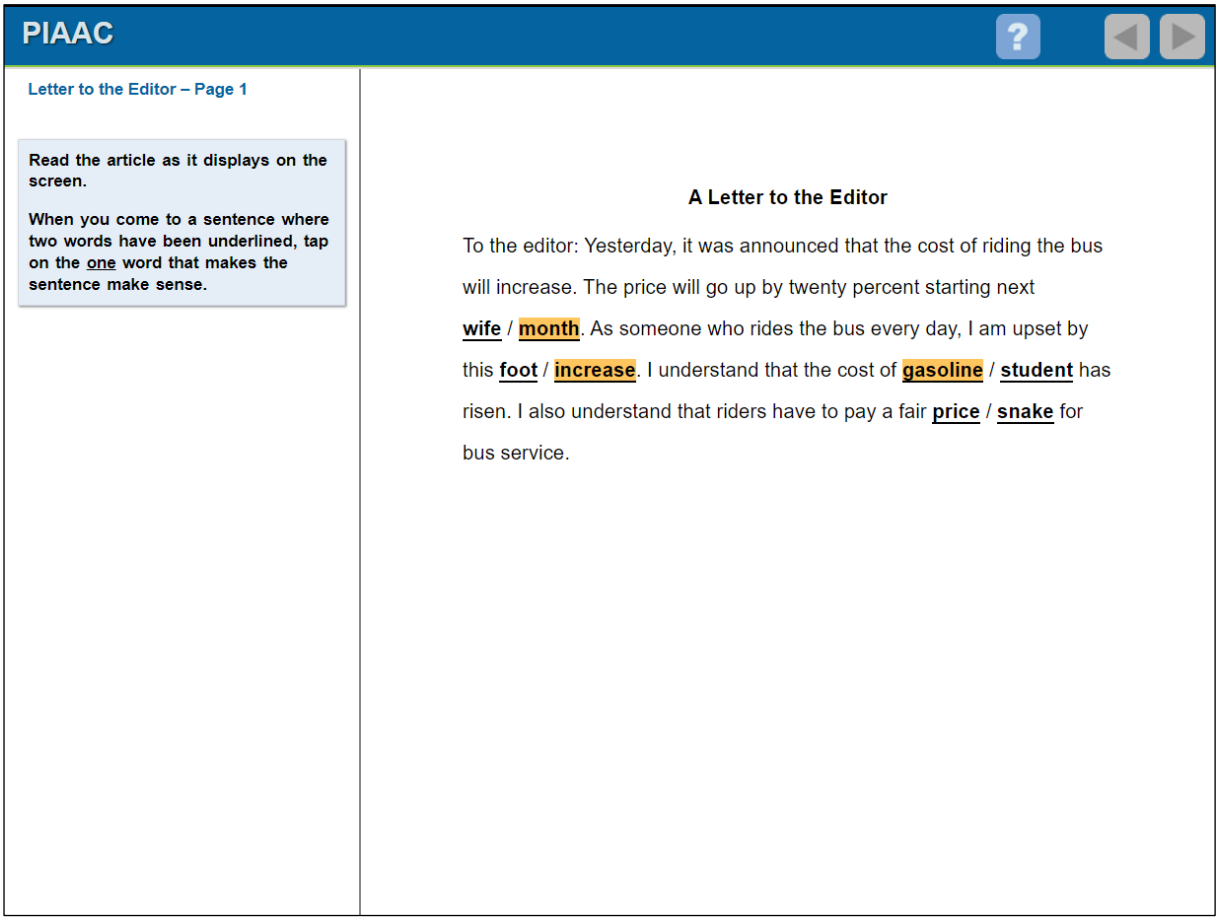
Additional sample sentence comprehension items include:

- Two boys threw the wall.
- The lightest balloon floated in the bright sky.
- A comfortable pillow is soft and rocky.

Passage comprehension

Respondents are asked to read a short article which builds sentence by sentence on the screen. Most sentences include two underlined words, and respondents are asked to select the one that best completes the sentence. The example below shows a portion of one article where three selections have already been made and a fourth sentence has just been displayed on the screen.

Figure 2.5. Sample reading component item: Passage comprehension



Numeracy

The development of the numeracy framework for the 2023 Survey of Adult Skills was inspired by a review conducted by a group of experts charged with identifying changes in the field since the framework for the first cycle of the survey was conceived and suggesting appropriate revisions and updates (Tout et al., 2017[4]).

That review urged that the framework for the 2023 Survey of Adult Skills should:

- reflect the importance of digital information, representations, devices and applications as realities that adults have to manage in dealing with the numerical demands of everyday life
- incorporate a wide range of different mathematical and quantitative skills and knowledge and avoid a narrow view that sees numeracy as only dealing with numbers and arithmetical operations
- better emphasise the importance of critical thinking, reflection and reasoning in the context of numeracy
- describe the full range of numeracy skills in the adult population.

Definition

The framework for the 2023 Survey of Adult Skills defines numeracy as “accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life” (Tout et al., 2021[5]).

Key changes from the definition used in the first cycle of the survey include:

- The elimination of the word “ability”, as it was thought to imply an innate ability that some people may not possess. This implication was not aligned with the Numeracy Expert Group’s belief that all adults have the capacity to learn mathematics and apply it successfully in their lives.
- The phrase “interpret and communicate” has been replaced with “reason critically” to align with the expert group’s view that one core cognitive process for numeracy, particularly in the context of technology environments, is the ability to evaluate, critically reflect and make judgements.
- The phrase “represented in multiple ways” was included to reflect the importance of digital information, representations, devices and applications in meeting the numeracy demands of everyday life.

Three core dimensions of numeracy were defined: content (including both areas of mathematical content and different representations of information), cognitive processes, representations and contexts.

Content

As in the first cycle of the survey, the assessment covers four key areas of mathematical content, information and ideas:

- quantity and number
- space and shape
- change and relationships
- data and chance.

Quantity and number involve understanding ordering, counts, place value, magnitudes, indicators, relative size and numerical trends. *Space and shape* cover understanding and using measurement systems and formulas, dimensions and units, location and direction, geometric shapes and patterns, angle properties, symmetry, transformations, and two- and three-dimensional representations and perspectives. *Change and relationships* cover understanding ways to describe, model and interpret mathematical relationships, quantitative patterns and change. This involves understanding, using and applying proportional reasoning and rates of change, including the use and application of ratios, and recognising, describing and/or using relationships between different variables. *Data and chance* include topics such as data collection, data displays, charts and graphs, measures of central tendency and variance, and understanding and knowing about chance and probability.

In addition, the framework identifies four types of representations that are found in real-world numeracy tasks:

- text or symbols
- images of objects
- structured information
- dynamic applications.

Texts included in the assessment can include symbols and numerical information. Note that in order to limit the impact of reading skills on the numeracy assessment, any text-based stimuli were short, simple and direct. *Images of objects* include photos or images of physical objects. *Structured information* consists of data or information represented in tables, graphs, charts and maps and may include calendars, schedules, timetables and infographics. *Dynamic applications* include interactive applications, animations, and applications supporting calculations such as loan calculators, currency or measurement convertors, spreadsheets and drawing programs.

Cognitive processes

The framework identifies three cognitive processes associated with numeracy skills:

- accessing and assessing situations mathematically
- acting on and using mathematics
- evaluating, critically reflecting and making judgements.

In order to *access and assess* situations mathematically, adults must be able to examine a contextual problem and determine if and where they can extract the essential mathematics to analyse, set up and solve the problem.

Acting on and using mathematics includes the processes of ordering, counting, estimating, computing, measuring, graphing and drawing. Adults must use their knowledge of mathematical processes, facts and procedures to solve real-world problems. Where relevant, they must also select and use appropriate tools, including those present in digital environments.

Evaluating, critically reflecting and making judgements is the process of evaluating whether a solution to a real-world problem is reasonable and relevant to the original problem situation and context. Based on these judgements, a decision can be made about whether to accept the solution or revise and adjust it.

Contexts

Tasks in the numeracy assessment reflect three real-world context areas that are important for adults:

- work
- personal
- social and community.

Mathematical situations encountered at *work* are typically more specialised than those in everyday personal life. Examples include completing purchase orders, maintaining inventories, managing schedules, interpreting workplace diagrams, and making and recording measurements.

Tasks in the *personal* context focus on numeracy-related activities for individuals and their immediate families. These include those associated with handling money and personal or family finances, health and well-being, shopping, personal time management, and travel and holiday planning.

Adults must be able to use quantitative data and statistics to interpret information presented by a range of *community* or governmental authorities, as well as perform tasks associated with community activities and *social* events. Sample tasks in this category include understanding graphs and numerical information presenting local or national crime or health data.

Distribution of test items by task characteristics

A total of 80 numeracy items were included in the final item pool, Items were selected from this pool to construct the assessment testlets administered in the 2023 Survey of Adult Skills. Table 2.3 shows the distribution of the pool items.

Table 2.3. Distribution of numeracy items across the framework dimensions

	Number (80 items)	Percent
Cognitive process		
Access and assess situations mathematically	23	29%
Act on and use mathematics	38	48%
Evaluate, critically reflect, make judgements	19	24%
Representation		
Text or symbols	15	19%
Images of objects	11	14%
Structured information	39	49%
Dynamic applications	15	19%
Mathematical content area		
Quantity and number	19	24%
Space and shape	16	20%
Change and relationships	17	21%
Data and chance	28	35%
Context		
Work	25	31%
Personal	26	33%
Social/community	29	36%

Sample numeracy items

This section presents three example numeracy items. To view and interact with the full set of sample items, see https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html.

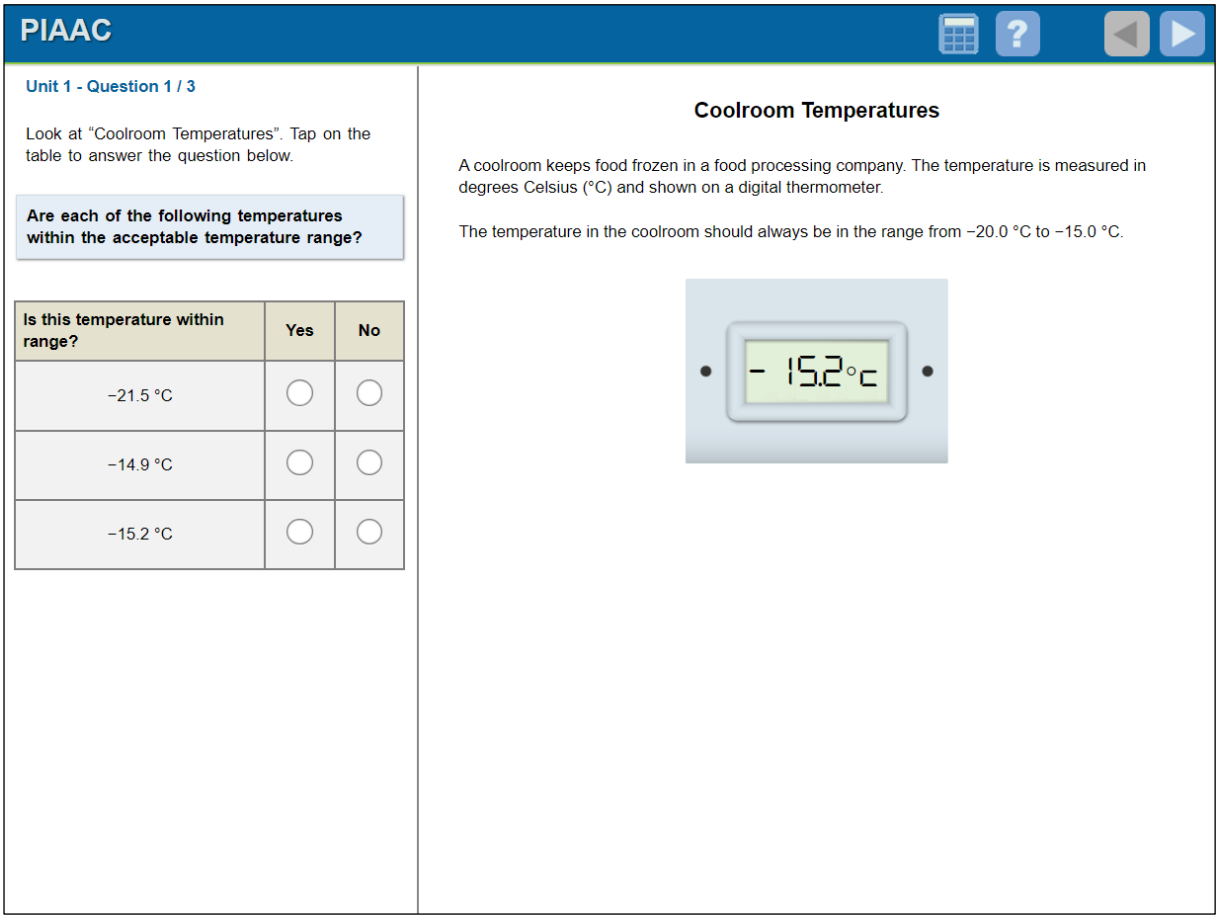
Sample item 1: Tolerances

This first item is a multi-part multiple-choice item. For this item, respondents are presented with a scenario about a coolroom – a room that keeps foods frozen at a food processing company – which must maintain a temperature within the range of -20°C to -15°C. For the actual question, respondents are given a table of different temperatures and asked to identify whether or not each temperature is within the acceptable range.

This item focuses on the following aspects of the numeracy construct:

- process: access and assess situations mathematically
- content: space and shape
- representation: images of physical objects
- context: work.

Figure 2.6. Sample numeracy item 1: Tolerances



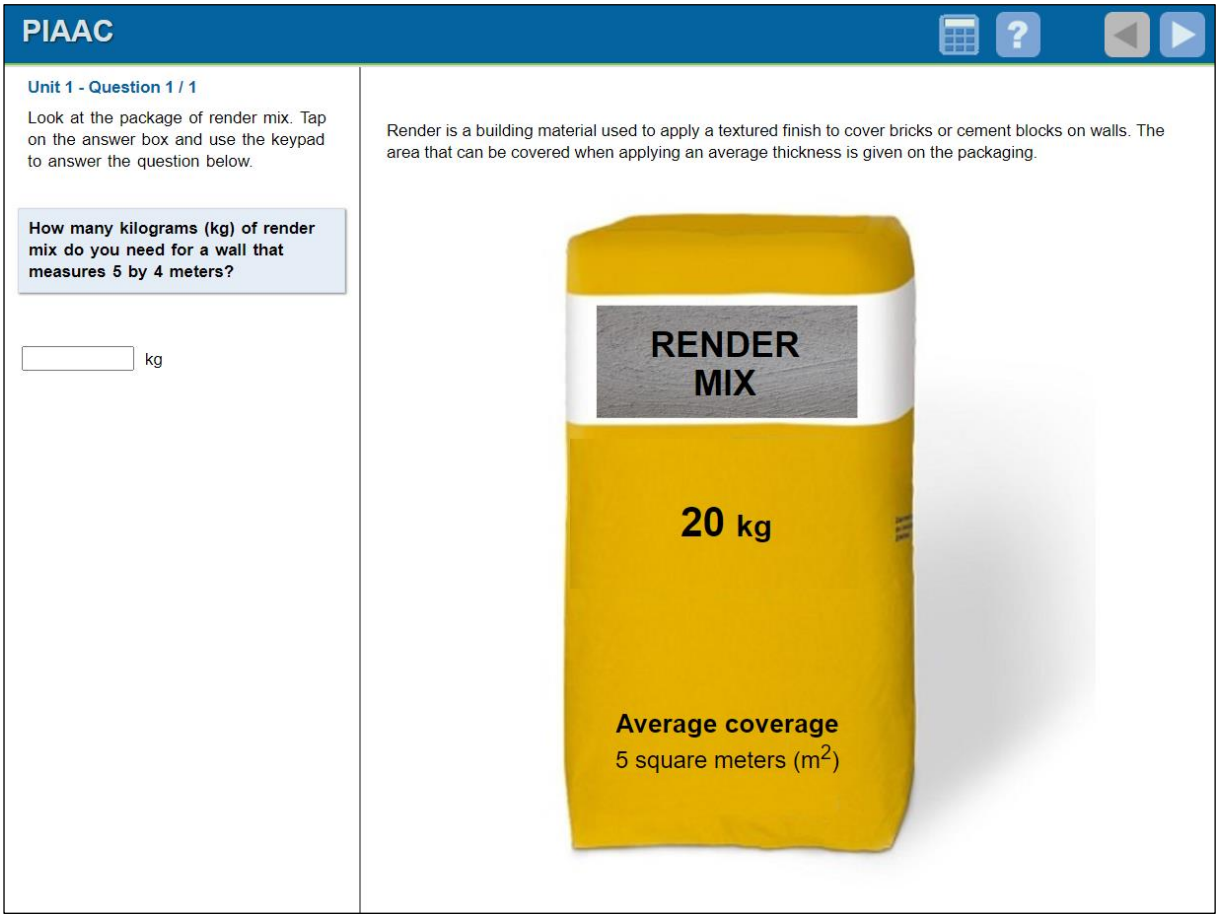
Sample item 2: Render Mix

In this second sample item respondents must calculate the size of the wall to be covered by the render mix and then use the information on the packaging to determine how many kilograms of mix are needed.

The item focuses on the following aspects of the numeracy construct:

- process: act on and use mathematics
- content: space and shape
- representation: images of physical objects
- context: work.

Figure 2.7. Sample numeracy item 2: Render Mix



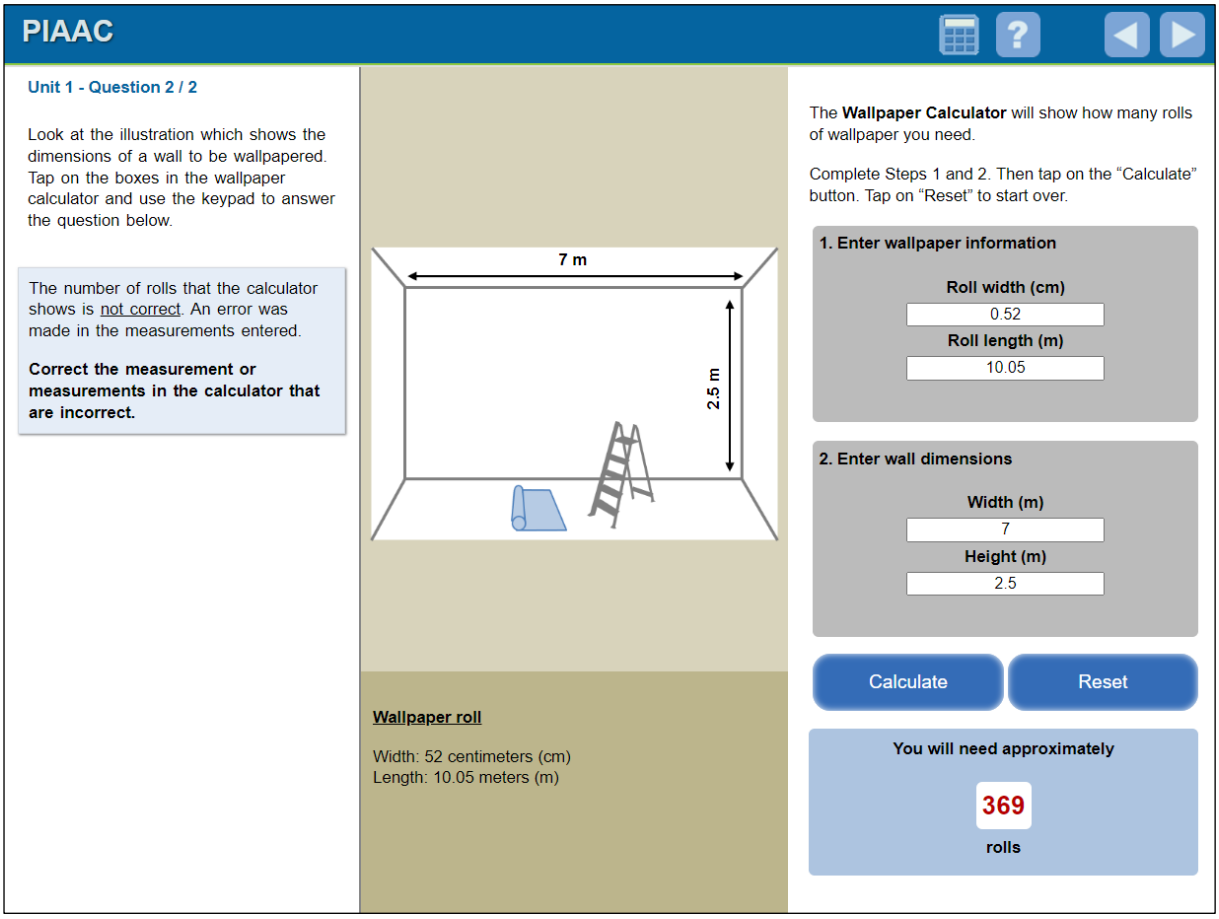
Sample item 3: Wallpaper

The third sample item is a numeric entry item, requiring respondents to fill in a number to answer. It uses a novel interactive tool, called “wallpaper calculator”. For this item, the wallpaper calculator has already been used to determine the number of rolls needed. However, an error was made with one or more values that were entered into the tool. The task is to identify the error(s) and enter the correct value(s).

The item focuses on the following aspects of the numeracy construct:

- process: evaluate, critically reflect, make judgements
- content: space and shape
- representation: dynamic application
- context: personal.

Figure 2.8. Sample numeracy item 3: Wallpaper



Numeracy components

The numeracy component assessment is a new element of the 2023 Survey of Adult Skills, and the first assessment of this kind in the context of large-scale international adult surveys. As for reading components, numeracy components should be thought of as basic numeracy skills that form a prerequisite to developing the more advanced numeracy skills measured in the numeracy assessment. The inclusion of numeracy components allows numeracy skills at the lowest end of the proficiency distribution to be measured more accurately.

Based on their review of the literature and consideration of both conceptual issues and delivery constraints, the Numeracy Expert Group recommended that the numeracy components assessment focus on number sense. Number sense relates to the understanding of quantities and how numbers represent quantities. The numeracy components items ask participants to estimate quantities from real-life pictures and to estimate the relative size of several numerical representations of quantities.

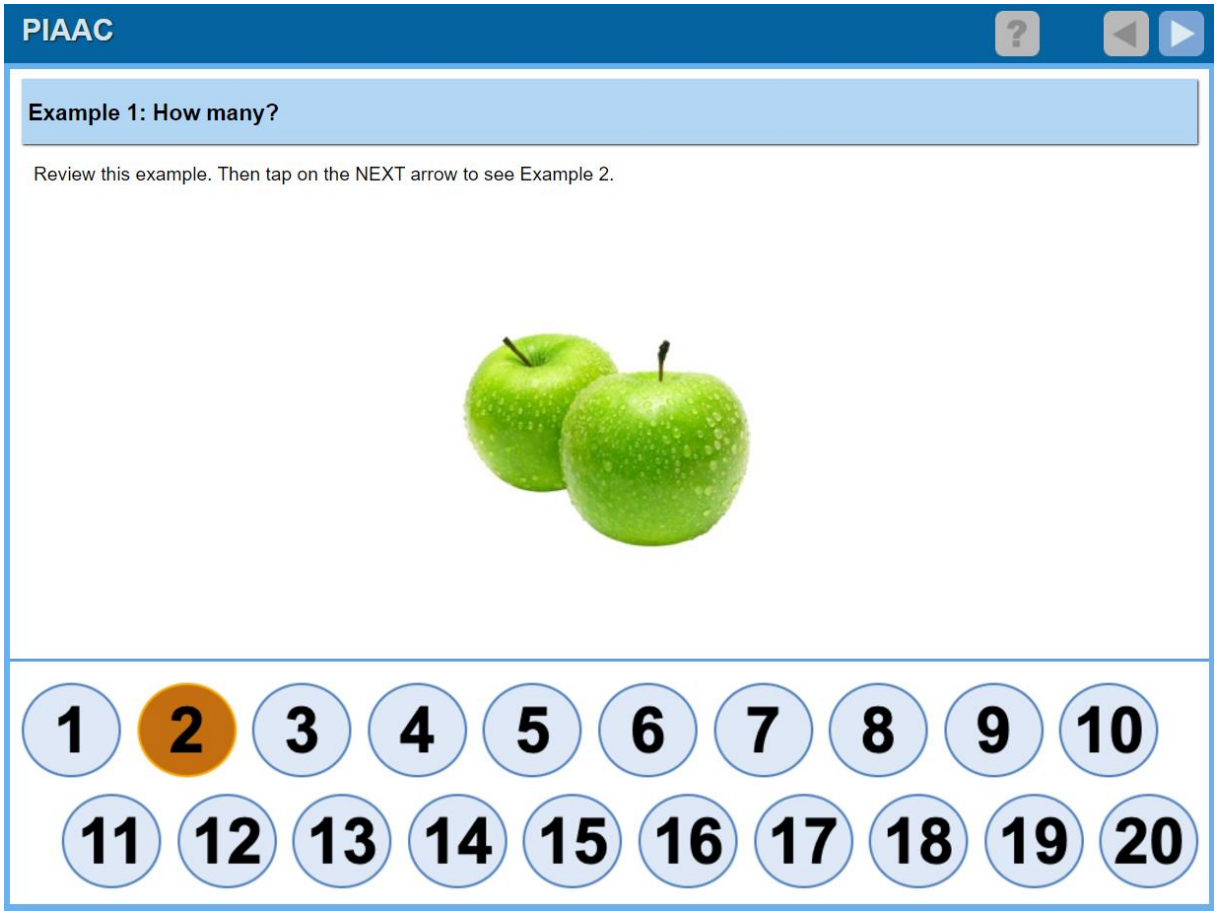
Numeracy components include two types of fluency-based measures, each focusing on different aspects of number sense: how many and which is biggest. *How many* tasks ask respondents to look at an image and identify how many items are shown. *Which is biggest* tasks ask respondents to identify the largest of four numbers.

Sample numeracy component items

How many?

Respondents are shown a screen with an image of a set of objects and are asked to tap on a number to indicate how many items are shown. As soon as a number is selected, the next screen displays. The items vary in terms of the number of objects shown and the format in which they are displayed (e.g. presented in an organised array, grouped or in a random visual display).

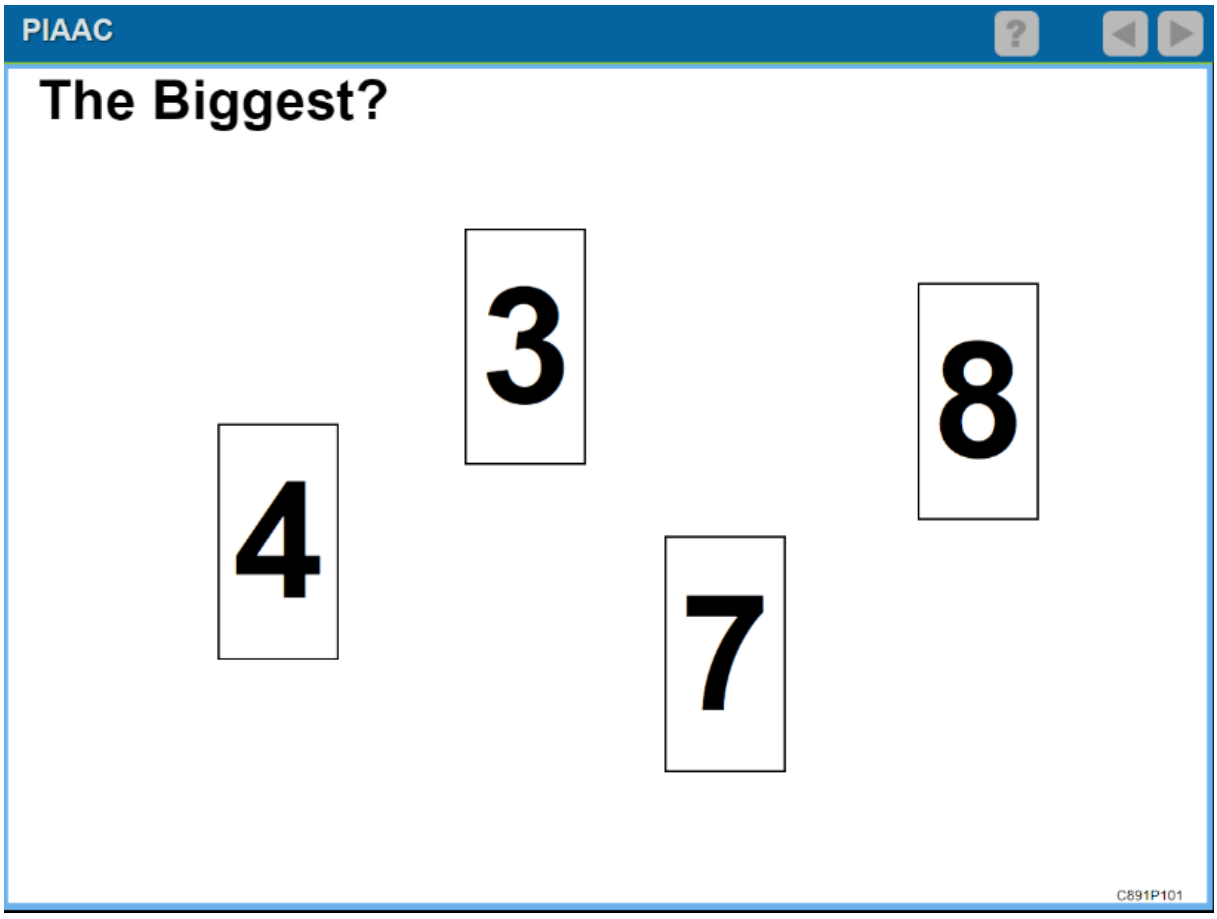
Figure 2.9. Sample numeracy component item: How many?



Which is biggest?

Respondents are shown a group of four numbers and asked to tap on the number that is biggest. As with the “how many?” items, once a selection is made, the next screen displays.

Figure 2.10. Sample numeracy component item: Which is biggest?



Additional "Which is biggest?" items display sets of numbers such as:

- 58 35 16 81
- 336 313 352 381
- 67.91 4.7 83 0.96
- 78.1 81.7 8.71 7.91

Adaptive problem solving

Adaptive problem solving (APS) is a new domain whose conceptual framework was specifically developed for the 2023 Survey of Adult Skills. APS was introduced to replace the assessment of problem solving in technology-rich environments (PSTRE) that was administered in the first cycle of the survey. PSTRE was exclusively focused on problems in digital environments and, as a consequence, it conflated problem solving and information and communication technologies (ICT) skills, as only test-takers with some (basic) ICT skills could participate and display proficiency in this domain. There was a sizeable non-response due to lack of familiarity with ICT devices or poor computer skills (between 8% and 57%, depending on the country). APS was therefore conceptualised as "general" problem solving, relevant to a range of information environments and contexts and not limited to digitally embedded problems.

The underlying conceptual model for APS was developed by Greiff et al. (2017[6]) who defined the three stages of problem solving (definition, search and application), the cognitive and metacognitive processes associated with each stage, and the information environments in which problem-solving tasks are situated.

This model highlighted important aspects of adaptive problem solving that should be a focus of the assessment. Additional specifications to define the scale and inform item development were undertaken by the APS Expert Group and articulated in the final framework for this domain.

Definition

The conceptual framework defines adaptive problem solving as "(…) the capacity to achieve one's goals in a dynamic situation, in which a method for solution is not immediately available. It requires engaging in cognitive and metacognitive processes to define the problem, search for information, and apply a solution in a variety of information environments and contexts" (Greiff et al., 2021[7]).

Within this definition are key features specific to adaptive problem solving compared to problem solving more generally. One critical feature of adaptive problem solving tasks is that these problems involve *dynamic situations*, where resources and information needed to solve a problem are not readily available, or some aspect of the problem changes while the solution is being developed. Additionally, it emphasises the importance of *metacognition*. Metacognitive skills are called upon in order to monitor the problem-solving process and adapt solution strategies as a problem changes.

Content

The APS framework identifies three features of tasks that require adaptive problem solving skills:

- problem configuration
- dynamics of the situation
- features of the environment

Items were not classified based on these features but instead the test developers manipulated aspects of these features to develop tasks with a range of difficulty.

The *problem configuration* refers to the initial problem setup and goal state(s). This includes the elements presented in the problem, the relationships among those elements (e.g. whether they interact with each other or are independent) and the resources or operators made available to the problem solver.

The *dynamics of the situation* refers to the change (or absence of change) in the problem situation, the problem constraints across time and how these affect the problem configuration. It is the dynamism of the problem that requires respondents to demonstrate adaptive problem solving skills.[4] The number of features that change, along with the frequency and salience of those changes, drives the difficulty of an APS task.

Features of the environment refers to various features that are characteristic of the environment and the information and resources that are available. The adaptive problem solving process is affected by the amount and sources of available information and how relevant it is to solve the problem.

The APS framework also identifies the types of information sources that are available to solve a problem:

- physical resources
- social resources
- digital resources.

Physical resources are hands-on and can be manipulated. These might include resources available for driving a car or operating machinery by pressing buttons and pulling levers. *Social resources* require the problem solver to engage in interpersonal and social interactions. These include planning an activity with friends or leading a group discussion. *Digital resources* require the problem solver to use of digital knowledge and skills to interact with digital features or devices. Examples include using digital tools to sort a table, send an email or format text.

Cognitive and metacognitive processes

As stated in the definition, adaptive problem solving involves both cognitive and metacognitive processes. Metacognitive processes become more important as problems become more complex and have aspects that change during the course of solving them. Different cognitive and metacognitive processes may be required within each of the three stages of problem solving: defining the problem, searching for information relevant to the solution of the problem and applying a solution.

Defining the problem

The three *cognitive processes* associated with this stage of problem solving are: selecting, organising and integrating problem information into a mental model; retrieving relevant background information; and externalising an internal problem representation by creating a table, making a drawing, etc. The two *metacognitive processes* are goal setting and monitoring problem comprehension.

Searching for information relevant for a solution

The framework identifies two *cognitive processes* associated with searching for a solution: searching for operators, within the mental model and in the environment, and evaluating how well these operators satisfy the problem constraints. The *metacognitive processes* associated with searching for a solution involve evaluating resources with respect to whether they can be executed. In the artificial problem-solving context of an assessment, this evaluation process is difficult to distinguish from the cognitive processes described above. Therefore, the expert group specified that items that tapped into this process should be coded for analysis as requiring both cognitive and metacognitive processes.

Applying a solution

The primary *cognitive process* in the third stage is to implement the selected operator(s) to solve the problem. As part of the *metacognitive processes* associated with applying a solution, problem solvers must evaluate whether they are progressing towards the goal and take actions if they are not. This involves monitoring progress, regulating the application of the operators and reflection.

Contexts

The situational contexts in which a problem might be embedded are:

- work
- personal
- social and community.

Problems in a *work* context might include situations where one is working under supervision or with co-workers. Tasks in a *personal* context include problems related to one's home, family, education, hobbies and finances. *Social and community* tasks may include interactions with others in leisure activities or use of community resources.

Distribution of test items by task characteristics

A total of 65 adaptive problem solving items were included in the final item pool. Items were selected from this pool to construct the assessments administered in the 2023 Survey of Adult Skills. Table 2.4 shows the distribution of the pool items.

Table 2.4. Distribution of adaptive problem solving items across the framework dimensions

	Number (65 items)	Percent
Information environment		
Digital	26	40%
Physical	24	37%
Social	15	23%
Cognitive processes		
Definition	19	29%
Searching	33	51%
Application	13	20%
Metacognitive processes		
Definition	23	35%
Searching	22	34%
Application	12	19%
Not applicable (static items)	8	12%
Context		
Work	26	40%
Personal	27	42%
Social/community	12	18%

Note: Static items with no dynamic features do not require the application of metacognitive strategies.

Sample adaptive problem solving items

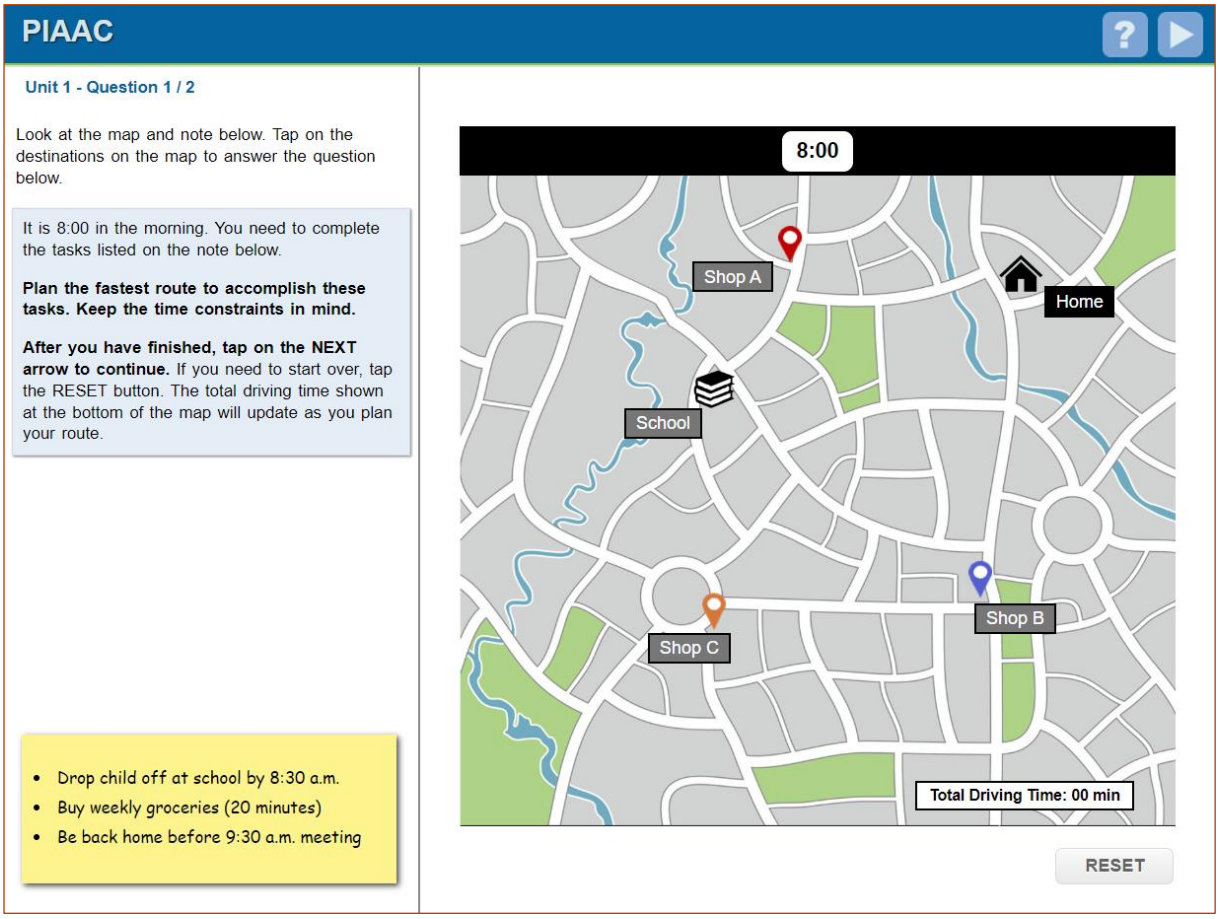
All the sample items for adaptive problem solving are taken from a single unit, in which the problem solver is asked to use an interactive map to accomplish pre-defined goals. Initially, the situation is static; it then becomes dynamic as obstacles change the presented problem and the available solutions. To view an interactive version of these sample items, see https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html.

Sample item 1: Best Route, question 1

In the first item, the problem solver needs to use an interactive map to find the fastest route to accomplish three goals, keeping a set of time constraints in mind.

The problem solver needs to: take a child to school by a designated time, purchase groceries and return home by a designated time. The total driving time (shown at the bottom right of the screen) updates as the route is selected by the respondent. This could be considered a standard problem-solving task, in which a solution needs to be found given some constraints that need to be satisfied.

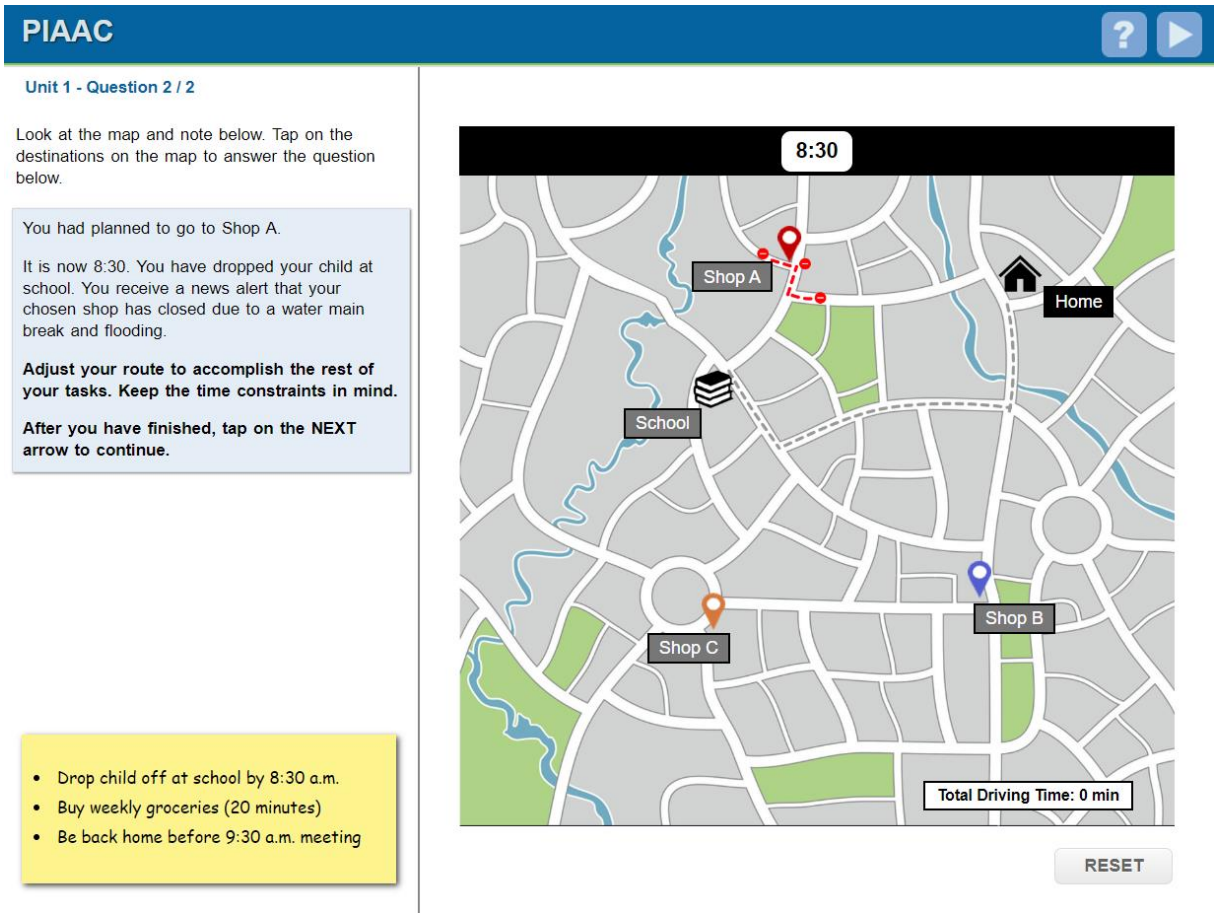
Figure 2.11. Sample adaptive problem solving item 1: Best Route



Sample item 2: Best Route, question 2

In the second item, the situation becomes dynamic as the problem solver has to deal with new circumstances that interfere with the initial problem solution. Impasses must be overcome and additional constraints need to be taken into consideration when adapting the initial problem solution.

Figure 2.12. Sample adaptive problem solving item 2: Best Route



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Notes

[1] See Chapter 6 for a more in-depth discussion of the relationship between the 2023 Survey of Adult Skills and previous international surveys of adult skills.

[2] In the first cycle of the Survey of Adult Skills, the locator test (which was referred to as the "core") included only eight items. The larger number of items included in the 2023 Survey of Adult Skills locator, as well as the inclusion of a few tasks of medium difficulty, allows the skills of low-performing adults to be more accurately measured without requiring them to take the full assessment. The assessment design is described in more detail in Chapter 5, and the differences between the first and the second cycles of the survey are discussed in Chapter 6.

[3] The composition of the different expert groups is reported in Annex B.

[4] It should be noted that the expert group specified that a small number of APS units should not include dynamic elements – i.e. that they should be static. These were included as baseline problem-solving tasks and were intended to be the easiest of the APS tasks.

3 Reporting the results of the 2023 Survey of Adult Skills

This chapter describes the proficiency levels used to report the results of the 2023 Survey of Adult Skills. It also provides information on the reporting of results for participating countries and economies that conducted the survey in more than one language.

This chapter describes how the results from the 2023 Survey of Adult Skills are reported. It shows how the literacy, numeracy and adaptive problem solving items used in the assessment are categorised according to difficulty; the cognitive processes required of adults to answer the questions; the real-life contexts in which such problems/questions may arise; and the way in which items are delivered to respondents, as described in their respective assessment frameworks (OECD, 2021[1]).

Proficiency levels for each domain describe in detail what adults can do when their score is within a certain range. This chapter presents how the proficiency levels were constructed and how they relate to proficiency scores. It concludes with information about the languages in which the survey was conducted and the approach to reporting in countries and economies where the assessment was delivered in more than one language.

Proficiency scales

In each of the three domains assessed, proficiency is considered a continuum of ability involving the mastery of information-processing skills that allow tasks of increasing complexity to be solved. The proficiency of respondents (their assessment results) and the difficulty of the assessment items are expressed on the same 500-point scale. At each point on the scale, an individual with a proficiency score of that value has a 67% chance of successfully completing test items given that difficulty value.[1] This individual will also have a lower likelihood of being able to complete more difficult items (those with higher values on the scale), and a greater likelihood of successfully completing easier items (those with lower values on the scale).

For instance, Table 3.1 shows the probability of a person who scores 300 points on the literacy scale completing tasks of the same, greater and lesser difficulty. This person will successfully complete items whose difficulty matches their proficiency (300 points on the literacy scale) 67% of the time; their chances of completing easier items (with a difficulty value of 250) are as high as 95%, but the chances of correctly answering more difficult items (with a difficulty value of 350) drop to 28%.

Table 3.1. Probability of successfully completing items of varying difficulty for a person scoring 300 on the literacy scale

	Item difficulty (literacy scale)			
	200	250	300	350
Probability of success	0.97	0.95	0.67	0.28

Proficiency levels

The proficiency scale in each of the domains assessed can be described in relation to the items that are located at the different points on the scale according to their difficulty. Annex A presents the characteristics of all items used in the 2023 Survey of Adults Skills to assess literacy, numeracy and adaptive problem solving. These characteristics include the item's difficulty as well as other key features, such as the cognitive processes needed to engage with it and the context in which the task was framed.

The scales have been divided into "proficiency levels" defined by particular score-point thresholds. Six proficiency levels are defined for literacy and numeracy (below Level 1 and Levels 1 to 5) and five for adaptive problem solving (below Level 1 and Levels 1 to 4). To help interpret of the results, the experts who designed the assessments have developed a summary description of the characteristics of the types of tasks that adults at a particular level can successfully complete. In other words, they offer a summary of what adults with proficiency scores within a range in a particular domain can do.

Except for the lowest level (below Level 1), a person scoring at the bottom of the range defining a given level has a 50% chance of successfully completing the tasks located at that level. This probability will, of course, vary with the difficulty of each particular item, as illustrated in Table 3.1. For example, a person with a score at the bottom of Level 2 would correctly answer about half of the items in a hypothetical assessment containing only items of Level 2 difficulty, while a person whose proficiency is at the top of Level 2 could correctly answer many more. An individual with a proficiency score around the mid-point of Level 2 will successfully answer about 67% of the items in this hypothetical assessment.

Literacy and numeracy

Table 3.2 and Table 3.3 contain the score-point thresholds for each of the six levels for literacy, and numeracy, and the descriptors of what respondents located at each of the levels are able to do. Box 3.1 and Box 3.2 provide illustrative item maps for literacy and numeracy for one item in each proficiency level.

In the case of literacy and numeracy, the score-point ranges associated with each level are the same as those used in the first cycle of the Survey of Adult Skills. These in turn were based on the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL) for document and prose literacy and ALL for numeracy. However, the descriptors of the proficiency levels in the 2023 Survey of Adult Skills differ from those of previous surveys because the underlying frameworks have evolved. This evolution does not prevent results from being compared over time, as strong links (both conceptually and through the presence of many common assessment items) remain between the different surveys (see Chapter 6).

Table 3.2. Proficiency levels: Literacy

Level	Score range	Literacy
5	Equal to or higher than 376 points	At Level 5, the assessment provides no direct information on what adults can do. This is mostly because feasibility concerns (especially with respect to testing time) precluded the inclusion of highly difficult tasks involving complex interrelated goal structures, very long or complex document sets, or tools containing highly complex texts (e.g. extensive catalogues, complex menu structures, or lists of unstructured results from search engines), which require advanced skills to access and process the information they contain. These tasks, however, form part of the construct of literacy in today's world, and future assessments aiming at a better coverage of the upper end of the proficiency scale may seek to include testing units tapping into literacy skills at Level 5. The characteristics of the most difficult tasks at Level 4 offer some insight into what might constitute proficiency at Level 5. Adults at Level 5 may be able to reason about the task itself, setting up reading goals based on complex and implicit requests. They can presumably search for and integrate information across multiple, dense texts containing distracting information in prominent positions. They are able to construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments and the reliability of unfamiliar information sources. Tasks at Level 5 may also require the application and evaluation of abstract ideas and relationships. Evaluating the reliability of evidentiary sources and selecting information which is not just topically relevant but also trustworthy may be key to achievement.
4	326 to less than 376 points	At Level 4, adults can read long and dense texts presented on multiple pages in order to complete tasks that involve accessing, understanding, evaluating and reflecting on the text(s) contents and sources across multiple processing cycles. Adults at this level can infer what the task is asking for based on complex or implicit statements. Successful task completion often requires the production of knowledge-based inferences. Texts and tasks at Level 4 may deal with abstract and unfamiliar situations. They often feature both lengthy content and a large amount of distracting information, which is sometimes as prominent as the information required to complete the task. At this level, adults are able to reason based on intrinsically complex questions that share only indirect matches with the text content, and/or require taking into consideration several pieces of information dispersed throughout the materials. Tasks may require evaluating subtle evidence claims or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Response modes may involve assessing or sorting complex assertions.

3	276 to less than 326 points	Adults at Level 3 are able to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. They can identify, interpret or evaluate one or more pieces of information, often employing varying levels of inference. They can combine various processes (accessing, understanding and evaluating) if the task requires. Adults at this level can compare and evaluate multiple pieces of information from the text(s) based on their relevance or credibility. Texts at this level are often dense or lengthy, including continuous, non-continuous and mixed texts. Information may be distributed across multiple pages, sometimes arising from multiple sources that provide conflicting information. Understanding rhetorical structures and text signals becomes more central to successfully completing tasks, especially when dealing with complex digital texts that require navigation. The texts may include specific, possibly unfamiliar, vocabulary and argumentative structures. Competing information is often present and sometimes salient, though no more than the target information. Tasks require the respondent to identify, interpret or evaluate one or more pieces of information, and often require varying levels of inference. Tasks at Level 3 also often demand that the respondent disregard irrelevant or inappropriate text content to answer accurately. The most complex tasks at this level include lengthy or complex questions requiring the identification of multiple criteria, without clear guidance regarding what has to be done.
2	226 to less than 276 points	At Level 2, adults are able to access and understand information in longer texts with some distracting information. They can navigate within simple multi-page digital texts to access and identify target information from various parts of the text. They can understand by paraphrasing or making inferences, based on single or adjacent pieces of information. Adults at Level 2 can consider more than one criterion or constraint in selecting or generating a response. The texts at this level can include multiple paragraphs distributed over one long or a few short pages, including simple websites. Non-continuous texts may feature a two-dimension table or a simple flow diagram. Access to target information may require the use of signalling or navigation devices typical of longer print or digital texts. The texts may include some distracting information. Tasks and texts at this level sometimes deal with specific, possibly unfamiliar, situations. Tasks require respondents to perform indirect matches between the text and content information, sometimes based on lengthy instructions. Some task statements provide little guidance about how to perform the task. Task achievement often requires the test taker to either reason about one piece of information or to gather information across multiple processing cycles.
1	176 to less than 226 points	Adults at Level 1 are able to locate information on a page of text, find a relevant link from a website, and identify relevant text among multiple options when the relevant information is explicitly cued. They can understand the meaning of short texts, as well as the organisation of lists or multiple sections within a single page. The texts at Level 1 may be continuous, non-continuous or mixed and pertain to printed or digital environments. They typically include a single page with up to a few hundred words and little or no distracting information. Non-continuous texts may have a list structure (such as a web search engine results page) or include a small number of independent sections, possibly with pictorial illustrations or simple diagrams. Tasks at Level 1 involve simple questions providing some guidance as to what needs to be done and a single processing step. There is a direct, fairly obvious match between the question and target information in the text, although some tasks may require the examination of more than one piece of information.
Below Level 1	Less than 176 points	Most adults below Level 1 are able to process meaning at the sentence level. Given a series of sentences that increase in complexity, they can tell if a sentence does or does not make sense either in terms of plausibility in the real world (i.e. sentences describing events that can versus those that cannot happen), or in terms of the internal logic of the sentence (i.e. sentences that are meaningful versus those that are not). Most adults at this level are also able to read short, simple paragraphs and, at certain points in the text, tell which of two words makes the sentence meaningful and consistent with the rest of the passage. Finally, they can access single words or numbers in very short texts in order to answer simple and explicit questions. The texts below Level 1 are very short and include no or just a few familiar structuring devices such as titles or paragraph headers. They do not include any distracting information nor navigation devices specific to digital texts (e.g. menus, links or tabs). Tasks below Level 1 are simple and very explicit regarding what to do and how to do it. These tasks only require understanding at the sentence level or across two simple adjacent sentences. When the text involves more than one sentence, the task merely requires dealing with target information in the form of a single word or phrase.

Box 3.1. Illustrative item map: Literacy

In addition to the released items (available at https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html), the selected items below illustrate the types of tasks within each level by describing non-released items and mapping them to the literacy framework.

Banking (C503P001)

- difficulty: below Level 1 (161 points)
- cognitive process: accessing text (locate information within texts)
- source: single
- pages: single
- context: personal

Based on an image of a very brief text message from a bank, respondents are asked to identify how long a provided identification code is valid. There is some distracting information in the message, with "code" or "identification code" being present in three locations. However, the very limited amount of text plus the fact that a time is listed in only a single location, makes the correct response easy to locate.

BiciMAD (C509P003)

- difficulty: Level 1 (215 points)
- cognitive process: accessing text (locate information within texts)
- source: single
- pages: single
- context: community and citizenship

This task is at the higher end of Level 1 and is based on a short section of a brochure with information about an electric bicycle rental programme. The brochure explains that bicycles are stored at stations around the city, with a number of bases at each station. Respondents are asked to identify the number of bases in the city. That information is explicitly listed in the brochure, but locating the information is a bit more complex for several reasons: the text is longer and the context may be unfamiliar to some respondents, there is no explicit structure (such as headings) to signal where the requested information is located, and there are several other numbers in the text that present distracting information.

App Comparison (C511P004)

- difficulty: Level 2 (230 points)
- cognitive process: evaluating
- source: multiple
- pages: single
- context: personal

The stimulus for this task consists of a web page with reviews of several apps for storing and organising photos posted by five individuals. Respondents are asked how one of those reviews could be made more credible. This item is the easiest "evaluate" item in the assessment. The task requires respondents to go beyond understanding the content of the specified review and to think about how each of four plausible options would or would not improve credibility.

Recycling Guide (C517P004)

- difficulty: Level 2 (270 points)
- cognitive process: accessing text (identify relevant text)
- source: multiple
- pages: multiple
- context: community and citizenship

This access task is situated in a simulated website consisting of six pages. The number of pages and the dynamic nature of the display adds to the complexity of the task because the respondent must identify the relevant page to locate the requested information. The task opens on the home page of a community recycling site and respondents are asked how residents can order a recycling cart. Respondents need to navigate to the Frequently Asked Questions page, where the information is provided. The names of the pages do not provide strong clues about where to look. Once the correct page is located, there are several mentions of recycling carts, creating distracting information. Together, these features make this one of the most difficult items in Level 2.

Online Learning (C516P004)

- difficulty: Level 3 (325 points)
- cognitive process: evaluating
- source: multiple
- pages: multiple
- context: education and training

This task includes two text sources. The first is a multi-paragraph narrative written by an employee at a manufacturing company describing his experience taking an online training course provided by the company. The second is an advertisement for online worker training programmes. The advertisement includes a list of several advantages of online learning. Respondents are asked to identify the advantages that are supported by the training experiences described by the employee in his narrative. There are no direct statements in the narrative that exactly match the items in the list of advantages in the advertisement, so making those connections requires a deeper understanding of the employee's statements. This factor, along with the need to integrate and compare information across two texts, makes this the most difficult Level 3 item in the assessment.

Desk Cycling (C514P004)

- difficulty: Level 4 (362 points)
- cognitive process: understanding (inferential)
- source: multiple
- pages: multiple
- context: work and occupation

The stimulus for this task includes two text sources: an article about desk cycling (i.e. using a small pedalling device that fits under a desk and can be used for exercise while working) and a blog where four users share their experience using this device. Respondents are asked to identify a statement on which one of the bloggers (identified in the item) and the study director quoted in the article would agree. Some of the provided options are true for one individual but not both, or are true for a different blogger. Respondents must integrate and compare information across the two sources, making this one of the more difficult items in the assessment.

Table 3.3. Proficiency levels: Numeracy

Level	Score range	Numeracy
5	Equal to or higher than 376 points	Adults at Level 5 can use and apply problem-solving strategies to analyse, evaluate, reason and critically reflect on complex and formal mathematical information, including dynamic representations. They demonstrate an understanding of statistical concepts and can critically reflect on whether a data set can be used to support or refute a claim. Adults at this level can determine the most appropriate graphical representation for relational data sets.
4	326 to less than 376 points	Adults at Level 4 can use and apply a range of problem-solving strategies to access, analyse, reason and critically reflect on and evaluate a broad range of mathematical information that is often presented in unfamiliar contexts. Such information may not be presented in an explicit manner. Adults at this level can devise and implement strategies to solve multi-step problems. This may involve reasoning about how to integrate concepts from different mathematical content areas or applying more complex and formal mathematical procedures. Adults at this level can: • calculate and interpret rates and ratios • devise a strategy to compare large data sets • read and interpret multi-variate data presented in a single graph • analyse complex, authentic algebraic formulae to understand relationships between variables • reflect and reason mathematically to review and evaluate the validity of statistical or mathematical conclusions, claims or arguments while accommodating relevant conditions • formulate a problem so that the result will be at the required level of specificity to the context of the situation.
3	276 to less than 326 points	Adults at Level 3 can access, act on, use, reflect on and evaluate authentic mathematical contexts. This requires making judgements about how to use the given information when developing a solution to a problem. The mathematical information may be less explicit, embedded in contexts that are not always commonplace, and use representations and terminology that are more formal and involve greater complexity. Adults at this level can complete tasks where mathematical processes require the application of two or more steps and where multiple conditions need to be satisfied. Tasks may also require the use, integration or manipulation of multiple data sources in order to undertake the mathematical analyses necessary for the specific task. Adults at this level can: • estimate or perform calculations with a wide range of whole numbers, decimals, percentages, fractions, and measurements, including the application of proportional reasoning • determine a missing value from a data set given the mean • recognise and use patterns (visual and numerical) to estimate values • reflect on and use mathematical reasoning when reviewing and evaluating the validity of conclusions drawn from data, including a limited set of related conditions or statements • evaluate claims and stated relationships using a variety of data sources • recognise a formulation using non-standard notation • use spatial-visualisation to analyse figures, including moving from three- to two-dimensional representations.
2	226 to less than 276 points	Adults at Level 2 can access, act on and use mathematical information and evaluate simple claims, in tasks set in a variety of authentic contexts. They are able to interpret and use information presented in slightly more complex forms (e.g. doughnut charts, stacked bar graphs or linear scales) that includes more formal terminology and more distracting information. Adults at this level can carry out multi-step mathematical processes. Adults at this level can: • use dynamic applications to perform simple measurements, and access and sort data given in tables or interactive charts • apply simple proportional reasoning or solve problems satisfying up to two conditions • formulate processes and expressions to represent situations mathematically, including combining and linking information • use mathematical reasoning when reviewing and evaluating the validity of statements • estimate or perform calculations involving fractions, decimals, time, measurements and less common percentages or perform routine algorithms such as that used to generate the mean • substitute into and evaluate contexts involving authentic algebraic formulae • identify patterns within two-dimensional geometrical representations.

1	176 to less than 226 points	Adults at Level 1 demonstrate number sense involving whole numbers, decimals, and common fractions and percentages. They can access, act on and use mathematical information located in slightly more complex representations set in authentic contexts where the mathematical content is explicit and uses informal mathematical terminology with little text and minimal distracting information. They can devise simple strategies using one or two steps to determine the solution. Adults at this level can: • interpret simple spatial representations or a scale on a map • identify and extract information from a table or graphical representation or complete a simple whole-number bar chart • identify the largest value in an unordered list, including comparing the decimal part of the number • interpret and perform basic arithmetic operations, including multiplication and division, with whole numbers, money and common whole number percentages such as 25% and 50%.
Below Level 1	Less than 176 points	Adults performing below Level 1 demonstrate elementary whole number sense and can access and use mathematical knowledge to solve single-step problems, where the information is presented using images or simple structured information set in authentic, commonplace contexts with little or no text or distracting information. The mathematical content is non-formal and explicit. Adults at this level can: • count up to 20 objects that are displayed with varying degrees of organisation (i.e. randomly arranged, separated into groups or in an array) • sort events into chronological order • compare unordered lists of numbers to identify the largest number based on the whole-number component • locate data directly from a graph • perform addition and subtraction with small whole numbers.

Box 3.2. Illustrative item map: Numeracy

In addition to the released items (available at https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html), the selected set of items below illustrates the types of tasks within each level by describing non-released items and mapping them to the numeracy framework.

Moving (C815P002)

- difficulty: below Level 1 (174 points)
- cognitive process: accessing and assessing situations mathematically
- representation: images of objects
- content: quantity and number
- context: work

In this task, a note containing the number of moving boxes needed for each of five rooms is shown, and respondents are asked to calculate the total number of boxes needed. The required operation of addition is signalled by the use of “total” in the question, and there are no extraneous numbers or distracting information included in the stimulus. The numbers that must be added are all whole numbers less than or equal to ten. These features of the stimulus and question make this one of the easiest tasks on the PIAAC numeracy scale.

Bike Tour (C801P001)

- difficulty: Level 1 (198 points)
- cognitive process: acting on and using mathematics
- representation: text or symbols

- content: quantity and number
- context: personal

In this task, an advertisement for a bike tour is presented that shows the number of kilometres that bikers will ride each day on a three-day tour. Respondents are asked to determine the length, in kilometres, of the "complete tour". However, nowhere in the advertisement is the phrase "complete tour" used, nor is a total distance given. Hence, respondents need to act on the information provided and decide how to use the advertisement to answer the question. The numbers in the problem are all two-digit whole numbers.

Expenses (C811P002)

- difficulty: Level 2 (229 points)
- cognitive process: accessing and assessing situations mathematically
- representation: dynamic applications
- content: data and chance
- context: personal

This task is based on a simulated app used to monitor monthly expenses in six categories. At the start of the task, the only visible information in the app is buttons for two specific months. Based on the information in the question, respondents must select the correct month to view a doughnut chart of the expenses for that month. Tapping on any segment of the doughnut chart displays the amount spent in that category as well as the percentage of the monthly expenses that the category represents. Respondents are asked to identify the three categories with the highest spending and then use the drag-and-drop function to put them in order from highest to third highest in terms of spending.

Zoo Visitors (C833P002)

- difficulty: Level 3 (280 points)
- cognitive process: evaluating, critically reflecting and making judgements
- representation: structured information
- content: quantity and number
- context: work

The stimulus for this task is a table showing the average number of visitors that arrive at each of the four entrance gates during each hour that a zoo is open. Respondents are asked to determine in which time slot it would be most helpful to have additional staff members in order to reduce waiting time at the entrances. Actual waiting times are not given in the table, so respondents need to understand how these data are related to wait times and then devise a strategy that can be used to complete the task. There is a lot of information to process in the table, and the total number of visitors during several of the time periods is very similar, which adds to the complexity of choosing the best strategy in this task.

Electric Cars (C810P002)

- difficulty: Level 4 (348 points)
- cognitive process: evaluating, critically reflecting and making judgements
- representation: structured information
- content: change and relationships
- context: social/community

The stimulus for this task includes two bar graphs: one showing the purchase price for three cars (one diesel, one petrol and one electric), and another graph showing the average cost per kilometre to drive each of these car types. Respondents are asked to calculate how long it would take to recoup the higher purchase price of an electric car as compared to the lower-priced diesel car, based on the different fuel costs for each type of car and the average number of kilometres she drives each year. Respondents must devise a strategy for integrating the information, and several computational steps are required to complete the task. The data in each graph are monetary amounts while the answer needs to be in terms of years and months, which adds to the complexity of the task.

Flying Hours (C812P003)

- difficulty: Level 5 (496 points)
- cognitive process: accessing and assessing situations mathematically
- representation: dynamic application
- content: data and chance
- context: social/community

The stimulus for this task is a table of data showing the average number of flying hours and average monthly salary per pilot for ten different airlines. Respondents are asked to identify the best type of graph to display the relationship between these variables. Tapping on an image of each of the four types of graphs given as the options shows the data displayed in that type of graph. However, only one type of graph shows the correct relational nature of these data, so the item requires a relatively sophisticated understanding of statistical representations.

Table 3.4 and Table 3.5 expand on the simple example made in Table 3.1. They show how the probability of correctly answering literacy and numeracy items at different levels of difficulty varies with the proficiency of respondents. An adult with a proficiency score of 300 in literacy (i.e. the mid-point of Level 3) has a 68% chance of successfully completing items of Level 3 difficulty, but only has a 29% chance of providing a correct answer to items of Level 4 difficulty. The probability of successfully completing items of Level 2 difficulty, on the other hand, is as high as 90%.

Table 3.4. Probability of successfully completing items of varying difficulty levels by proficiency score: Literacy

Item difficulty	Proficiency score											
	150	175	200	225	250	275	300	325	350	375	400	425
Level 4	0.00	0.01	0.02	0.04	0.07	0.14	0.26	0.43	0.61	0.77	0.88	0.94
Level 3	0.07	0.12	0.19	0.29	0.40	0.54	0.66	0.77	0.85	0.91	0.94	0.97
Level 2	0.24	0.34	0.45	0.56	0.67	0.76	0.83	0.89	0.93	0.95	0.97	0.98
Level 1	0.32	0.49	0.67	0.81	0.90	0.95	0.97	0.99	0.99	1.00	1.00	1.00

Table 3.5. Probability of successfully completing items of varying difficulty levels by proficiency score: Numeracy

Item difficulty	Proficiency score											
	150	175	200	225	250	275	300	325	350	375	400	425
Level 4	0.04	0.07	0.10	0.15	0.23	0.32	0.43	0.55	0.66	0.76	0.84	0.89
Level 3	0.08	0.13	0.20	0.29	0.41	0.54	0.67	0.77	0.85	0.91	0.94	0.96
Level 2	0.05	0.12	0.26	0.46	0.68	0.84	0.93	0.97	0.99	1.00	1.00	1.00
Level 1	0.50	0.59	0.67	0.75	0.81	0.86	0.90	0.93	0.95	0.96	0.97	0.98

Adaptive problem solving

The adaptive problem solving scale was divided into four proficiency levels. Table 3.6 presents the score-point ranges defining each level and the descriptors of what respondents located at each of the levels are able to do. Box 3.3 provides an illustrative item map for adaptive problem solving.

Table 3.6. Proficiency levels: Adaptive problem solving

Level	Score range	The types of tasks completed successfully at each level of proficiency
Level 4	Equal to or higher than 326 points	Adults at Level 4 are able to define the nature of problems in ill-structured and information-rich contexts. They can integrate multiple sources of information and their interactions, identify and disregard irrelevant information, and formulate relevant cues. Adults at this level can identify and apply multi-step solutions to meet one or more complex goals. They adapt the problem-solving process to changes, even if these changes are not obvious, occur unexpectedly or require a major re-evaluation of the problem. They are able to distinguish between relevant and irrelevant changes, predict future developments of the problem situation, and consider multiple criteria simultaneously to judge whether the solution process is likely to lead to success. Adults at Level 4 engage in the following cognitive processes: • develop complex mental models of problems by integrating information from multiple sources • establish connections between tasks and stimuli even if these connections are difficult to detect or contain complex interactions • develop strategies to reach several goals in parallel and implement multi-step solutions • continuously update their mental model, search strategies and solutions during problem solving. Adults at this level engage in the following metacognitive processes: • continuously reflect and monitor the problem-solving process even if the environment is complex and changes unexpectedly • constantly revisit and re-evaluate their mental model, the available information and goal attainment • show adequate and immediate reactions to change • cope with frequent and unpredictable change and adapt their solution strategy accordingly.
Level 3	276 to less than 326 points	Adults at Level 3 understand problems that are either static but more complex, or have an average to high level of dynamics. They can solve problems with multiple constraints or problems that require the attainment of several goals in parallel. In problems that change and require them to adapt, they can deal with frequent and, to some extent, continuous changes. They discriminate between changes that are relevant and those that are less relevant or unrelated to the problem. Adults at this level can identify and apply multi-step solutions that integrate several important variables simultaneously and consider the impact of several problem elements on each other. In dynamically changing problems, they predict future developments in the problem situation based on information collected from past developments. They adapt their behaviour according to the predicted change. Adults at Level 3 engage in the following cognitive processes: • generate mental models for moderately to highly complex problems • actively search for solutions by continuously evaluating the information provided in the problem environment • distinguish between relevant and irrelevant information. Adults at this level engage in the following metacognitive processes: • monitor comprehension of the problem and the changes in the problem • monitor and evaluate progress towards the goal of the problem • search for solutions by setting sub-goals and evaluating alternative solutions to the problem • reflect on their approach to solving the problem and, if necessary, revise their strategy.

Level 2	226 to less than 276 points	Adults at Level 2 can identify and apply solutions that consist of several steps to problems that require one target variable to be considered in order to judge whether the problem has been solved. In dynamic problems that exhibit change, adults at this level can identify relevant information if they are prompted about specific aspects of the change or if changes are transparent, occur only one at a time, relate to a single problem feature and are easily accessible. Problems at this level are presented in well-structured environments and contain only a few information elements with direct relevance to the problem. Minor impasses may be introduced but these can be resolved easily by adjusting the initial problem-solving procedure. Adults at Level 2 engage in the following cognitive processes: • develop mental models for simple to moderately difficult problems and adapt these as needed • adequately react to changes that are presented in visible increments • adapt resolution strategies to changes in the problem statement and the environment if these changes are of low or moderate cognitive complexity. Adults at this level engage in the following metacognitive processes: • monitor progress towards a solution that consists of one specific goal • search for optimal solutions by evaluating alternative solution paths within a given problem environment of low to moderate complexity • reflect on the chosen solution strategy if an impasse occurs and when explicitly prompted to adapt.
Level 1	176 to less than 226 points	Adults at Level 1 are able to understand simple problems, and develop and implement solutions to solve them. Problems contain a limited number of elements and little to no irrelevant information. Solutions at this level are simple and consist of a limited number of steps. Problems are embedded in a context that includes one or two sources of information and presents a single, explicitly defined goal. Adults at Level 1 engage in the following cognitive processes: • develop mental models of simple and clearly structured problems • understand connections between tasks and stimuli that are explicit and embedded in a well-structured environment • solve problems that do not change and thereby do not require adaptivity.
Below Level 1	Less than 176 points	Adults performing below Level 1 understand very simple static problems situated within a clearly structured environment. Problems contain no invisible elements, no irrelevant information that might distract from the core of the problem, and typically only require a single step to solve the problem. Adults at this proficiency level are able to engage in the basic cognitive processes required to solve problems if explicit support is given and if they are prompted to do so.

Box 3.3. Illustrative item map: Adaptive problem solving

In addition to the released items (available at https://www.oecd.org/en/about/programmes/piaac/piaac-released-items.html), the selected set of items below illustrates the types of tasks within each level by describing non-released items and mapping them to the APS framework.

Product Return (C107P001)

- difficulty: below Level 1 (170 points)
- cognitive process: searching for information relevant to the solution of the problem
- metacognitive process: not applicable
- information environment: digital
- context: personal

This is the first task in a unit situated in a simulated website environment. The environment is simple and well structured, consisting of five pages that contain only images and limited text. Each page can be accessed by clicking on a tab that has a name summarising the content on the page.

The task begins on the home page of the website, and the respondent is asked to follow a process for returning an item that was ordered on line. The wording of the problem is clearly defined and uses the keyword “return”, which exactly matches the label on one of the web page tabs (“Returns”). The direct match between the task and the relevant web page makes the solution very noticeable. Once the respondent navigates to the Returns page, there is only one action that can be taken on that page, which is to tap on a button to begin the return process. These features make this the easiest task on the PIAAC APS scale.

Transport (C101P001)

- difficulty: Level 1 (188 points)
- cognitive process: defining the problem
- metacognitive process: not applicable
- information environment: physical
- context: work

This task is situated in a simple, well-structured environment with a limited number of elements, consisting of a graphic of a delivery truck and three packages. Respondents are asked to drag and drop the packages onto the truck, given a limited set of constraints (e.g. the truck can only be loaded from the back to the front and the delivery order of the three packages). There is a single problem-solving goal, and operators are visible and arranged logically. To solve this problem, respondents must create a mental model of loading and then delivering the packages and co-ordinate this model with the images of the truck and packages.

Travel Planning (C109P003)

- difficulty: Level 2 (239 points)
- cognitive process: applying a solution
- metacognitive process: searching for information relevant to the solution of the problem
- information environment: digital
- context: social/community

To complete this task, respondents must review four travel options and select the one that best meets a set of requirements. A list of five requirements is provided, four of which are relevant to this task. The resources needed to solve the problem are well structured and consist of a table with several types of information: departure/arrival time (represented graphically), travel mode/duration of trip and round-trip cost. Respondents need to consider the four travel options and match the details with the constraints provided in the travel requirements. Although there are several elements to consider, the difficulty of this task is manageable because the elements can be considered independently when assessing each travel option. Each of the incorrect options can be eliminated by identifying the one travel requirement that it does not meet. This process of elimination requires respondents to use metacognitive processes related to searching for the solution by evaluating alternative solutions.

Garden Time (C102P005)

- difficulty: Level 3 (298 points)
- cognitive process: searching for information relevant to the solution of the problem

- metacognitive process: applying a solution
- information environment: digital
- context: personal

The overall task is to select a combination of three fertilisers that meet a set of optimal criteria for growing trees. This and the previous item in the unit share the same complex environment, which consists of an interactive tool for selecting amounts of fertilisers and two tables where the results of those selections can be viewed. In this environment, the critical information is unknown until respondents begin making their selections.

In this item, there is a change in the problem configuration that requires respondents to adapt their solution strategies. A new fertiliser is introduced, requiring respondents to reconsider the selections from the previous item. The change is explicitly mentioned in the problem statement, but the characteristics of the new fertiliser are only discoverable through the interactive tool. Respondents must derive the composition of the selected fertilisers (the two previous fertilisers and the new fertiliser) and monitor progress to evaluate when their selections best match the target. To complete this task correctly, respondents must generate a complex mental model by iteratively implementing solutions in the interactive tool. They must monitor and evaluate their progress as they work towards a final application of their solution.

Ships Ahoy (C114P005)

- difficulty: Level 4 (350 points)
- cognitive process: applying a solution
- metacognitive process: applying a solution
- information environment: physical
- context: personal

This is an example of a highly dynamic problem where respondents have to continuously adapt their solution to the latest evolution in the problem environment. The environment consists of an interactive simulation where respondents control the speed and direction of a boat as it travels around islands and under varying wind conditions to reach a harbour. The entire route is not visible from the start but is revealed as the boat progresses. Respondents must continuously monitor their progress and adapt the position and speed of the boat as they encounter obstacles while travelling to the harbour.

Table 3.7 shows the probability of adults with particular proficiency in adaptive problem solving items of different levels of difficulty.

Table 3.7. Probability of successfully completing items of varying difficulty levels by proficiency score: Adaptive problem solving

Item difficulty	Proficiency score											
	150	175	200	225	250	275	300	325	350	375	400	425
Level 4	0.12	0.17	0.22	0.29	0.37	0.46	0.55	0.63	0.71	0.78	0.84	0.88
Level 3	0.04	0.07	0.14	0.24	0.39	0.57	0.73	0.84	0.92	0.96	0.98	0.99
Level 2	0.05	0.11	0.23	0.44	0.66	0.83	0.93	0.97	0.99	0.99	1.00	1.00
Level 1	0.24	0.42	0.62	0.79	0.89	0.95	0.98	0.99	1.00	1.00	1.00	1.00

Test languages and reporting

Each country or economy participating in the 2023 Survey of Adult Skills had to choose which language or languages they would use to administer the assessment. Most frequently, they chose their official national language or languages. In some cases, they also chose a widely used language in addition to the national language. Participating countries and economies chose the most relevant and/or commonly used languages in economic and civic life (e.g. in interaction with public bodies and institutions, such as educational institutions). Table 3.8 shows which languages were used in which countries and economies.

Table 3.8. Test languages by country

OECD countries and economies	Language(s) of the direct assessment	Languages of the background questionnaire
OECD countries		
Austria	German	German
Canada	English, French	English, French
Chile	Spanish	Spanish
Czechia	Czech	Czech
Denmark	Danish	Danish
Estonia	Estonian, Russian	Estonian, Russian
Finland	Finnish, Swedish	Finnish, Swedish
France	French	French
Germany	German	German
Hungary	Hungarian	Hungarian
Ireland	English	English
Israel	Hebrew, Arabic	Hebrew, Arabic
Italy	Italian	Italian
Japan	Japanese	Japanese
Korea	Korean	Korean
Latvia	Latvian, Russian	Latvian, Russian
Lithuania	Lithuanian	Lithuanian
Netherlands	Dutch	Dutch
New Zealand	English	English
Norway	Norwegian (Bokmål)	Norwegian (Bokmål), English
Poland	Polish	Polish
Portugal	Portuguese	Portuguese
Slovak Republic	Slovak, Hungarian	Slovak, Hungarian
Spain	Castilian, Catalan, Basque, Galician, Valencian	Castilian, Catalan, Basque, Galician, Valencian
Sweden	Swedish	Swedish
Switzerland	French, Italian, German (standard), Swiss German	French, Italian, German (standard), Swiss German
United States	English	English, Spanish
Subnational entities		
Flemish Region (Belgium)	Dutch	Dutch
England (UK)	English	English
Partner countries		
Croatia	Croatian	Croatian
Singapore	English	English

It should always be borne in mind that proficiency in literacy, numeracy and adaptive problem solving can't be disentangled from proficiency in the language in which the assessment was administered. This is particularly important for interpreting the results of adults whose native language is different from the one used for the assessment. Their relatively poor performance in the assessment is not necessarily an indication of the lack of (abstract) "skills". A British citizen living and working in France may display poor literacy skills when taking the assessment in French but be a proficient reader with high literacy skills when working and interacting in English.

While most foreign-born adults living abroad would have sufficient proficiency in the language of the host country to participate in the survey and take the assessment, a small minority may lack the basic language proficiency to do so. In the first cycle of the Survey of Adult Skills, these adults were classified as "literacy-related non-respondents". As they were not even able to answer the background questionnaire, it was not possible to provide reasonable estimates of their literacy, numeracy and adaptive problem solving proficiency. In the first cycle of the survey, across the three data collection rounds between 2012 and 2018, 1.5% of adults were not able to take part in the survey because of insufficient proficiency in the questionnaire and assessment language; in the Flemish Region (Belgium) and the United States the share of adults in this situation exceeded 5%.

In order to collect more information on these adults, the 2023 Survey of Adult Skills introduced a new instrument called the doorstep interview. This is a short, self-administered questionnaire offered in 43 languages (the official languages of all 31 countries and economies participating in the survey, as well as the languages of the most important linguistic minorities in each country). Through the doorstep interview, adults with poor language proficiency in the assessment language were able to report key personal background information such as gender, age, level of education, employment status, country of birth and duration of residence in the survey country. The information collected through the doorstep interview was used to estimate the skills of such respondents, thus obtaining a more accurate picture of the distribution of skills in the overall adult population.

For those countries and economies that administered the assessment in more than one language, results are normally aggregated across the different languages, and a single measure of proficiency is reported. In other words, the average literacy proficiency in Estonia is computed as the average result of Estonian adults who took the assessment in Estonian or Russian. Only in Canada was the sample designed to allow proficiency to be reliably estimated separately for both English and French. OECD publications do not present separate results for English and French speakers in Canada although they can be computed from the available microdata and can be reported in national reports or other publications.

References

OECD (2021), *The Assessment Frameworks for Cycle 2 of the Programme for the International Assessment of Adult Competencies*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/4bc2342d-en. [1]

Notes

[1] This is consistent with the first cycle of the survey but differs from the approach used in IALS and ALL in which a value of 0.80 was used to locate items and test takers on the relevant scales (see Chapter 6 for more details).

4 The background questionnaire of the 2023 Survey of Adult Skills

This chapter describes the background questionnaire of the 2023 Survey of Adult Skills. This questionnaire collects a wealth of information on respondents, including demographics, educational attainment, labour-force status and job characteristics, skills use, information on the working environment, non-economic outcomes, and social and emotional skills.

The background questionnaire (BQ) for the 2023 Survey of Adult Skills collects comprehensive information designed to support the survey's major analytical objectives, which were to:

- describe the proficiency in key information-processing skills for certain subgroups of the adult population
- identify which factors are associated with the acquisition, development, maintenance and loss of proficiency over the lifespan
- highlight how proficiency in information-processing skills is related to economic and non-economic outcomes
- investigate how social and technological changes influence the practice and relevance of information-processing skills.

The background questionnaire for the 2023 Survey of Adult Skills is based on to the one used in the first cycle of the survey (OECD, 2011[1]). A Background Questionnaire Expert Group,[1] composed of internationally renowned academics specialising in labour economics, the economics of education and sociology, revised the questionnaire used in the first cycle. The main objectives of this revision were to update the questions and make them more relevant for current societal and work environments, while maintaining a high degree of comparability with the first cycle to allow for analysis over time.

Revisions to the questionnaire mainly concerned adapting it to new international standards, such as the International Standard Classification of Education 2011 (ISCED); improving the questions in light of new research and experience with data analysis from the first cycle of the survey; adapting the questions to better reflect the present environment, particularly in light of technological changes in the last decade; and introducing questions to measure concepts not measured in the first cycle.

The principles guiding the selection of items to be included in the questionnaire have not fundamentally changed since the first cycle. Other than being relevant to the policy questions that the Survey of Adult Skills aims to address, items were expected to have an established relationship to skills in the theoretical and empirical literature, either as determinants or as outcomes of skills. They also needed to have good measurement properties in terms of reliability and validity and, ideally, be able to maintain that over time. Efforts were made to ensure they had comparable meanings across groups and countries after careful translation and adaptation, and that they were comparable with other existing international surveys as far as possible. Questions also needed to be relevant to a majority of adult respondents.

The questionnaire items were all translated and adapted to reflect the national contexts of participants. This step was particularly important in domains such as educational attainment and participation in education and training, given the large differences in the structure of education systems across countries and economies. As far as possible, efforts were made to align the questions to existing national protocols, such as those for collecting information on labour-force participation and employment, so that the results from the Survey of Adult Skills are as comparable as possible with official national statistics. Efforts were then made to recode the raw information and produce derived variables that allow valid international comparisons to be made. In particular, information was coded in accordance with the International Standard Classification of Education (ISCED 2011) for educational qualifications, the International Standard Industrial Classification (ISIC Rev 4) for industry types and International Standard Classification of Occupations (ISCO 2008) for occupations.

Participating countries and economies also had the opportunity to add a small number of "national" questions to their versions of the background questionnaire to collect information on issues that they judged particularly relevant or important in their local contexts.

The background questionnaire for the 2023 Survey of Adult Skills collected information in six main areas:

- demographic characteristics and background of respondents
- educational attainment and participation in education and training

- labour-force status and employment
- the use of skills and the working environment
- social and emotional skills
- non-economic outcomes.

The information collected in each of these areas is described in more detail below, together with the rationale for including it in the questionnaire.

Demographic characteristics and background of respondents

Understanding the distribution of proficiency across subgroups of the adult population is one of the major objectives of the Survey of Adult Skills. To this end, the background questionnaire collects information on basic demographic variables like gender and age, as well as on household and family structure. All these variables are potentially important for explaining observed proficiency and are useful for characterising inequality across groups.

The background questionnaire also contains several questions on the economic and social background of participants. These include their language background, immigration status, the education and occupational levels of their parents (when the respondent was 14 years old) and their family's cultural capital (Table 4.1). An important reason for including these retrospective questions is that they can be considered to have an influence on individual's choices about their education, which are normally made after people complete mandatory school.

Table 4.1. Information collected on demographic characteristics and backgrounds

Domain	Specific data items	BQ section
Demographics	Year and month of birth, gender, country of birth.	A1-A3
Household and family structure	Number of persons in household, living with spouse or partner, activity of spouse/partner, number and age of children.	J1-J3
Language background	First and second languages spoken during childhood, the language currently spoken at home.	A4
Immigration status	Age at migration, country of birth of parents.	A3
Home environment at age 14	Number of books at home, parents' or guardians' occupation and highest level of education, place of residence (urban versus rural), household composition and family structure.	J4-J9

Educational attainment and participation in training activities

There is a complex relationship between education and training activities, whether formal or non-formal,[2] and proficiency in the information-processing skills measured by the Survey of Adult Skills. Literacy, numeracy and problem solving are partly developed through participation in schooling and other post-school education and training activities (e.g. vocational education and training, university, and workplace-based learning). At the same time, greater skills proficiency related to higher innate cognitive ability can affect whether individuals choose to participate in education and training beyond compulsory schooling.

Given the importance of education for skills proficiency and the strong policy interest in understanding the relationship between skills and participation in formal education, the background questionnaire collects extensive information on participants' educational experience. Respondents are asked to report the highest level of education they have completed and other lower-level qualifications they have attained, in order to better understand the pathways they followed through the education system. Information on educational pathways is an important new element of the BQ for the 2023 Survey of Adult Skills. Respondents are also

asked whether they are currently enrolled in education and whether they have dropped out of a course of study before completing it.

As the Survey of Adult Skills targets the adult population aged 16-65, many respondents have long left formal education. However, this does not mean they have stopped learning and improving their skills. In the current context, characterised by rapid technological change and population ageing, adult education and learning are at the core of the policy discourse, and continuing participation in (formal or non-formal) adult training is an important determinant of the evolution of skills proficiency over the course of people's lives. For all these reasons, the background questionnaire contains a much richer set of questions than in the first cycle of the survey on participation in training activities in the 12 months preceding the interview (Table 4.2).

Table 4.2. Information collected on education experience and current training activities

Domain	Specific data items	BQ section
Educational attainment and pathways	Highest qualification (ISCED), the country where this qualification was obtained, the field of study of the highest qualification, age when the highest qualification was obtained, and other qualifications.	B1-B4
Current education	Current participation in formal education (level and field of study).	B5
Incomplete education	Incomplete formal qualification, level of incomplete formal qualification, the age at which formal qualification was interrupted.	B6
Training activities	Participation in training activities in the last 12 months or any point, number of training activities.	B8
Context of most recent training activity	Field of activity, activity mainly job-related, the main reason for participation, took place in or outside working hours, the focus of activity, in person or remote, employment status at the time of participation, related to the digital transformation, perception of usefulness, delivery of a certificate, duration, funding sources.	B9-B21
Barriers to undertaking education and training	Wanted to participate in training activities in the last 12 months but did not, reasons preventing participation.	B22-B23

Labour-force status, work history and job characteristics

The relationships between skills and labour-market outcomes, such as employment, income and job characteristics, are central to the Survey of Adult Skills. According to human capital theory, cognitive skills are expected to be an important component of individual productivity, and observing how they are rewarded in the labour market constitutes *prima facie* evidence of their relevance and importance.

The central role of the relationship between skills and labour-market outcomes is reflected in the choice of instruments chosen to measure income and employment status, whose quality and level of detail are on a par with those used in labour-force surveys. The information collected on labour-force status, work history and job characteristics is presented in Table 4.3.

Since skills can affect (and can be affected by) job transitions and changes in the content of people's jobs, the questionnaire also gathers some information on the evolution of workers' careers. This is why respondents are asked about job tenure, how their position with their current employer has evolved and how long they have been in the labour market. Similarly, unemployed individuals are asked about the characteristics of their most recent job if they have been employed in the past five years.

Job characteristics and the actual content of jobs in terms of the tasks workers need to perform are crucial factors affecting incentives to maintain or invest in skills. They are also crucial information for analysing whether labour-market institutions are allocating workers to jobs efficiently. This is why the background questionnaire of the Survey of Adult Skills contains detailed information on the use of skills at work (as well as in everyday life) and the characteristics of the working environment, as discussed below.

Table 4.3. Information collected on labour-force status, work history and job characteristics

Domain	Specific data items	BQ section
Current activity	Labour-force status (International Labour Organization definition), main current activity.	C1-C5
Work history	Ever worked, had paid work in the last 12 months, age at which stopped working (if currently unemployed), total time in employment, received benefits in the last 12 months (unemployment, disability, sickness or retirement), number of employers in the last five years.	C6-C12
Current job	Sector of industry (ISIC) and occupation (ISCO), employed or self-employed, age at which started working with current employer, most important activities, change of position/tasks/unit (while remaining with the same employer) , age started with current employer, establishment size, the evolution of the number of employees, part of a larger organisation, (if self-employed) number of employees, management or supervisory responsibilities, number of subordinates, type of employment contract, usual working hours, qualification and experience required to get this job and satisfactorily perform the duties, level of job satisfaction, gross wage or salary, the existence of bonuses, (if self-employed) earnings from business.	D1-D16
Most recent job (if unemployed)	Sector of industry (ISIC) and occupation (ISCO), most important activities, employed or self-employed, date when started last employment, establishment size, part of a larger organisation, (if self-employed) number of employees, management of supervisory responsibilities, number of subordinates, type of employment contract, usual working hours, qualification required to get this job, the main reason for leaving last job.	E1-E11

The use of skills and the working environment

The background questionnaire collects data on how often respondents engage with tasks that require reading, writing and numeracy skills and the use of technology, both at work and in everyday life. Respondents are asked about how often they engage at work with activities requiring other skills not related to information processing but relevant to many jobs. These include physical and manual skills or people-centred skills such as the ability to co-operate with colleagues, manage people, or negotiate and influence others.

Information on how often respondents engage with certain tasks should not be interpreted as evidence of their proficiency in the underlying skills required to perform them. Such interpretation would only be valid if it were the case that job tasks are only assigned to people capable of carrying them out and that people with greater levels of a particular skill are more likely to perform tasks that require that skill frequently.

The BQ attempted to cover a diverse range of tasks, especially those related to reading, writing and numeracy. Some of these tasks are arguably more complex or difficult than others, thus requiring higher levels of underlying ability. However, the questions do not explicitly ask how complex or difficult the tasks are, how critical or important they are to overall performance on the job, nor whether respondents can normally complete those tasks successfully. Therefore, information on skills use should be interpreted primarily as evidence about the skill content of respondents' job and as a proxy for the skills demanded in the workplace.

This information on the skills and task contents of individual jobs is complemented by questions that aim to understand better the broader working environment in which jobs are performed. These questions refer more to organisational norms rather than actual practices carried out by individual workers.

The role of literacy and numeracy practices in maintaining and developing skills

The Survey of Adult Skills seeks not only to describe the level and distribution of proficiency in the skills it measures but also to provide information on factors associated with acquiring, maintaining and developing these skills and their outcomes. Proficiency in cognitive skills, such as literacy and numeracy, are not fixed for life, and life paths, interests and individual circumstances affect how skills are gained and lost. Adults enhance or maintain their skills by engaging in literacy and numeracy practices and using information and communication technologies (ICT) at work and in everyday life. Proficiency and practice are mutually

reinforcing, with practice positively affecting the level of proficiency and proficiency having a positive impact on practice.

Table 4.4 provides an overview of the clusters of tasks related to cognitive skills and technology about which information is collected in the 2023 Survey of Adult Skills. A cluster comprises several types of tasks, for which respondent reports their frequency of use. These clusters differentiate between work (section F) and everyday life (section G) contexts. This differentiation acknowledges the relevance of skills for different social functions. The tasks are chosen to cover the diversity of use cases in each context (work and everyday life) and normally, although not always, differ according to the context.[3]

Table 4.4. Information collected on skills use at work and in everyday life

Task cluster	Component activities at work	Component activities in everyday life	BQ section	
Cognitive skills				
Reading	Read directions or instructions; letters, memos or e-mails; articles in newspapers, magazines or newsletters; manuals or reference materials; bills, invoices, or bank or financial statements.		F1	G1
	Read books or articles in professional journals or scholarly publications.	Read books, fiction or non-fiction.	F1	G1
Writing	Write letters, memos or e-mails; write reports or articles; fill in forms.		F2	G2
Numeracy	Make calculations such as on prices, costs or quantities; read and prepare charts, graphs or tables; undertake measurements.		F3	G3
	Use maps, plans or GPS for finding directions and locations; use advanced mathematics or statistics.	Use information to make financial decisions; use mathematics, such as formulas or mathematical rules.	F3	G3
Technology				
ICT general use	Experience with computer in job.	Ever used a smartphone, tablet, laptop or desktop computer outside of work. Frequency of use.	F4	G4-G5
ICT skills	Use a computer or digital device to communicate with others; to access information.		F5	G6
	Use a computer or digital device to create or edit electronic documents, spreadsheets or presentations; to use specialised software; to use a programming language.	Use a computer or digital device for entertainment or leisure; for online banking or e-commerce; to manage your personal life.	F5	G6

Comparative information on a broader range of tasks performed on the job

Cognitive information-processing skills like literacy, numeracy and problem solving are just one subset (although arguably a fundamental one) of the many different generic skills and attributes that are valued in the labour market and can increase employability. A range of more specialised skills, such as being able to work collaboratively, or communication or manual skills, are also important in the modern workplace. A direct comparative assessment of these types of skills is a complex endeavour that cannot be undertaken in a survey like the Survey of Adult Skills. Therefore, the choice was made to ask respondents about the different types of generic tasks they perform in their jobs. This information can then be used to infer the skills required to perform these tasks. This approach was pioneered in the UK Skills Survey and is known as the Jobs Requirement Approach (Felstead et al., 2007[2]).

Table 4.5 provides an overview of the clusters of work-related tasks covered in the Survey of Adult Skills. As with the questions on skills use at work and in everyday life, respondents are asked how often they engage with each task.

Table 4.5. Information collected on tasks performed at work

Activity cluster	Component activities at work	BQ section
Co-operation	Co-operating or collaborating with co-workers	H1
Influence	Influencing or persuading people; negotiating with people	H5
Problem solving	Solving simple (less than 5 minutes) and complex problems (more than 30 minutes)	H6
Self-direction	Planning your own activities; organising your own time	H4
Learning at work	Learning new things, learning-by-doing process, keeping up to date with new products or services	H9
Horizontal interaction	Sharing work-related information; teaching or training people; giving presentations	H3
Client interaction	Dealing directly with people who are not employees	H3
Physical skills	Working physically for a long period	H7
Manual skills	Using hands or fingers for precision work	H7

Box 4.1. Using Item Response Theory to derive indicators of skills use

Item Response Theory (IRT) is a methodology that combines multiple items (i.e. answers to multiple-choice questions) from a questionnaire or an assessment exercise to derive measures of an underlying unobservable trait. This methodology is used to estimate literacy, numeracy and problem-solving proficiency in the Survey of Adult Skills direct assessment and also to derive a summary index of how frequently individuals use certain skills at work and/or in their daily lives.

The items in the background questionnaire of the Survey of Adult Skills elicit information about skills use are all ordered multiple-choice items where each consecutive alternative indicates a greater frequency of performing a certain task, ranging from 1 (never performing that task) to 5 (performing the task every day). With this type of item, the most appropriate IRT model is the generalised partial credit model, which estimates the latent trait based on the answers to a group of items associated with that trait. This latent construct is assumed to be unidimensional. The estimated model parameters map each level on the latent scale to the probability of choosing a specific alternative among the possible choices over the immediate precedent. The resulting scale is a continuous one-dimensional construct that explains the covariance among the item responses: people with a higher level on the derived scale have a higher probability of frequently performing the task detailed in a given item.

From the background questionnaire of the 2023 Survey of Adult Skills, the following skills use indices are computed using IRT and included in its Public Use File:

- reading (at work and in everyday life)
- writing (at work and in everyday life)
- numeracy (at work and in everyday life)
- ICT (at work and in everyday life)
- task discretion (at work only)
- learning (at work only)
- influencing skills (at work only).

The IRT methodology can only be applied when a sufficient number of items represent the underlying trait. This was not the case for many activity clusters, such as using physical skills or the frequency of co-operating with co-workers. In these cases, researchers must rely on direct measures of skills use based on discrete variables that take five possible values.

All the IRT-derived indices are continuous variables which should be interpreted as representing the level of use of the underlying skill. For ease of comparison, they have all been standardised to have a mean of 2 and a standard deviation of 1 across the pooled sample of respondents in all participating countries and economies.

While the careful survey design guarantees that results can be meaningfully compared across countries and economies, the standardisation of the IRT-derived skills use indices implies that comparisons across skills domains should only be taken as suggestive. Indeed, such comparisons are problematic for reasons beyond the choice of the indicators or the reported metric, as skills are often conceptually different notions and the forms of their interplay are difficult to ascertain.

When combined with information on the use of literacy, numeracy and ICT skills at work, these questions help provide a detailed picture of the skills required for a job. Knowing which tasks workers engage with more often is informative about which skills are demanded in the labour market. This provides a useful complement to the information on skill supply that can be derived from the direct assessment of literacy, numeracy and problem solving. Such an approach is also aligned with the so-called "task approach" to labour markets, which has been extensively used in the recent academic literature to analyse changes in the demand for labour in response to shocks like globalisation and technological changes (Autor, Levy and Murnane, 2003[3]; Autor, 2013[4]; Lassébie and Quintini, 2022[5]).

Qualifications and skills mismatches

An important goal of the Survey of Adult Skills is to inform policy makers about how effectively skills are being used. Workers may lack the skills needed to perform their jobs satisfactorily or be employed in jobs that do not allow them to put the skills they have to good and productive use. Such mismatches are to some extent inevitable, but efforts can be made to minimise them as much as possible, as they tend to reduce economic productivity and individual welfare.

Skills mismatches can have a negative impact on economic growth through increasing labour costs, reducing productivity, slowing technology adoption and ultimately lowering output (OECD, 2016[6]; Adalet McGowan and Andrews, 2017[7]). Mismatched individuals also face higher risks of unemployment, and lower wages and job satisfaction (Allen and van der Velden, 2001[8]; OECD, 2016[6]; Quintini, 2011[9])

Data from the first cycle of the Survey of Adult Skills have provided an important contribution to improving the measurement of skills mismatch (Pellizzari and Fichen, 2017[10]; Pérez Rodríguez et al., 2023[11]; OECD, 2014[12]). In particular, the Survey of Adult Skills data allow us to go beyond traditional measures of self-reported mismatches, combining them with actual information on skills measured through its assessment.

The background questionnaire of the 2023 Survey of Adult Skills continues to include some questions on self-reported qualification and subjective skills mismatches, improving on the questionnaire used in the first cycle by asking respondents about which particular skills they feel they are under-skilled, over-skilled or well-matched in (Table 4.6).

Table 4.6. Information collected on aspects of qualifications and skills mismatches

Domain	Specific data items	BQ section
Subjective skills mismatch	Whether the respondent feels over-skilled, well-matched or under-skilled, and for which skills this evaluation would apply	H19
Match of qualifications to job requirements	Educational qualification and work experience needed to get their current job	D12

Working environment and organisational practices

Information on the skills and task content of individual jobs is complemented by questions that aim to create a better understanding of the wider working environment in which jobs are performed.

Information on tasks performed on the job helps describe job content but leaves aside the working environment in which these practices occur. The background questionnaire includes items to describe organisational norms and practices under which individual job tasks are performed (Table 4.7). How work is organised can have important consequences for productivity and workers' well-being (Bloom et al., 2014[13]). In the context of the Survey of Adult Skills, particular interest lies in capturing so-called high-performance work practices (such as the presence of teamwork, social support and knowledge sharing, having well-defined objectives, and continuous feedback and rewards for good performance) that are often thought to favour a better allocation of skills to tasks and better incentives for workers to invest in developing their skills.

Another important aspect that the Survey of Adult Skills aims to capture is how the working environment has evolved in recent years, how these changes have affected skills requirements and skills policies, and whether workers have been supported in the context of such changes.

Table 4.7. Information collected on the working environment

Domain		Specific data items	BQ section
Task discretion		Respondent has control over the sequence of tasks, speed of work, working hours or how the work is done	H8
Work pressure		Working to tight deadlines or at a very high speed	H12
Work format		Short repetitive tasks	H17
Changes in the working environment		Changes in the last three years to: machinery, information and communication, working methods and practices, outsourcing and relocation, products or services, contact with clients. Existence of employer-supported training	H18
Optional	Teamwork	The presence of a team leader, the influence of team members on leader selection, tasks and work targets	H2
Optional	Participation in decision-making	Able to apply own ideas in work, involved in improving the work organisation or work processes	H14
Optional	Social support and knowledge sharing	Receive assistance from supervisor or manager, receive assistance from co-workers, helping co-workers to learn new things	H10, H13

Note: The optional questions on the working environment were asked in Austria, the Flemish Region (Belgium), Chile, Croatia, Czechia, Denmark, Estonia, France, Hungary, Italy, Latvia, the Netherlands, New Zealand, Poland, Portugal, the Slovak Republic, Spain, England (United Kingdom), and the United States.

The PIAAC Employer Module

The PIAAC Employer Module on Skills Gaps assesses skill gaps in the employed workforce, explores the prevalence and nature of these gaps, and collects data on the strategies used by enterprises to address them. Skill gaps occur when the skills of employees exceed or fall short of the requirements of their jobs under current market conditions. This includes qualification mismatches, where an employee's qualifications do not meet the requirements of the job, and field-of-study mismatches, where an employee's qualifications are in a different field to that required by the job. These gaps have significant economic consequences, including lower earnings and reduced job satisfaction for individuals, as well as lower productivity and slower growth for economies.

The Survey of Adult Skills and the PIAAC Employer Module are conceptually linked. While the former is a household survey collecting information from employees, the latter is addressed to and collects information

from employers. This allows data on skills mismatches from both employer and employee perspectives to be compared and enhances the richness and accuracy of the insights collected.

The questionnaire used in the Employer Module consists of a core part, an essential part and a set of optional items. The core includes five items on skill gaps, the actions put in place by the enterprise to address them and any recent changes at enterprise level (Q1 to Q5). The essential part includes questions on the background of the enterprise (Q6 to Q10), such as sector, location, size and age (Table 4.8). These are needed to contextualise answers to the module and to link it to other data sources. The optional questions (QA1 to QE2) explore other policy-relevant characteristics of the enterprise, such as its ability to innovate, its work and organisational practices, its difficulties in recruiting and retaining staff, and its employees' participation in training. OECD (2024[14]) provide an overview of the optional questions implemented by countries and economies.

At a conceptual level, the alignment between the Employer Module and the Survey of Adult Skills is achieved by ensuring the concepts of skills and training used in both questionnaires are consistent. This includes strict correspondence in concept and wording for questions in the core of the Employer Module, ensuring that the types of skills and macro trends measured are identical. The same applies to questions in the essential part of the module. Data collected through the Employer Module and the Survey of Adult Skills background questionnaire can also be statistically linked by merging data from both surveys at a pre-determined level of aggregation, typically industry and enterprise size, to create a single dataset for subsequent analysis. For a more detailed description of the relationship and the mapping of survey items in both questionnaires see Marcolin and Quintini (2023[15]). For more technical details on the survey see OECD (2024[14]).

Although the Employer Module was developed as a stand-alone survey, the first iteration was administered as an add-on to the 2020 wave of the European Continuing Vocational Training Survey (CVTS 6). The module was administered in five European countries: Hungary, Italy, the Netherlands, Portugal and the Slovak Republic in 2021 and 2022.

Table 4.8. Information collected through the Employer Module

	Domain	Specific data items	BQ section
Core	Extent of skill gap	Share of employees not well matched to their job	Q1
	Type of skill gap	Type of skills where gap exists	Q2
	Measures to address skill gap	Type of measures taken by enterprise to address skill gap	Q3
	Changes in the operational environment	Changes to machinery, IT technologies and processes, working methods and organisational practices, outsourcing practices, products and services, client or customer contact	Q4
	Training provision	Training provided to support employees through changes	Q5
Essential	Location	Postcode of enterprise	Q6
	Economic activity	Sector of economic activity	Q7
	Company size	Number of persons employed	Q8
	Company growth	Change to number of persons employed	Q9
	Age of company	Year of creation of enterprise	Q10

Social and emotional skills

Social and emotional skills cover a range of personal attributes related to how individuals perceive themselves and how much they can regulate and manage their thoughts and behaviour; they are important for achieving goals, working with others and managing emotions (OECD, 2015[16]). They are also known as non-cognitive skills, soft skills or character skills. They are typically distinguished from cognitive skills

and information-processing skills in the sense that they are not normally measured through achievement or IQ tests; this does not imply, however, that the manifestation of these skills does not involve any kind of cognitive activity (Kankaraš, 2017[17]). These skills include aspects of individual personality and other important attributes, dispositions and beliefs such as motives, attitudes, values, self-perceptions, temperament and social competencies.

Social and emotional skills are generally recognised as an important component of the bundle of knowledge, skills and attributes that constitute an individual's human capital and are increasingly being introduced in international and national frameworks setting out objectives for skills development. They have been shown to be related to important work and life outcomes, often through the impact they have on building up cognitive skills through formal education (Heckman and Kautz, 2012[18]; Kautz et al., 2014[19]). Recent evidence shows that modern labour markets increasingly reward social and emotional skills (Deming, 2017[20]).

The background questionnaire of the 2023 Survey of Adult Skills includes a self-assessment of social and emotional skills using the Big Five Inventory (Soto and John, 2017[21]), as well as a question eliciting patience. Patience relates to the disposition to invest in the future, which is essential in learning. The Big Five framework is the most comprehensive and well-validated framework for understanding social and emotional skills. It specifies five higher-order dimensions (factors), each of which can be further divided in more narrow traits or "facets", covering many of the aspects of non-cognitive skills and personal attributes identified as relevant to labour-market success and broader social functioning.

The module on social and emotional skills was optional. Three countries (Japan, Korea and the United States) decided not to administer it while 16 countries and economies decided to use a shorter version of the inventory that only measures the five domains and not the facets (Table 4.9).

Table 4.9. Information collected on social and emotional skills

Constructs	Domains	Facets	BQ section
Big Five	Open-mindedness	Intellectual curiosity, aesthetic sensitivity, creative imagination	K
	Conscientiousness	Productiveness, responsibility, organisation	
	Extraversion	Energy level, sociability, assertiveness	
	Agreeableness	Respectfulness, trust, compassion	
	Emotional stability	Anxiety, emotional volatility, depression	
Patience	Willingness to give up something now to benefit from more in the future		I4

Note: Japan, Korea and the United States did not administer Section K of the background questionnaire. Austria, the Flemish Region (Belgium), Switzerland, Denmark, Finland, France, England (United Kingdom), Hungary, Ireland, Israel, Lithuania, Latvia, the Netherlands, Poland, Singapore, and Sweden administered the BFI-2XS version of the inventory (15 items in total) that only allows to assess the five domains. Canada, Chile, Czechia, Germany, Spain, Estonia, Croatia, Italy, Norway, New Zealand, Portugal and the Slovak Republic administered the BFI-2S version (30 items in total) that allows to collect information on the facets (on top of the domains).

Box 4.2. Deriving scores for social and emotional skills

Social and emotional skills are latent constructs measured through a set of items, all assumed to be empirical manifestations of the underlying trait. The items in the Big Five Inventory (BFI) all ask respondents the extent to which they agree with a particular statement about themselves. The degree of agreement is expressed on a 5-point Likert scale, where 1 means strongly disagreeing with the sentence and 5 means strongly agreeing with it.

The number of items for each domain or facet is relatively small, as the choice was made to keep the questionnaire as short as possible in order to avoid an excessive burden on respondents. The longer BFI-2S instrument has only two items per facet and six per domain. The shorter BFI-2XS instrument has three items per domain. This makes it challenging to apply the IRT modelling strategy employed to derive skills use indices (Box 4.1). For this reason, the choice was made to estimate scores by taking a simple average of the answers given to the battery of items representing a specific domain or facet. This relies on the assumption that each item is equally related to the underlying construct, while IRT or latent factor models allow each item to contribute differently to the final score.

For countries and economies that administered the longer BFI-2S instrument, two scores for each domain are estimated: one based on the three items that are in common with the BFI-2XS instrument (for better comparability with the countries and economies that administered the shorter instrument), and one based on all six items related to a given domain in the BFI-2S.

These scores are then standardised to have an equal mean and an equal variance within all countries and economies. Cultural and linguistic differences often result in similar questions being interpreted differently in different countries and economies. As a result, scalar invariance is often not achieved, meaning that it would be incorrect to compare average scores and conclude that residents in a given country are more extroverted or more open-minded than residents of a different country. However, metric invariance implies that each item is similarly related to the underlying construct across countries. It is then possible to examine how each domain or facet is correlated with other variables, and these correlations can be validly compared across countries and economies.

Non-economic outcomes

As well as the impact of proficiency in information-processing skills on labour-market outcomes such as employment and income, there is a growing interest in the relationship of proficiency to other outcomes that describe individuals' overall well-being or how they perceive themselves as citizens. The Survey of Adult Skills collects information on respondents' beliefs about society and the political process, participation in voluntary activities, and their self-reported health status. A measure of overall life satisfaction was introduced in the 2023 Survey of Adult Skills (Table 4.10).

Table 4.10. Information collected on non-economic outcomes

Domain	Specific data items	BQ section
Trust	Trust in others, perception of others' behaviour towards self	I1
Political efficacy	Influence on the political process	I1
Volunteering	Frequency of voluntary work in the past 12 months	I2
Health status	Self-assessed health status	I3
Life satisfaction	Self-assessed life satisfaction	I5

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Notes

[1] The composition of the Background Questionnaire Expert Group is reported in Annex B.

[2] Formal education and training refers to activities that are institutionalised, intentional and planned through public organisations and recognised private bodies. Non-formal education is also institutionalised, intentional and planned by an education provider but leads to qualifications that are not recognised by national educational authorities and can also lead to no qualifications at all. Informal learning takes place outside of institutionalised settings and arises from the learner's involvement in activities that are not undertaken with a learning purpose in mind.

[3] In the first cycle of the Survey of Adult Skills, the same questions were asked to elicit use of skills at work and in everyday life.

5 The methodology of the 2023 Survey of Adult Skills and the quality of data

This chapter focuses on how the 2023 Survey of Adult Skills was designed, managed and conducted. It discusses the target population, exclusions from the survey, sample size and response rates, as well as how the overall quality of the data was assessed.

The design and implementation of the 2023 Survey of Adult Skills was guided by associated technical standards and guidelines which were developed to ensure that the survey yielded high-quality and internationally comparable data. The Technical Standards and Guidelines (TSGs) for the 2023 Survey of Adult Skills articulate the standards participating countries and economies are expected to adhere to in implementing the survey and describes the steps they should follow in order to meet them[1]. It also makes recommendations for actions relating to the standards which were not mandatory but could help to produce high-quality data. Standards were established for 16 distinct aspects of the design and implementation of the survey (Table 5.1).

Table 5.1. Areas of activity covered by the 2023 Survey of Adult Skills Technical Standards and Guidelines

Standards	
Quality assurance and quality control	Data collection staff training
Ethics	Data collection
Survey planning	Data capture
Sample design	Data file creation
Survey instrument	Confidentiality and data security
Translation and adaptation	Weighting
Information technology	Estimation
Field management	Documentation

Box 5.1. How the survey was managed

The development and implementation of the 2023 Survey of Adult Skills was overseen by the PIAAC Board of Participating Countries (BPC). The BPC consisted of representatives from each of the participating countries and economies. Croatia participated as an observer. The BPC was responsible for making major decisions on budgets, developing and implementing the survey, reporting results, and monitoring the progress of the project. The BPC was supported in its work by the OECD Secretariat, which was responsible for providing advice to the BPC and managing the project on its behalf.

The OECD contracted an international consortium to undertake a range of tasks relating to the design and development of the assessment, implementation of the survey, and analysis of the resulting data. The consortium was responsible for developing questionnaires, assessment instruments and the computer-delivery platform; supporting survey operations; quality control; scaling; and database preparation.

Participating countries and economies were responsible for the national implementation of the survey, in particular for sampling, translation and adaptation of materials, data collection, and database production. In each country, all these activities were led and co-ordinated by a national project manager.

The TSG document is one element of a comprehensive process of quality assurance and control that was put in place to reduce potential sources of error, increase comparability and maximise the quality of the data produced by the 2023 Survey of Adult Skills. Participating countries and economies received assistance in meeting the standards in a variety of ways. Where relevant, manuals, training materials, testing plans and toolkits were produced. Training was provided to countries at appropriate stages of the project. In certain areas, such as sampling, translation and adaptation, and the operation of the computer-delivery platform, passage through the various stages of implementation was subject to a review of the steps completed, and sign-off was often required before moving to the next stage. Regular consultations

were held with countries at project meetings and through bilateral contact. Compliance with the technical standards was monitored throughout the development and implementation phases through direct contact, the provision of evidence that required activities were completed and ongoing collection of data from countries about key aspects of implementation.

The quality of each country and economy's data was reviewed prior to publication. The review was based on the analysis of the psychometric characteristics of the data and evidence of compliance with the technical standards. A data quality assessment was prepared for each country, and recommendations were made regarding release and, if necessary, any restrictions and/or qualifications that should apply to the release and publication. The Technical Advisory Group (TAG), comprised of independent experts, validated the approach to the review of data and the results of the analysis; the project's steering body, the PIAAC Board of Participating Countries (BPC), made the final decision on release.

This chapter provides the background needed to correctly interpret the results of the reviews of data quality. It describes the following aspects of the design and the methodology of the 2023 Survey of Adult Skills:

- survey and assessment design
- sampling
- translation and adaptation of survey instruments
- survey administration
- survey response rates and non-response bias analysis
- the doorstep interview and literacy-related non-response
- the overall assessment of data quality.

Survey and assessment design

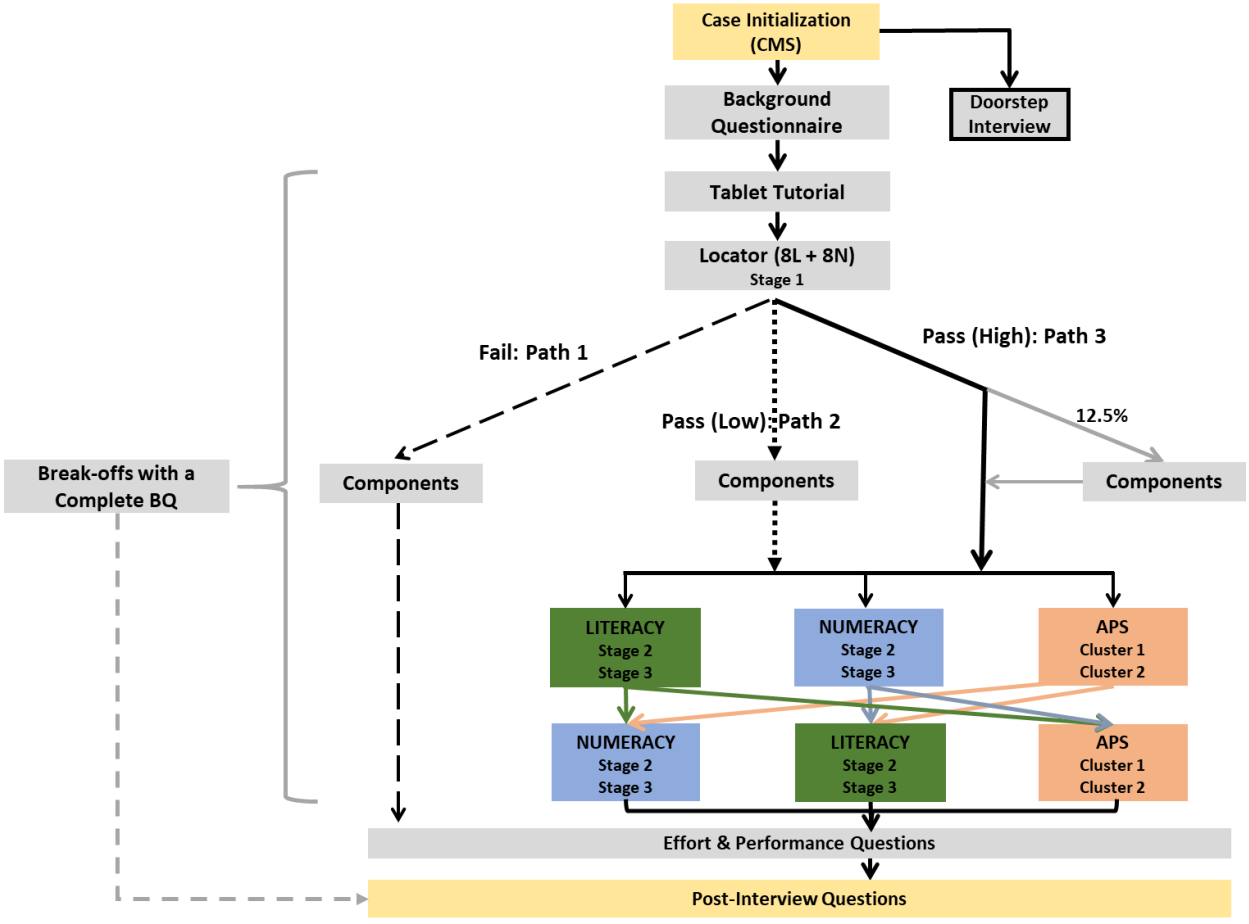
The Survey of Adult Skills (PIAAC) collects data using a combination of a personal interview and a self-completed assessment. The 2023 Survey of Adult Skills has two components: a background questionnaire and a direct assessment.

The background questionnaire (BQ) is administered as a computer-aided personal interview. Trained interviewers ask the questions contained in the background questionnaire and record the answers using a tablet and a keyboard. The time needed to complete the background questionnaire varies depending on respondents' characteristics (many questions in the background questionnaire only concern adults who are currently employed, for instance).

The second component is a direct assessment of literacy, numeracy and adaptive problem solving (APS) completed autonomously by the respondent. To complete the assessment, respondents use the same touchscreen tablet device used by the interviewer to administer the questionnaire. The tablet interface replicates the feeling of using paper-based instruments as much as possible. If they wish, respondents can also use a digital stylus to interact with the interface. The interviewers remain with the respondents to supervise them during the assessment. The interviewer is not supposed to help the respondent during the direct assessment but can assist if there are technical problems. Normally, the interviewer encourages respondents to persist through the assessment and to attempt to provide answers to the best of their ability. The direct assessment component is untimed, allowing respondents to take as much time as they need to complete it.

Figure 5.1 summarises the design of the survey and the various elements of the interview.

Figure 5.1. The 2023 Survey of Adult Skills assessment design



The interview starts with the background questionnaire. The questionnaire collects detailed information on the socio-demographic characteristics of respondents (age, gender, migration status), as well as on their educational careers and labour-market outcomes (see Chapter 4 for more information). Respondents who are unable to complete the background questionnaire because of language barriers are administered the doorstep interview, discussed below.

Following completion of the background questionnaire, respondents first go through a short tablet tutorial to make sure they understand how to interact with the device and with the interface. The ease of use of the tablet, accompanied by a digital stylus, ensures that even adults with very low familiarity with digital devices can complete the assessment on the tablet.

The tablet-only design allows adaptive algorithms to be used to optimise the delivery of assessment items. These algorithms use information from the background questionnaire (such as age and educational attainment), as well as information from answers to previous assessment items, to select and administer assessment items that are neither too easy nor too difficult for the respondent.

The first step of this adaptive process is a locator test (also referred to as Stage 1), including eight literacy and eight numeracy items. Based on their answers to these items, respondents are sorted into three different paths:

- Respondents who fail the locator test are directed to Path 1 and are administered an assessment of reading and numeracy component skills.

- Respondents who pass the locator test with a low score are directed to Path 2. They take the reading and numeracy component skills assessment and then proceed to the direct assessment of literacy, numeracy and adaptive problem solving.
- Respondents who pass the locator test with a high score are directed to Path 3. Some of these adults (12.5%) are randomly chosen to take the component skills assessment and then proceed to the direct assessment of literacy, numeracy and adaptive problem solving. The rest proceed directly to the assessment.

Table 5.2 reports the distribution of respondents across the different paths of the survey for each country and economy.

Table 5.2. Distribution of respondents across different survey paths

OECD countries and economies	Doorstep Interview (%)	Break-offs with a complete BQ (%)	Path 1 (%)	Path 2 (%)	Path 3 (%)
Austria	2.8	4.2	1.6	9.9	81.4
Canada	2.5	3.9	1.1	9.5	82.9
Chile	0.0	3.0	7.1	26.4	63.4
Czechia	4.5	0.0	0.5	9.3	85.6
Denmark	5.3	4.3	0.5	4.5	85.4
Estonia	1.2	1.1	1.0	9.0	87.6
Finland	3.7	1.1	0.9	4.0	90.3
France	0.6	6.2	2.2	12.3	78.7
Germany	2.7	1.8	1.5	8.9	85.2
Hungary	1.0	0.2	1.7	16.3	80.8
Ireland	0.6	2.1	0.5	12.3	84.5
Israel	0.8	1.3	3.4	19.1	75.4
Italy	0.2	0.7	1.9	20.7	76.5
Japan	1.1	0.2	0.9	5.4	92.4
Korea	0.6	3.8	1.4	17.7	76.5
Latvia	0.4	6.7	1.0	12.6	79.2
Lithuania	2.6	1.6	1.3	15.3	79.3
Netherlands	3.1	2.0	1.8	5.4	87.7
New Zealand	0.1	3.9	4.1	10.6	81.3
Norway	1.4	1.6	1.0	6.0	90.0
Poland	0.1	0.2	7.1	15.2	77.4
Portugal	3.0	1.2	3.3	20.2	72.2
Slovak Republic	0.4	1.0	1.3	11.8	85.5
Spain	2.1	0.5	1.1	15.8	80.4
Sweden	-	2.9	0.8	3.9	92.4
Switzerland	3.3	0.4	2.1	8.0	86.2
United States	0.9	1.1	4.8	15.1	78.1
Subnational entities					
England (UK)	0.4	1.6	1.4	8.8	87.8
Flemish Region (Belgium)	3.1	4.3	1.0	6.5	85.1
Partner countries					
Croatia	0.3	2.4	2.0	13.7	81.5
Singapore	-	0.2	2.7	13.2	83.9

The reading and numeracy component skills assessment focuses on basic literacy and numeracy skills that are foundational to the more advanced skills measured in the direct assessment. The inclusion of component skills allows for a more precise estimation of literacy and numeracy at the bottom end of the skills distribution.

In the direct assessment, each respondent is only assessed in two out of the three domains (literacy, numeracy or adaptive problem solving). Respondents are first randomly allocated to one domain. Then, after they complete that assessment, they are randomly allocated to one of the two remaining domains.

The literacy and numeracy assessments use a hybrid multistage design with both an adaptive and a linear component. In both the adaptive and the linear path, respondents are administered one testlet in both Stage 2 and 3 (Stage 1 being the locator test). In the adaptive path, six different testlets are available in Stage 2, three of low difficulty and three of high difficulty. Which of these six is assigned to respondents depends on his or her performance in the locator test and personal characteristics collected in the background questionnaire (such as level of education). Stage 3 also features six testlets (two of low difficulty, two of medium difficulty and two of high difficulty). One of these six is administered to respondents based on how they performed in Stage 2 (with those that performed better having a higher chance of receiving a more difficult testlet). The linear (non-adaptive) path is used to ensure that each item is attempted by a sufficient number of respondents from a wide proficiency range. After the locator test, 25% of the respondents are randomly allocated to this path, where they take one of six possible testlets in both Stage 2 and 3.

The assessment of adaptive problem solving follows a balanced incomplete block design, where assessment items are divided into five clusters. Respondents who take the APS assessment are assigned to two randomly selected clusters of items.

A final set of questions after completion of the direct assessment asks respondents about the effort they put into completing the assessment (as compared to a high-stakes situation). Respondents are also asked how they thought they performed in the assessment.

Finally, interviewers complete a post-interview questionnaire in which they record their observations about the context, the environment and the conditions under which the interview took place.

Sampling

To maximise the comparability of results, countries and economies participating in the 2023 Survey of Adult Skills were expected to meet stringent standards relating to the target population, sample design, sample selection response rates and non-response bias analysis.

The target population and sampling frame

The target population for the survey consisted of the non-institutionalised population aged 16-65 years, residing in the country at the time of data collection, irrespective of nationality, citizenship or language status. The normal territorial unit covered by the survey was that of the country as a whole. However, in two countries, the sample frame covered only a portion of the national territory: in Belgium, only residents in the Flemish Region participated in the survey, and in the United Kingdom, only residents in England participated.

To draw a sample of respondents from the target population, a sampling frame is needed. Different countries and economies used different sampling frames and sampling strategies. The main distinction is whether frames are based on population registries, or whether they are based on lists of dwellings.

Population registries are based on administrative lists of residents maintained at either national or regional level, which contain useful variables for stratification, weighting and non-response bias analyses. The frames used by countries with population registry samples are shown in Table 5.3.

When population registries are not available, countries relied on a dwelling units registry or geographical clusters, which are based on lists of dwelling units or primary sampling units maintained at the national level for official surveys or a frame of geographical clusters formed by combining adjacent geographical areas, respecting their population sizes and taking into consideration travel distances for interviewers. When sampling frames are based on dwellings, interviewers need to visit the household to screen household members, randomly selecting members who are eligible to participate in the survey (because they are part of the target population). The frames used by countries and economies that relied on screeners are listed in Table 5.4.

Table 5.3. Sampling frames for countries and economies with population registry samples

OECD countries and economies		Sampling frame	
		Stage 1	Stage 2
Austria		Population registry, 2022	
Denmark		Population registry, 2022	
Estonia		Population registry, 2022	
Finland		Statistics Finland's Population database (based on the Central Population Register), 2022	
France		Centralised person registry from tax files updated yearly, 2018 (PSUs were formed in 2018 based on 2016 data)	Person registry from taxation file, 2021
Germany		List of municipalities from German Federal Bureau of Statistics, 2021	Population registries in selected municipalities, 2022
Hungary		Register of localities from Hungarian Central Statistical Office, 2022	Register of persons from Ministry of Interior, 2022
Israel		Big localities	Population registry, 2022
Italy	Small localities	Population registry, 2022	
	List of municipalities from National Statistical Institute of Italy, 2022	Population registry, 2022	Population registry, 2022
Japan		Resident registry, 2020	Local registries, 2022
Netherlands		Population registry, 2022	
Norway		Population registry, 2022	
Poland		Population registry, 2022	Population registry, 2022
Sweden		Population registry, 2022	
Switzerland		Population registry, 2022	
Subnational entities			
Flemish Region (Belgium)		Population registry, 2022	
Partner countries			
Croatia		Census of Population, Households and Dwellings, 2021	Population registry, 2022
Singapore		Population registry, 2022	

Note: The grey shading indicates that there is no such stage in the country's sample design. PSU stands for "primary sampling unit".

Table 5.4. Sampling frames for countries and economies using screeners

OECD countries and economies	Sampling frame			
	Stage 1	Stage 2	Stage 3	Stage 4
Canada	2021 Census	2021 Population Census long-form returns	Field enumeration	
Chile	2017 National Census files, updated with more recent data whenever possible	2017 National Census files, updated with more recent data whenever possible	Pre-Census 2017 files and field listing for selected Secondary Sampling Units	Field enumeration
Czechia	Register of Census Districts and Buildings (RSO), 2022	Register of Census Districts and Buildings (RSO), 2022	Field enumeration	
Ireland	Census 2016 data, updated from Geo Directory, 2022	Census 2016 data, updated from Geo Directory, 2022	Field enumeration	
Korea	2020 Register-based Population and Housing Census	2020 Register-based Population and Housing Census, with updates from 2021 regional datasets and 2022 canvassing	Field enumeration	
Latvia	Demographic Statistics Data Processing System (using Population and Dwelling Register information), 2022	Demographic Statistics Data Processing System, 2022	Field enumeration	
Lithuania	Address Register, 2022	Address Register, 2022	Address Register, 2022	Field enumeration
New Zealand	Statistics NZ's household survey frame, 2019	Postal address file (PAF) and Māori Electoral Roll, 2022	Field enumeration	
Portugal	National postal codes and addresses database, 2022	National postal codes and addresses database, 2022	Field enumeration	
Slovak Republic	2021 Census	2021 Census	Field enumeration	
Spain*	Population register, 2022	Population register, 2022	Field enumeration	
United States	List of counties from US Census Bureau, 2020	Blocks defined by Census Bureau, 2020	List of addresses from the postal service, with field listing where necessary, 2022	Field enumeration
Subnational entities				
England (UK)	List of MSOAs based on 2011 Census, with 2021 size measures	Royal Mail Postcode Address File, 2022	Field listing	Field enumeration

Note: The grey shading indicates that there is no such stage in the country's sample design. MSOA stands for "Middle layer Super Output Areas", as defined by the UK Office for National Statistics.

* Spain is included in this table, even though it has a population registry. Spain used a population registry as the sampling frame for the first two sampling stages only and used a household screener for the third sampling stage.

Coverage of the target population

According to the TSGs, sampling frames were required to cover at least 95% of the target population. The exclusion (non-coverage) of groups in the target population had to be limited to the greatest extent possible and be based on operational or resource constraints, as in the case of populations located in remote and isolated regions. A complete list of exclusions for countries and economies using population registries is presented in Table 5.5; Table 5.6 includes a similar list for countries using screeners.

Table 5.5. Exclusions from the target population: countries and economies using population registries

OECD countries and economies	Percentage of target population not covered* (%)	Groups not covered
Austria	2.0	Undocumented immigrants
Denmark	<=0.6	Undocumented immigrants, PIAAC field trial (FT) sampled persons, sampled persons from a recent national survey related to adult competencies
Estonia	1.9	People without a detailed address; undocumented immigrants (no estimate provided)
Finland	0.7	Asylum seekers, undocumented immigrants, people who have official security classification
France	2.0	Undocumented immigrants
Germany	0.6	Persons living in inaccessible areas, undocumented immigrants
Hungary	0.5	Individuals with no registered address; undocumented immigrants (negligible)
Israel	4.9	Foreign citizens with or without a permit; persons who have crossed the border illegally; Bedouin tribes and other persons living outside boundaries of localities; people who were selected to other surveys in the past three years; respondents to the Survey of Adult Skills field trial
Italy	1.3	Undocumented immigrants
Japan	0.1	Undocumented immigrants
Netherlands	2.6	Opt-outs, Waddeneilanden (small islands too difficult to reach), undocumented immigrants
Norway	0.5	Undocumented immigrants
Poland	0.3	Undocumented immigrants, foreigners who do not meet an obligation to register
Sweden	0.6	Asylum seekers, people with a residence permit valid for less than one year, undocumented immigrants
Switzerland	<4.7	People under guardianship, asylum seekers, diplomats, people in non-institutional collective dwelling units, undocumented immigrants
Subnational entities		
Flemish Region (Belgium)	1.0	Undocumented immigrants
Partner countries		
Croatia	4.9	Residents of remote islands and mountain areas; undocumented immigrants
Singapore	<0.1	Undocumented immigrants

Note: The non-coverage rate accounts for excluded subpopulations, such as undocumented immigrants or non-institutionalised collective dwelling units, with the exception that the homeless are not being considered part of this rate. Other exclusions that occurred as a natural part of the survey process are not included in the expected non-coverage rate.

Table 5.6. Exclusions from the target population: countries and economies using screeners

OECD countries and economies	Percentage of target population not covered* (%)	Groups not covered
Canada	3.3	Residents of reserves and other Indigenous settlements; residents of remote areas in provinces or sparsely populated regions; persons in non-institutional collective dwelling units; persons in the northern territories.
Chile	0.2	Areas sparsely populated and difficult to access
Czechia	2.9	Municipalities with less than 200 inhabitants; PSUs with less than 30 occupied dwellings
Ireland	0.2	Households on the islands surrounding Ireland
Korea	0.3	Small island residents (without land connection); redeveloping areas; natural and other disaster-affected areas
Latvia	1.5	Eligible dwelling units without any declared person on the frame
Lithuania	4.0	Residents of villages with 20 or fewer residents as age-eligible persons; residents of Neringa
New Zealand	2.0	People in non-private dwellings and private temporary dwellings; people living in off-shore islands and waterways (except Waiheke Island, which is included); Primary Sampling Units with less than nine occupied dwellings on 2018 Census night
Portugal	1.8	Group quarters, addresses in some smaller municipalities in the ultra-periphery regions of Portugal
Slovak Republic	4.4	Municipalities with fewer than 300 PIAAC-eligible persons
Spain *	0.5	Dangerous areas
United States	0.5	Non-locatable dwelling units
Subnational entities		
England (UK)	<0.7	Non-institutional collective dwelling units

Note: The non-coverage rate accounts for excluded subpopulations, such as undocumented immigrants or non-institutionalised collective DUs, with the exception that the homeless are not being considered part of this rate. Other exclusions that occurred as a natural part of the survey process are not included in the expected non-coverage rate.
* Spain is included in this table, even though it has a population registry. Spain used a population registry as the sampling frame for the first two sampling stages only and used a household screener for the third sampling stage.

Sample size

The minimum sample size required for the 2023 Survey of Adult Skills depended on two factors: the sample design and the number of languages in which the assessment was administered. It ranged between 4 000 to 5 000 completed cases per reporting language, depending upon the sample design, as shown in Table 5.7. For a case to be counted as “completed”, the following conditions must be met: i) responses to key background questions, including age, gender, highest level of schooling, employment status and country of birth, have been collected; ii) the tablet tutorial Section has been attempted; and iii) the Locator has been attempted.

Table 5.7. Assignment of the standard minimum number of completed cases

Design type	Standard minimum number of completed cases (per reporting language)
Unclustered – 1-stage (persons) registry with equal probabilities of selection	4 000
Clustered – 2-stage (primary sampling units and persons), that is, an area sample with many PSUs; or 2-stage (DUs and persons)	4 500
Clustered – 3-stage (PSUs, DUs and persons); 3-stage (PSUs, secondary sampling units (SSUs) and persons); or 4-stage (PSUs, SSUs, DUs and persons)	5 000

Note: PSU stands for "primary sampling units"; SSU stands for "secondary sampling units"; DUs stands for "dwelling units".

Countries that planned to report on general proficiency had to achieve the appropriate minimum completed sample size shown in Table 5.7 for their main language. Eight countries (Canada, Estonia, Finland, Israel, Latvia, the Slovak Republic, Spain and Switzerland) implemented the survey in multiple languages, but only Canada decided to provide separate results for the two assessment languages (English and French). Table 5.8 provides sampling information including the minimum based on the standards, and the expected and actual sample size for each participating country and economy. More detailed information about sampling and weighting can be found in the Technical Report of the 2023 Survey of Adult Skills (OECD, forthcoming[1]).

Table 5.8. Sample size information

OECD countries and economies	**Standards minimum** (Target population or Target population/ Country-specific samples)	**Expected number of completes** (Target population or Target population/ Country-specific samples)	**Actual number of completed cases in the dataset**	**Groups oversampled**
Austria	4 000	4 500	4 565	Low-educated individuals, non-Austrians, and persons in certain interviewer regions
Canada	5000 / 10 000	7 000 / 10 000	11 697	An incomplete oversample of 424 individuals who were within the scope of the PIAAC target population (Indigenous population, the youth population (aged 16-30) living in Nova Scotia) which was incorporated into the main sample by matching to non-respondents in the main sample
Chile	5 000	5 000 / 5 100	4 726	
Czechia	5 000	5 061	5 057	
Denmark	4 000	4 925	5 067	Immigrants
Estonia	4 000	7 500	6 665	
Finland	4 000	4 200	4 061	
France	4 400 / 5 000	5 500	6 432	Small regions
Germany	4 500	5 000	4 793	
Hungary	4 500	4 500	4 564	Selected regions
Ireland	5 000	5 000	3 852	
Israel	4 060	6 250 / 6 280	6 092	The Arab population and Ultra-orthodox

OECD countries and economies	Standards minimum (Target population or Target population/ Country-specific samples)	Expected number of completes (Target population or Target population/ Country-specific samples)	Actual number of completed cases in the dataset	Groups oversampled
Italy	4 500	7 500	4 847	Persons aged 16-29 and immigrant population (foreigners)
Japan	4 500 / 5 000	5 000	5 165	
Korea	5 000	5 000	6 198	
Latvia	5 000	7 692	6 563	
Lithuania	5 000	5 000	6 186	
Netherlands	4 000	4 000 / 5 267	3 513	
New Zealand	5 000	7 351 / 7 965	5 359	Persons of Māori and Pacific ethnicities Persons aged 16-24 years
Norway	4 000	4 000	4 053	
Poland	4 500	4 500	5 014	
Portugal	4 500 / 5000	5 000	3 160	
Slovak Republic	5 000	5 000	5 238	
Spain	5 000	6 000	5 871	
Sweden	4 000	4 000	3 710	
Switzerland	4 000	7 000	6 648	French-speaking and Italian-speaking language areas
United States	5 000	5 000 / 9 380	3 765	An incomplete oversample of small states was incorporated into the main sample through composite estimation
Subnational entities				
England (UK)	5 000	5 000	4 941	
Flemish Region (Belgium)	4 000	4 000	3 909	
Partner countries				
Croatia	4 500	4 500	4 316	
Singapore	4 000	4 000	5 011	

Note: The PIAAC technical standard targets are for a self-weighting sample of the PIAAC target population. Additional samples are needed for country-specific samples outside of the target population or oversampled populations. Targets include multiple languages. Initial sample sizes and country targets for Austria, Canada, Chile, Denmark, France, Israel, Italy, the Netherlands, New Zealand, Switzerland and the United States include oversampled populations and country-specific samples outside the target population unless otherwise noted.

Translation and adaptation of survey instruments

Participating countries and economies were responsible for adapting and translating the assessment instruments, background questionnaires and survey materials for administration in their national languages. Any national adaptations of either the assessment instruments or the questionnaire were subject to strict guidelines, review and approval by the international consortium. The recommended procedure included a double translation from the English source version performed by professional staff, followed by a reconciliation.

All national versions of the instruments were subject to full linguistic quality-control procedures, which involved verification by the consortium of target versions submitted by each participating country/economy against the source versions, with reporting of residual errors and undocumented deviations and expert advice where corrective action was needed:

- for questionnaire and assessment items newly developed for Cycle 2: full verification of all national materials
- for trend items (used in the first cycle): focused verification of changes requested by countries and economies
- for trend literacy units: verification of the scoring rules in literacy items.

Detailed information on the various aspects of translation, adaptation and verification of test and survey materials can be found in the Technical Report of the 2023 Survey of Adult Skills (OECD, forthcoming[1]).

Survey administration

The Survey of Adult Skills was administered under the supervision of trained interviewers either in the respondent's home or in a location agreed upon between the respondent and the interviewer.

The background questionnaire, which was the first component of the interview, was administered by the interviewer. Respondents were able to seek assistance from others in the household in completing the questionnaire, for example, in translating questions and answers. Proxy respondents were not permitted.

Following completion of the background questionnaire, the respondent undertook the direct assessment on a tablet as described above. Respondents were also permitted to use calculators, notepads and a pen during the assessment. Interviewers administering the survey were required to be trained according to common standards. These covered the timing and duration of training, as well as its format and content. A full set of training materials was provided to countries. The persons responsible for organising training nationally attended training sessions organised by the international consortium.

The survey (background questionnaire plus direct assessment) was normally undertaken in a single session. However, in exceptional circumstances, a respondent could take the questionnaire in one session and the direct assessment in another. The direct assessment was required to be completed in one session. Respondents who did not complete the assessment within a single session for whatever reason were not permitted to finish it at a later time.

Data collection in the 2023 Survey of Adult Skills was scheduled from 1 September 2022 to 30 April 2023 (8 months or 242 days). Six countries completed data collection within this period (Estonia, France, Hungary, Japan, Korea and Poland). The pace of data collection in many countries was slower than projected due to unanticipated challenges such as staffing shortages from the outset, interviewer attrition or difficulties in reaching certain population subgroups (e.g. immigrants, younger respondents). As a result, the OECD and the consortium allowed some countries to extend the data collection period, with 5 countries completing it by the end of May 2023 (Austria, Germany, Lithuania, Singapore and Switzerland), 12 countries completing it by the end of June 2023 (Croatia, Denmark, England [UK], Finland, the Flemish Region [Belgium], Ireland, Latvia, Norway, Spain, the Slovak Republic, Sweden and the United States), 3 countries completing it by the end of July 2023 (Italy, Israel and Canada), and 5 countries completing it by 6 August 2023 (Chile, Czechia, the Netherlands, New Zealand and Portugal). Detailed information on the data collection timeline can be found in Chapter 19 of the Technical Report of the 2023 Survey of Adult Skills (OECD, forthcoming[1]).

Response rates and non-response bias analysis

In all surveys, low response rates constitute a significant threat to the quality of the data, as they may introduce non-response bias. This happen when those who do not respond are systematically different from those who decide to participate in the survey. When this is the case, the results of the survey are no longer representative of the characteristics of the underlying target population. The 2023 Survey of Adult Skills TSGs require countries and economies to put in place a range of strategies to reduce the incidence and effects of non-response, to adjust for it when it occurs, and to evaluate the effectiveness of any weighting adjustments implemented to reduce non-response bias. In particular, countries and economies were expected to establish procedures during data collection to minimise non-response. These included pre-collection publicity, selecting high-quality interviewers, delivering training on methods to reduce and convert refusals, monitoring data collection closely to identify problem areas or groups, and directing resources to these particular groups. At least seven attempts were to be made to contact a selected individual or household before it could be classed as a non-contact. The overall rate of non-contact was to be kept below 3%.

Response rates were calculated for each stage of the assessment: 1) the screening questionnaire (for countries and economies that need to sample households before selecting respondents); 2) the background questionnaire; and 3) the direct assessment.

The overall response rate was calculated as the product of the response rates (complete cases/eligible cases) for the relevant stages of the assessment. For countries and economies with a screening questionnaire, the overall response rate was the product of the response rates for the screener, the background questionnaire and assessment; for those without a screener, it was the product of the response rates for the questionnaire and the assessment.

The computations at each stage are hierarchical, in that they depend on the response status from the previous data collection stage. A completed case thus involved completing the screener (if applicable), the background questionnaire and the direct assessment. In the case of the BQ, a completed case was defined as having responses to key background questions, including age, gender, highest level of schooling and employment status, or responses to age and gender for literacy-related non-respondents. For the direct assessment, a completed case was defined as having completed the locator stage 1 in Figure 5.1) and a literacy or numeracy module (stage 2 and 3 in Figure 5.1), or a case in which the locator was not completed for a literacy-related reason (for example because of a language difficulty or because the respondent was unable to read or write in any of a country's test languages, or because of learning or mental disability.

Countries and economies using population registry-based sampling frames were able to treat some or all of the individuals in their samples who were untraceable as exclusions (i.e. as outside the target population) and exclude them from the numerator and denominator of the response-rate calculation (provided that the 5% threshold for exclusions was not exceeded).

The TSGs set a goal of a 70% response rate. However, countries faced challenges with declining response rates, which resulted in lower rates than encountered in the first cycle. Response and coverage rates are presented in Table 5.9.

Table 5.9. Achieved response rates and population coverage

OECD countries and economies	Response rate (%)	Coverage rate (%)
Austria	39	95
Canada	28	97
Chile	56	100
Czechia	40	97
Denmark	27	98
Estonia	50	97
Finland	34	99
France	55	95
Germany	45	97
Hungary	59	95
Ireland	47	100
Israel	61	95
Italy	29	95
Japan	41	95
Korea	73	100
Latvia	28	99
Lithuania	44	96
Netherlands	40	95
New Zealand	48	98
Norway	41	99
Poland	57	95
Portugal	39	98
Slovak Republic	70	96
Spain	61	99
Sweden	31	99
Switzerland	30	95
United States	28	100
Subnational entities		
England (UK)	38	99
Flemish Region (Belgium)	35	95
Partner countries		
Croatia	36	95
Singapore	62	99

Bias from non-response can arise if non-respondents are systematically different (in terms of skills proficiency, for example) from those who agree to participate in the survey. While low response rates introduce a *potential* source of bias, they do not necessarily mean that a bias is present. If the decision to participate in the survey is *not* related to skills proficiency, very low response rates will not result in any bias.

For this reason, the non-response bias analysis (NRBA) undertaken in the 2023 Survey of Adult Skills looked at a wide range of indicators, over and above response rates, to assess the extent to which results from the survey are susceptible to non-response bias. An extended NRBA considered further indicators related to the likelihood of non-response bias in the estimation of adults' proficiency from the survey. These include:

- comparison of estimates before and after weighting adjustments
- comparison of weighted estimates to external totals

- correlations between auxiliary variables used for weighting and proficiency estimates
- comparison of estimates from alternative weighting adjustments
- analysis of variables collected during data collection
- level-of-effort analysis, looking at differences in proficiencies among respondents who required different number of contacts before agreeing to participate in the survey
- the sensitivity of population estimates of proficiency to a range of assumptions on the proficiency of non-respondents.

Korea was the only country that achieved a response rate above 70% and was therefore not required to undertake the extended NRBA. The Slovak Republic, despite achieving a response rate of 70%, undertook the extended NRBA because it did not fully meet the sampling standards. In particular, in both Lithuania and the Slovak Republic, evidence was found that not all eligible persons in a household were given a chance of being selected to participate in the survey, which could lead to undercoverage bias. Measures were taken to reduce undercoverage bias (weight calibration). Although some additional caution should be used when analysing data from these countries, the outcomes of additional analysis, including the NRBA, suggest that the effects of this departure from the sampling standards are rather small.

When the decision to participate in the survey is linked to specific characteristics of the sampled adults, the distribution of these characteristics among participants in the Survey of Adult Skills may not match the true distribution in the population or that observed in other surveys. However, as all surveys are affected by some non-response, it is not clear that other sources are necessarily more accurate than the Survey of Adult Skills. Misalignments between the distribution of certain characteristics of adults in the sample and in the population, as well as with other sources, have been observed in both cycles of the Survey of Adult Skills. As a result, the changes in the composition of the population observed over the two cycles of the Survey of Adult Skills may also not match exactly the changes observed in other sources.

Sampling weights can be applied to bring the composition of the sample closer to the known distribution of characteristics in the population. In the Survey of Adult Skills, countries and economies agreed with the Secretariat and the OECD contractors on which variables to use for weighting. For variables that were not used in weighting, some discrepancies may remain after weighting.

Table 5.10 provides an overview of some misalignments between the (weighted) PIAAC sample and alternative data sources. Discrepancies are listed if they are statistically significant and over 1.5 percentage points. Some of these misalignments can be explained by differences in the definition or in other methodological aspects between the Survey of Adult Skills and other sources. Moreover, not all countries could verify the alignment across all characteristics due to data availability.

Alternative weighting schemes were considered to understand the extent to which the observed discrepancies might bias the estimated proficiency of the adult population in the 2023 Survey of Adult Skills. Significant differences in estimated proficiency were found in a few countries with these alternative weights (Table 5.11). However, the impact of applying alternative weighting schemes never exceeded four score points. This means that the fact that the distribution of some characteristics in the sample is not consistent with other sources does not seem to have a major impact on estimated proficiency because these alternative weighting adjustments resulted in only minor changes to the overall results.

Table 5.10. Discrepancies in the distribution of certain variables between the PIAAC weighted sample and an alternative source

OECD countries and economies	Variables whose distribution does not match an alternative source	Differences in coverage, timing or definition can partly explain the discrepancies
OECD countries		
Austria	-	-
Canada	Education, Nativity, Language, Life satisfaction	Yes
Chile	Education by gender	No
Czechia	ISCO-08 broad skill levels (current occupation)	Yes
Denmark	Population density	No
Estonia	-	-
Finland	-	-
France	-	-
Germany	-	-
Hungary	Education	Yes
Israel	Marital status by population group[1], Type of locality[2]	No
Italy	-	-
Japan	Education by gender, Education by age, Employment status by age	Yes
Korea	Not applicable	Not applicable
Latvia	Employment status	Yes
Lithuania	Education, Employment status, Gender	Yes
Netherlands	Income, Socio-economic status, Wealth	No
New Zealand	Employment status, Ethnicity	Yes
Norway	Employment status, Industry, Household composition	No
Poland	Education by age	Yes
Portugal	Region by age	Yes
Slovak Republic	Education by region	Yes
Spain	-	-
Sweden	Education, Employment status, Occupation, Economic activity, Nativity	Yes
Switzerland	-	-
United States	Education, Employment status, Household composition, Race/ethnicity, Health insurance coverage	Yes
Subnational entities		
England (UK)	Employment status by age	Yes
Flemish Region (Belgium)	Employment status by age	Yes
Partner countries		
Croatia	-	-
Singapore	Nativity	Yes

1: The population groups are defined as follows: Jews, Not Ultra-Orthodox; Jews, Ultra-Orthodox; Arab Population.
2: Localities are classified as follow: Jewish/Arab by population density.

Table 5.11. Notable and significant differences in estimated proficiency from alternative weighting schemes

Countries and economies	Score differences			Variables used for reweighting
	Literacy	Numeracy	Adaptive problem solving	
Estonia	2.54	2.58	1.82	County (5) * Education (3)
Lithuania	-3.55	-3.73	-2.34	Education (5) * Labour force status (4)
Latvia	2.86	2.91	2.23	Gender (2) * Education (7)
Netherlands	1.10	1.41	0.98	Socio-economic status
Poland	-1.88	-2.16	-1.09	Education (4)
Singapore	2.18	2.17	1.43	Gender (2) * Education (5)
Spain	-2.45	-2.46	-1.95	Country of birth (2) * Region (18)

Note: The table reports the difference between the average proficiency estimated using the final PIAAC weights and the proficiency obtained using alternative weighting schemes. The table only reports countries and economies for which differences are statistically significant and notable (absolute value of the difference larger than the standard error of the differences). In a few other countries, statistically significant differences are found, but they are almost all smaller than 1 score point. These are not reported to save space but can be found in the *Survey of Adult Skills 2023 Technical Report* (OECD, forthcoming[1]). The number in parenthesis next to the variables used for reweighting indicates the number of categories for each variable.

Following the extended NRBA, countries and economies were classified into different categories, reflecting a holistic assessment of how susceptible their proficiency estimates were to non-response bias, and the corresponding level of caution that is advised when interpreting the results:

- pass: meaning that the analysis provided no strong evidence of non-response bias
- low caution: meaning that some caution should be taken in interpreting the results, as non-response bias may be present
- medium caution: meaning that proficiency estimates are more susceptible to non-response bias and more caution should be exerted
- high caution: meaning that the likelihood of non-response bias is higher.

Details on the indicators included in the analysis and on the criteria followed in classifying countries and economies can be found in the Technical Report of the 2023 Survey of Adult Skills (OECD, forthcoming[1]).

Results of the NRBA are presented in Table 5.12. In interpreting the outcomes of the NRBA and the resulting classification of countries, readers should note that:

- The classification reflects an assessment of the likely existence of non-response bias, and not of its magnitude. In other words, one cannot conclude that countries in the “high caution” category necessarily have a larger non-response bias than countries in the “low caution” category.
- The criteria and the thresholds used for the classification have been approved by consensus by the independent experts who are member of the Technical Advisory Group.
- In any such classification, threshold effects will always exist, meaning that countries might be classified in different categories even though the differences in their underlying indicator are very small.
- This classification reflects a judgement on the collected data, and not on the quality of the work done by national centres and data collection agencies, which all countries completed satisfactorily and in accordance with the requirements specified in the technical standards and guidelines.

Table 5.12. Outcomes of the non-response bias analysis

Countries and economies	Response rate (%)	Outcome of the NRBA analysis
Korea	73	Not applicable
Slovak Republic	70	Pass
Singapore	62	Pass
Israel	61	Pass
Spain	61	Pass
Estonia	50	Pass
France	55	Pass
Hungary	59	Low caution
Poland	57	Low caution
Chile	56	Low caution
New Zealand	48	Low caution
Ireland	47	Low caution
Germany	45	Low caution
Lithuania	44	Low caution
Norway	41	Low caution
Czechia	40	Low caution
Austria	39	Low caution
Finland	34	Low caution
Sweden	31	Low caution
Denmark	27	Low caution
Japan	41	Medium caution
Netherlands	40	Medium caution
Portugal	39	Medium caution
England (UK)	38	Medium caution
Croatia	36	Medium caution
Flemish Region (Belgium)	35	Medium caution
Switzerland	30	Medium caution
United States	28	Medium caution
Canada	28	Medium caution
Italy	29	High caution
Latvia	28	High caution

Note: The extended NRBA was not required for countries with response rates above 70%. For this reason, results of the NRBA are not applicable for Korea. The extended NRBA was conducted for the Slovak Republic, despite a response rate of 70%, because the country did not fully meet the sampling standards.

The doorstep interview and literacy-related non-response

In most participating countries and economies, a proportion of respondents are unable to undertake the assessment for literacy-related reasons, such as being unable to speak or read the test language(s), having difficulty reading or writing, or having a learning or mental disability. Some of these respondents may be able to complete the background questionnaire or key parts of it, presumably with the assistance of an interviewer who spoke the respondent's language, a family member or another person. This form of non-response could introduce bias since it is systematically concentrated among those with low literacy proficiency in the survey language (presumably migrants or people with very poor reading skills). In the first cycle, the share of such non-respondents amounted to less than 2% in most countries but exceeded 4% in four countries and economies (OECD, 2019[2]).

To reduce the bias induced by such literacy-related non-response, the 2023 Survey of Adult Skills introduced a new instrument called the doorstep interview. This is a short questionnaire offered in 43 languages which collects basic background information: gender, age, years of schooling, employment status and country of origin. This questionnaire can be easily completed by individuals who do not speak the language(s) of the assessment and are, therefore, unable to answer the regular background questionnaire and the direct skills assessment. The information collected through the doorstep interview was used to estimate the literacy and numeracy proficiency of these non-respondents. This innovation allowed the survey results to cover the entire target population.

The share of doorstep interview cases in each country and economy are shown in Table 5.13.

Table 5.13. Doorstep interview cases across participating countries and economies

OECD countries and economies	Number of cases	Share among all interviews (% - unweighted)	Share of the represented population (% - weighted)	Share among foreign-born adults (% - weighted)
Austria	182	4.0	2.8	9.9
Canada	90	0.8	2.5	7.3
Chile	2	0.0	0.0	0.4
Czechia	72	1.4	4.5	52.8
Denmark	887	17.5	5.3	29.5
Estonia	110	1.7	1.2	10.4
Finland	143	3.5	3.7	32.4
France	36	0.6	0.6	3.8
Germany	118	2.5	2.7	11.1
Hungary	48	1.1	1.0	20.0
Ireland	11	0.3	0.6	1.9
Israel	20	0.3	0.8	4.2
Italy	32	0.7	0.2	1.7
Japan	43	0.8	1.1	43.1
Korea	35	0.6	0.6	12.9
Latvia	4	0.1	0.4	4.0
Lithuania	88	1.4	2.6	40.7
Netherlands	97	2.8	3.1	15.3
New Zealand	2	0.0	0.1	0.1
Norway	64	1.6	1.5	6.2
Poland	1	0.0	0.1	16.8
Portugal	57	1.8	3.0	11.6
Slovak Republic	8	0.2	0.4	17.5
Spain	84	1.4	2.1	9.6
Sweden	0	0.0	0.0	-
Switzerland	217	3.3	3.3	9.0
United States	7	0.2	0.9	4.4
Subnational entities				
England (UK)	5	0.1	0.4	1.4
Flemish Region (Belgium)	209	5.4	3.1	16.2
Partner countries				
Croatia	22	0.5	0.3	2.8
Singapore	0	0.0	0.0	-

Note: The high number of unweighted cases in Denmark is due to the decision to oversample the immigrant population.

While clearly an improvement with respect to the first cycle of the Survey of Adult Skills, the introduction of the doorstep interview poses a challenge for comparing estimates over time, as the sampled populations are no longer fully comparable: adults who completed the doorstep interview in the second cycle would have been handled as literacy-related non-respondents in the first cycle. The OECD recommends excluding cases who only completed the doorstep interview in all analysis comparing results from the second and first cycles of the Survey of Adult Skills.

Overall assessment of data quality

The data from participating countries and economies were subject to a process of adjudication to determine whether they were of sufficient quality to be reported and released to the public. Data adjudication can be seen as the culmination of the quality assurance and quality-control arrangements put in place to ensure that the survey produces reliable and valid data. These had included establishing the Technical Standards and Guidelines (TSGs) covering all aspects of the implementation of the survey and collecting information to monitor compliance with them, as well as identifying problems as they emerged and recommending corrective action. The international consortium also provided guidance, training, assistance and tools to help countries comply with the requirements of the TSGs.

The adjudication process used a broad definition of quality: “fitness for use”. Although countries’ compliance with the TSG was an important component of the quality assessment, the goal was to go beyond compliance to assess whether the data produced were of sufficient quality in terms of their intended uses or applications.

In assessing overall data quality, the focus was on four key areas:

- sampling
- survey operations and interviewer training standards
- instrumentation
- data output and the operation of the delivery platform.

In each of these areas, countries and economies were assessed against a set of quality indicators which reflected the major requirements of the TSGs. All countries and economies either fully met the required quality standards or met them to a degree that was believed not to compromise the overall quality of the data. The data from all participating countries and economies were determined to have met the quality standards required for reporting and public release. The project’s Technical Advisory Group reviewed the assessments of the quality of all national data before submitting them to the Board of Participating Countries.

In some countries, there were some specific concerns because unusual response patterns were identified, suggesting that some respondents may not have exerted a reasonable level of effort in answering the literacy, numeracy and adaptive problem solving assessment. This may call into question whether their responses accurately reflect their proficiency. The OECD Secretariat therefore conducted additional quality checks on the data, expanding on the quality-control procedures set in the Technical Standards and Guidelines. To identify such cases, the OECD relied on the following criteria: a very short time spent on the assessment, a high share of very rapid responses, a high share of missing answers, and locator failure (i.e. failure to answer a set of easy questions) from highly educated, native-born respondents. Anomalies were mostly found in the responses to the cognitive assessment; the pattern of responses to the background questionnaire did not raise particular concerns.

Disengaged respondents will always exist in surveys, and it is difficult to establish objective criteria to assess whether a reasonable level of effort was exerted. In some countries (Israel, Lithuania, New Zealand, Poland, the Slovak Republic, and Spain), it was found that many of these respondents were clustered

around a few interviewers, suggesting that the problem may stem from such interviewers not following the PIAAC protocols. In particular, interviewers were identified for which a high share of their cases met at least two of the criteria mentioned above. This cast doubts on the quality of all data collected by such interviewers.

In Lithuania, New Zealand, the Slovak Republic and Spain, all cases from the identified interviewers (406 in Lithuania, 301 in New Zealand, 356 in the Slovak Republic, and 385 in Spain) have been excluded from the data used to estimate the population model, which establishes the relationship between the variables from the background questionnaire and performance on the direct assessment to generate proficiency estimates (plausible values; see the *Survey of Adult Skills 2023 Technical Report* (OECD, forthcoming[1]) for more detail). This exclusion enhances the robustness of the model, by ensuring it is estimated based only on the cases considered to be of sufficient quality. In the absence of definitive evidence of data falsification or other forms of interviewer misconduct, the responses to the cognitive assessment items still contributed to the estimation of plausible values for these and all respondents.

In Israel, six interviewers were identified as having a relatively large share of cases with unusual response patterns, using the same criteria that led to the identification of cases in the other countries. All data from these interviewers (748 cases in total) have been excluded from the data used to estimate the population model, which establishes the relationship between the variables from the background questionnaire and performance on the direct assessment to generate proficiency estimates (OECD, forthcoming[1]). This exclusion enhances the robustness of the model, by ensuring it is estimated based only on the cases considered to be of sufficient quality.

Moreover, stronger evidence was collected that three of these interviewers breached data collection protocols throughout the survey or were implausibly productive (conducting a very large number of interviews in a relatively short period). As this raised additional concerns about the quality of data, the responses to the cognitive assessment items for all cases of these interviewers were excluded from the database (572 in total). Plausible values for these cases were then estimated using only their responses to the background questionnaire (for which no unusual patterns were detected) and the parameters estimated by the population model.

In Poland, nine interviewers were identified as having a relatively large share of cases with unusual response patterns of respondents, using the same criteria that led to the identification of cases in the other countries. All data from these interviewers (774 cases in total) have been excluded from the data used to estimate the population model, which establishes the relationship between the variables from the background questionnaire and performance on the direct assessment to generate proficiency estimates (OECD, forthcoming[1]). This exclusion enhances the robustness of the model, by ensuring it is estimated based only on the cases considered to be of sufficient quality.

Moreover, stronger evidence was collected that six of these interviewers in Poland breached data collection protocols throughout the survey. For instance, some of these interviewers were implausibly productive, conducting many interviews on a single day. Others did not record interviews or obtain respondents' phone numbers, which made validation of interviews more difficult. Yet another interviewer was found to have falsified seven cases during data collection (cases which were immediately removed from the dataset as part of the quality-control process and are not included in the 774 cases under consideration in this note). Twenty-seven other cases collected from this interviewer were, however, validated and remained in the dataset. Since these factors raise concerns about the quality of all cases completed by these six interviewers, the responses to the cognitive assessment items for all cases of these six interviewers were excluded from the database (559 in total). Plausible values for these cases were then estimated using only their responses to the background questionnaire (for which no unusual patterns were detected) and the parameters estimated by the population model.

In Poland, other cases with unusual response patterns that could suggest possible disengagement or lack of a reasonable level of effort during the assessment were identified. As these cases were not clustered

within any particular interviewer, they were left in the dataset and treated as all other cases, given the difficulty of establishing objective criteria to determine whether reasonable effort was exerted, and whether the results of the assessment truly reflect the proficiency of respondents. While similar cases are present in all countries, the number of such cases in Poland can potentially have a significant impact on the estimated proficiency of the overall population. This should be kept in mind when interpreting Poland's results. For this reason, in OECD (2024[3]) results for Poland are flagged with an asterisk.

References

OECD (2024), *Do Adults Have the Skills They Need to Thrive in a Changing World?: Survey of Adult Skills 2023*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/b263dc5d-en. [3]

OECD (2019), *The Survey of Adult Skills: Reader's Companion, Third Edition*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/f70238c7-en. [2]

OECD (forthcoming), *Survey of Adult Skills 2023 Technical Report*, OECD Publishing, Paris. [1]

Notes

[1] The Technical Standards and Guidelines are available at https://www.oecd.org/en/about/programmes/piaac/piaac-data.html#manuals

6 Relationship of the Survey of Adult Skills to other international adult skills surveys

This chapter examines the relationship between the two cycles of the Survey of Adult Skills (PIAAC) and other international skills surveys. It first focuses on previous international adult skills surveys, notably the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL). It then looks at its relationship to the OECD Programme for International Student Assessment (PISA), which targets 15-year-old students.

The Survey of Adult Skills (PIAAC) provides an unparalleled source of evidence for policy makers about the skills of adults. Its first cycle was conducted in three separate rounds of data collection between 2011 and 2018. In this cycle, 245 000 adults were interviewed in 39 countries and economies, representing 1.15 billion people. In the second cycle, the 2023 Survey of Adults Skills, 160 000 adults were interviewed in 31 countries and economies, representing 673 million people.

This chapter is organised in two parts. The first describes the relationship between the two cycles of the Survey of Adult Skills and previous international adult skills surveys. In particular, it compares the Survey of Adult Skills with the previous two international assessments of adult skills: the International Adult Literacy Survey (IALS) of 1994-98 and the Adult Literacy and Life Skills Survey (ALL) of 2003-07.[1] The first cycle of the Survey of Adult Skills was also related to two surveys conducted by UNESCO (the Literacy Assessment and Monitoring Programme – LAMP) and the World Bank (the STEP Measurement Study). Information about the relationship between the first cycle of the Survey of Adult Skills and the LAMP and STEP surveys can be found in OECD (2019[1]) and in Keslair and Paccagnella (2020[2]).[2]

The second part examines the relationship between the Survey of Adult Skills and the OECD Programme for International Student Assessment (PISA), which focuses on 15-year-old students. Although there are similarities between these two surveys in terms of how skills are defined, there are significant differences between them, primarily in the target populations and the measures used to assess skills.

The relationship between the Survey of Adult Skills and other adult skills surveys

This section compares the two cycles of the Survey of Adult Skills with previous adult skills surveys, IALS and ALL. The Survey of Adult Skills aimed to provide comparable measures of proficiency in the domains of literacy and numeracy with the earlier surveys, and there has been some overlap in participation. In total, 27 countries and economies participated in both cycles of the Survey of Adult Skills, while 17 countries and economies which participated in the 2023 Survey of Adult Skills also participated in IALS. Eight countries and economies participated in both IALS and ALL. IALS was undertaken in three separate waves, with data collection occurring in 1994, 1996 and 1998. ALL was undertaken in two waves, with data collection taking place in 2003 and 2006-08. Table 6.1 lists the countries and economies participating in IALS, ALL and the two cycles of the Survey of Adult Skills, together with the dates of data collection.

Table 6.1. Countries and economies participating in adult skills surveys

OECD countries and economies	IALS (1994-98)	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
OECD countries				
Australia	1996	2006-07	2011-12	-
Austria	-	-	2011-12	2022-23
Canada	1994	2003	2011-12	2022-23
Chile	1998	-	2014-15	2022-23
Czechia	1998	-	2011-12	2022-23
Denmark	1998	-	2011-12	2022-23
Estonia	-	-	2011-12	2022-23
Finland	1998	-	2011-12	2022-23
France	-	-	2011-12	2022-23
Germany	1994	-	2011-12	2022-23
Hungary	1998	2007-08	2017-18	2022-23
Ireland	1994	-	2011-12	2022-23
Israel	-	-	2014-15	2022-23
Italy	1998	2003-04	2011-12	2022-23

Japan	-	-	2011-12	2022-23
Korea	-	-	2011-12	2022-23
Latvia	-	-	-	2022-23
Lithuania	-	-	2014-15	2022-23
Netherlands	1994	2007-08	2011-12	2022-23
New Zealand	1996	2005 and 2007	2014-15	2022-23
Norway	1998	2003	2011-12	2022-23
Poland	1994	-	2011-12	2022-23
Portugal	-	-	-	2022-23
Slovak Republic	-	-	2011-12	2022-23
Slovenia	1998	-	2014-15	-
Spain	-	-	2011-12	2022-23
Sweden	1994	-	2011-12	2022-23
Switzerland	1994	-	-	2022-23
United States[1]	1994	2003	2011-12, 2014-15 and 2017	2022-23
Subnational entities				
Flemish Region (Belgium)	-	-	2011-12	2022-23
England (UK)	1996	-	2011-12	2022-23
Northern Ireland (UK)	1996	-	2011-12	-
Partner countries				
Croatia	-	-	-	2022-23
Singapore	-	-	2014-15	2022-23

1. The United States participated in all three rounds of the first cycle of the Survey of Adult Skills (PIAAC). It collected data as part of Round 1 in 2011-12. It then collected additional data for targeted population groups as part of a National PIAAC Supplement (Rampey et al., 2016[3]) in 2014 and participated in Round 3 in 2017. Data collected in the first and second round were combined and reweighted to totals related to the 2010 census (while the 2011/12 data were weighted to totals from the 2000 census). The 2012/14 data set has fully replaced the original 2011/12 dataset in all OECD reports, as it provides a more accurate representation of the proficiency of the working-age population at that point in time. The 2017 data collected as part of Round 3 can be used as an additional data point. Details of the PIAAC data collection in the United States can be found in the technical reports for the survey and the National PIAAC Supplement (Hogan et al., 2016[4]; OECD, 2019[5]).

Evolution of assessment frameworks and instruments

Over time, assessment frameworks in large-scale assessments (including adult assessments) face competing pressures. On the one hand, there is a desire to retain continuity in measures (to provide reliable measures of change over time). On the other hand, measures need to be relevant to contemporary realities and changing understanding of the phenomena measured. Three main factors drive these changes: 1) developments in the understanding of the skills measured; 2) technological and social developments that affect the nature and practice of these skills in everyday life, work and study; and 3) technological and methodological advances in the science and practice of measurement (OECD, 2021[6]).

Although the different international adult assessments have been designed to be linked psychometrically in the domains of literacy and numeracy, the constructs measured have undergone considerable revision and extension, even if a common core remains. The skills assessed in the 2023 Survey of Adult Skills and its predecessors are presented graphically in Table 6.2. The shading indicates links between surveys, with the same colour indicating that the domains are comparable in terms of the constructs measured and the content of the assessment instruments.

Table 6.2. Skills assessed in adult skills surveys

IALS (1994-98)	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
Prose literacy	Prose literacy		
Document literacy	Document literacy		
Literacy (rescaled to combine prose and document literacy)	Literacy (rescaled to combine prose and document literacy)	Literacy (encompasses the reading of prose and document texts as well as digital texts) Reading components (print vocabulary, sentence meaning and passage fluency).	Literacy – includes the dimensions of organisation (density of content, representations and access devices) and source (single or multiple authors/publishers) to better represent the range of texts accessible in digital environments, including interactive texts Reading components (measuring sentence meaning and passage fluency and being integrated into the literacy scale)
	Numeracy	Numeracy	Numeracy (expanded to include representations of mathematical information in the form of "structured information" and also "dynamic applications") Numeracy components (measuring quantity and relative magnitudes and being integrated into the numeracy scale)
Quantitative literacy			
	Problem solving		
		Problem solving in technology-rich environments	
			Adaptive problem solving

Note: See Box 6.1 for references for the assessment frameworks for each programme.

The descriptors used to describe the characteristics of the tasks at each proficiency level differ between surveys, because of the evolution of the assessment frameworks. Differences are even more marked when comparing the two cycles of the Survey of Adult Skills with IALS and ALL because of the introduction of the new domain of "literacy" (which replaced the previously separate domains of prose and document literacy) and because the way in which the "proficiency" of individuals and the "difficulty" of items are defined also changed. In particular, the Survey of Adult Skills locates items and individuals on the proficiency scales for literacy, numeracy and problem solving using a response probability (RP) value of 0.67. In other words, individuals are located on the scale at the point at which they have a 67% probability of successfully completing a random set of items representing the construct, and items are located on the scale at the point in which they have a 67% probability of being successfully completed by a random sample of the adult population (see Chapter 3). In IALS and ALL a response probability of 0.80 was used. The first cycle of the Survey of Adult Skills moved from a 0.80 RP to a 0.67 RP in order to align with the practice adopted in PISA (OECD, 2010, p. 48[7]).

The change in response probability has no consequences for either the estimation of the proficiency or the precision of the scales. The estimation of proficiency is independent of the selection of an RP value, as it is a function of the level of correct response to the test items. The precision of the scale is a function of the number of items in the scale, which is again independent of the choice of RP value. What the change in

RP value does affect is the way proficiency is defined and described. In effect, “proficiency” is defined in terms of a different probability of successfully completing tasks. In the case of the shift from an RP value of 0.80 to one of 0.67, the result is that proficiency is described in terms of more difficult items that are completed with a lower probability of success (OECD, 2019[1]).

Literacy

The Survey of Adult Skills defines literacy more broadly than the definitions used in IALS and ALL. Literacy encompasses the domains of prose and document literacy,[3] which were assessed separately in IALS and ALL. In addition, literacy includes a stronger emphasis on reading digital and mixed-format texts (i.e. texts containing both continuous and non-continuous elements; see Chapter 2). The second cycle further expanded the classification of texts to include the dimensions of organisation (density of content, representations and access devices) and source (single or multiple authors/publishers) to better represent the range of texts accessible in digital environments, including interactive texts. The conceptualisation of the cognitive processes used in gaining meaning from text, the definition of the contexts in which reading takes place, and the factors affecting the difficulty of test items are very similar across all adult skills surveys. Still, the 2023 Survey of Adult Skills emphasises evaluation in terms of the evaluation of the accuracy, soundness and task relevance of a text in relation to both its source and content. Additionally, cognitive processes are now considered independently of the factors affecting task difficulty. Task difficulty is conceived as being driven by the features of the stimulus text(s), the formulation of the question/task description and the interaction of the text and question/task description (see Table 6.3).

A set of common test items provided a psychometric link between the first cycle of the Survey of Adult Skills and IALS and ALL. A similar approach was used to link the first and second cycles of the Survey of Adult Skills: 28 of the 80 literacy items included in the second cycle assessment were linking items (i.e. items that were used in the first cycle of the survey).

The assessment of reading components was introduced in the first cycle of the Survey of Adult Skills as a new element. These were also included in the second cycle, with minor changes in the construct (print vocabulary was omitted). A more important change introduced in the second cycle was the inclusion of the performance on the components assessment into the main literacy proficiency scale.[4] Table 6.3 shows the evolution of literacy constructs across the adult skills surveys.

Table 6.3. Evolution of literacy assessment frameworks across adult skills surveys

	IALS (1994-98) / ALL (2003-07)		Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
Construct	Prose literacy	Document literacy	Literacy	Literacy
Definition	Literacy is using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.		Literacy is the ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential. Literacy encompasses a range of skills, from the decoding of written words and sentences to the comprehension, interpretation, and evaluation of complex texts.	Literacy is accessing, understanding, evaluating, and reflecting on written texts in order to achieve one's goals, develop one's knowledge and potential, and to participate in society.
	Prose literacy is the knowledge and skills needed to understand and use information from texts, including editorials, news stories, brochures and instruction manuals.	Document literacy is the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables and charts.		
Cognitive processes	• locating • cycling • integrating • generating		• access and identify • integrate and interpret (relating parts of text to one another) • evaluate and reflect	• accessing text • understanding • evaluating
Content	Continuous texts: • description • narration • exposition • argumentation • instruction • document or record.	Non-continuous texts: • matrix documents • graphic documents • locative documents • entry documents • combination documents.	Texts characterised by their medium (print-based or digital) and by format: • continuous or prose texts which involve narration, argumentation or descriptions, for example • non-continuous or document texts, for example, tables, lists and graphs • mixed texts which involve combinations of prose and document elements • multiple texts which consist of the juxtaposition or linking of independently generated elements.	Texts characterised by their: • type (description, narration, exposition, argumentation, instruction, transaction) • format (continuous, non-continuous, mixed) • organisation (the amount of information and the density of content representation and access devices) • source (single vs. multiple texts)
Contexts	• home and family • health and safety • community and citizenship • consumer economics • work • leisure and recreation		• personal • work • community • education	• work and occupation • personal • community and citizenship • education and training
Factors affecting task difficulty	• type of match • type of information requested • plausibility of distractors		• transparency of the information • degree of complexity in making inferences • semantic complexity and syntactic complexity • amount of information needed • prominence of the information • text features (such as text cohesion signals)	• text factors (length, type of text, familiarity of content, presence of content signalling devices) • task factors (length of stem, explicitness of guidance) • text-by-task factors (type of match, presence of distracting or irrelevant information)

Source: Murray, Kirsch and Jenkins (1998[8]), OECD/Statistics Canada (2000[9]), Murray, Clermont and Binkley (2005[10]), OECD (2012[11]) and Rouet et al. (2021[12])

Numeracy

The conceptualisation of numeracy in the 2023 Survey of Adult Skills remains similar to the definitions used in its first cycle and ALL, with a focus on accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life. As shown in Table 6.2, the domain of numeracy was introduced in ALL to replace quantitative literacy, which had been measured in IALS. Quantitative literacy covers the skills needed to undertake arithmetic operations such as addition, subtraction, multiplication and division, either singly or in combination, using numbers or quantities embedded in printed material. Numeracy covers a broader range of situations in which actors must deal with mathematical information of different types, not just situations involving numbers embedded in printed materials (Gal et al., 2005[13]).

The revisions to the numeracy framework for the 2023 Survey of Adult Skills were primarily focused on ensuring that the assessment reflects the importance of digital information, representations, devices and applications that adults have to manage in dealing with the numerical demands of everyday life. In particular, some of the key elements of this revision included 1) addressing 21st century skills, including critical thinking and reflection, reasoning and understanding of degree of accuracy; 2) considering advances in technology and information and communication technologies (ICT) while keeping a balance with more traditional modes and means of communication and undertaking numeracy tasks; 3) making better use of technology for assessment in relation to both authenticity and making items accessible; and 4) addressing a number of issues regarding adults' numeracy performance and understanding, including a person's disposition to use mathematics and to see mathematics in a numeracy situation (Tout et al., 2021[14]).

As in the case of the literacy assessment, the first cycle of the Survey of Adult Skills included common items with ALL, while several numeracy items are now common to both cycles of the Survey of Adult Skills. Out of the 80 numeracy items included in the second cycle numeracy assessment, 32 were linking items (i.e. items that were used in the first cycle of the survey).

The 2023 Survey of Adult Skills introduced an assessment of numeracy components that aimed to provide insights into the skills and knowledge of adults with low levels of numeracy (below Level 1). The content is limited to the fundamentals of number sense. More specifically, they cover understanding of quantity (16 items requiring respondents to identify how many objects are displayed) and relative magnitude (14 items asking respondents to identify the biggest number in a set). As with reading components, the numeracy component items are integrated into the numeracy proficiency scale.[5] Table 6.4 shows the evolution of the numeracy constructs across the different adult skills surveys.

Table 6.4. Evolution of numeracy assessment frameworks across adult skills surveys

	IALS (1994-98)	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-17)	Survey of Adult Skills (second cycle, 2022-23)
Construct	Quantitative literacy	Numeracy	Numeracy	Numeracy
Definition	Quantitative literacy is the knowledge and skills required to apply arithmetic operations, either alone or sequentially, to numbers embedded in printed materials, such as balancing a chequebook, figuring out a tip, completing an order form	Numeracy is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations. Numerate behaviour is observed when people manage a situation or solve a problem in a real context;	Numeracy is the ability to access, use, interpret and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life. To this end, numeracy involves managing a	Numeracy is accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in

	IALS (1994-98)	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-17)	Survey of Adult Skills (second cycle, 2022-23)
	or determining the amount of interest in a loan from an advertisement.	it involves responding to information about mathematical ideas that may be represented in a range of ways; it requires the activation of a range of enabling knowledge, factors and processes.	situation or solving a problem in a real context by responding to mathematical content/information/ideas represented in multiple ways.	adult life.
Cognitive processes	• locating • cycling • integrating • generating	• identify or locate • act upon or react • interpret • communicate	• identify, locate or access • act upon and use (order, count, estimate, compute, measure, model) • interpret, evaluate and analyse • communicate	• access and assess situations mathematically • act on and use mathematics • evaluate, critically reflect, make judgements
Content	Non-continuous texts: • matrix documents • graphic documents • locative documents • entry documents • combination documents	Mathematical information: • dimension and shape • pattern, functions and relationships • data and chance • change Representations of mathematical information: • objects • pictures • symbolic notation • formulae • visual displays • texts	Mathematical content, information and ideas: • quantity and number • dimension and shape • pattern, relationships, change • data and chance Representations of mathematical content: • objects and pictures • numbers and symbols • diagrams, maps, graphs, tables • texts • technology-based displays	Mathematical content, information and ideas: • quantity and number • space and shape • change and relationships • data and chance Mathematical representations: • text or symbols • images of physical objects • structured information • dynamic applications
Contexts	• home and family • health and safety • community and citizenship • consumer economics • work • leisure and recreation	• everyday life • work-related • society and community • further learning	• work-related • personal • society and community • education and training	• personal • work • social/community
Factors affecting task difficulty	• type of match • type of information requested • plausibility of distractors • type of calculation • operation specificity	• type of match/problem • plausibility of distractors • complexity of mathematical information • type of operation • expected number of operations	• type of match/problem • plausibility of distractors • complexity of mathematical information • type of operation • expected number of operations	• type of match/problem • plausibility of distractors • complexity of mathematical information • type of operation • expected number of operations

Source: Murray, Kirsch and Jenkins (1998[8]), OECD/Statistics Canada (2000[9]), Murray, Clermont and Binkley (2005[10]), OECD (2012[11]) and Tout et al. (2021[14]).

Adaptive problem solving

The domain of adaptive problem solving (APS) was first introduced in the 2023 Survey of Adult Skills and is independent of previous measures of problem solving. Results from the APS assessment are therefore not comparable with results on problem solving in technology-rich environments (PSTRE) from the first cycle of the survey. PSTRE was an assessment of problem-solving skills as they apply to technology-rich environments. APS, on the other hand, did not systematically assess the proficiency of problem solvers at interacting with technology-rich environments.

APS represents the return to a concept of general problem solving that is relevant to a range of information environments and contexts and is not limited to digitally embedded problems, even though digital aspects as a mode of problem solving play an important role in APS. The concept of APS recognises that problems often dynamically change while they are being solved, which requires constant monitoring and, if necessary, adapting the original solution. These changes occur because of unexpected physical and/or social events in the environment and because of the unintended consequences of the problem solver's actions. Adaptive problem solving is measured through 65 items. Table 6.5 shows the evolution of the problem-solving constructs across the adult skills surveys.

Table 6.5. Evolution of problem-solving assessment frameworks across adult skills surveys

	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
Construct	Analytical problem solving	Problem solving in technology-rich environments	Adaptive problem solving
Definition	Problem solving involves goal-directed thinking and action in situations for which no routine solution procedure is available. The problem solver has a more or less well defined goal, but does not immediately know how to reach it. The incongruence of goals and admissible operators constitutes a problem. The understanding of the problem situation and its step-by-step transformation based on planning and reasoning, constitute the process of problem solving.	Problem solving in technology-rich environments involves the ability to use digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks. The assessment focuses on the abilities to solve problems by setting up appropriate goals and plans, and accessing and making use of information through computers and computer networks.	Adaptive problem solving involves the capacity to achieve one's goals in a dynamic situation, in which a method for solution is not immediately available. It requires engaging in cognitive and metacognitive processes to define the problem, search for information, and apply a solution in a variety of information environments and contexts.
Cognitive processes	• defining the goal • analysing the given situation and constructing a mental representation • devising a strategy and planning the steps to be taken • executing the plan, including control and – if necessary – modification of the strategy • evaluating the result	• setting goals and monitoring progress • planning • acquiring and evaluating information • using information	• defining the problem • searching for relevant information • applying a solution
Content	Problems	Technology: • hardware devices • software applications • commands and functions • representations (e.g. text, graphics, video) Nature of problems: • intrinsic complexity which includes the number of steps	Aspects of the environment in which adaptive problem solving tasks are embedded: • problem configuration • dynamics of the situation • features of the environment

	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
		required for a solution, the number of alternatives, the complexity of computation and/or transformation, the number of constraints • explicitness of the problem statement, for example, if it is largely unspecified or described in detail	
Contexts	Not specified	• personal • work and occupation • civic	• personal • work • social/community
Factors affecting task difficulty	Not specified	• minimum number of steps required to solve the problem • number of options or alternatives at various stages in the problem space • diversity of operators required, complexity of computation/transformation • likelihood of impasses or unexpected outcomes • number of constraints to be satisfied • amount of transformation required to communicate a solution • ill defined (implicit, unspecified) vs. well defined (explicit, described in detail)	• number of elements, relations, and operations • salience and accessibility of operators • interactions between problem elements • number of parallel tasks and goals • number of features that change and their relevance • salience of change (if something changes) • frequency of change • degree of impasse • wealth of information • proportion of irrelevant information • (lack of) structure of the environment • number of sources of information

Source: Murray, Clermont and Binkley (2005[10])OECD (2012[11]) and Greiff et al. (2021[15]).

Implications for the comparability of results over time

The evolution of the frameworks and the methodological changes introduced between the first and the second cycle of the Survey of Adult Skills (notably the inclusion of components in the main literacy and numeracy scales in the 2023 survey) have implications for the comparability of results between the two cycles of the survey.

When looking at changes in proficiency between the first and second cycle of the Survey of Adult Skills, additional uncertainty around scale values due to changes in the assessment frameworks and items must be taken into account ("is a score of 235 in the second cycle of the survey the same as 235 in the first cycle?"). The difference between a score in the second cycle scale and the corresponding score in the first cycle scale is modelled as a constant, equal for all countries and at all points of the proficiency scale. While the actual value of this constant remains unknown, its standard deviation $le_{1,2}$ can be estimated and is known as the *linking error.* This linking error should be added to the standard error of any trend statistics expressed as a proficiency score (e.g. difference in mean proficiency across cycles or the values of the percentiles of the proficiency distribution). More formally, the standard error of the change in proficiency for country (or subgroup) g between the first and second cycle is: $\sigma(\Delta_{g2-g1}) = \sqrt{\sigma_{g2}^2 + \sigma_{g1}^2 + le_{1,2}^2}$, where σ_{g1} is the standard error of the proficiency of group g in the first cycle, σ_{g2} is the standard error of the

proficiency of group g in the second cycle, and $le_{1,2}$ is the linking error between the two cycles. The actual value of the linking error is 3.27 for literacy and 2.95 for numeracy.

It should be noted that the linking error does not apply to trends of any statistic which is analogous to a score point difference, such as gender or age gaps in proficiency scores. Given that the additional uncertainty for comparing results across cycles is modelled as a constant at all points of the scale, when taking the difference between two scores, the uncertainties associated with each score cancel each other out, and there is no need to add the linking error term to the standard error of the trend.

A more complex case is when the analysis looks at trends in the shares of the population scoring at a given proficiency level. In this case, the additional error term for the standard error of these trends depends on $le_{1,2}$, but also on the density f_g of the proficiency score distribution around these cut-offs. For instance, the resulting linking error for the trend in the proportion of the population score at Level 1 in group g will be $le_{1,2}^2 * (f_g(226) - f_g(176))^2$.

The inclusion of performance in the components assessment into the main literacy and numeracy scales improves the precision of the estimates of proficiency at the bottom end of the literacy and numeracy scales but may also affect the comparability of results over time, particularly for adults who only took the components assessment after they failed the locator test. The estimated proficiency of these adults is based on a much richer set of information in the second cycle of the survey than it was in the first cycle. Caution is therefore advised when analysing changes in proficiency over time for subgroups of adults in which low-skilled adults who failed the locator are over-represented. Adults who failed the locator and only took the components assessment constitute a small minority of the overall sample. For most analysis, the impact of this methodological change is therefore negligible. However, in some groups of the population, the share of such adults may be larger, especially in some countries. In OECD reports, as a general (albeit somewhat subjective) rule, changes in proficiency are not reported when the share of adults who only took the components assessment constitutes more than 20% of the group analysed. Table 6.6 presents, for each country and economy, the share of respondents that only took the components, both as a percentage of the overall population, and as a percentage of foreign-born adults.

Table 6.6. Share of respondents who failed the locator test and only took the reading and numeracy components assessments

OECD countries and economies	% of the overall population (%)	% of foreign-born adults
OECD countries		
Austria	1.6	3.7
Canada	1.1	1.3
Chile	7.1	8.4
Czechia	0.5	0.4
Denmark	0.5	1.0
Estonia	1.0	1.3
Finland	0.9	1.4
France	2.2	7.2
Germany	1.5	4.8
Hungary	1.7	0.8
Ireland	0.5	0.6
Israel	3.4	2.7
Italy	1.9	5.1
Japan	0.9	1.6
Korea	1.4	4.2
Latvia	1.0	0.9
Lithuania	1.3	1.2

OECD countries and economies	% of the overall population (%)	% of foreign-born adults
Netherlands	1.8	5.3
New Zealand	4.1	5.0
Norway	1.0	3.5
Poland	7.1	18.9
Portugal	3.3	3.5
Slovak Republic	1.3	0.3
Spain	1.1	2.3
Sweden	0.8	2.5
Switzerland	2.1	5.1
United States	4.8	15.1
Subnational entities		
England (UK)	1.4	2.9
Flemish Region (Belgium)	1.0	3.0
Partner countries		
Croatia	2.0	4.1
Singapore	2.7	3.9

Mode of delivery

A major difference between the two cycles of the Survey of Adult Skills and IALS and ALL is the way in which the assessment was delivered. Both cycles of the Survey of Adult Skills were designed to be delivered on digital devices. The first cycle of the survey relied on laptops, although there was a pencil-and-paper option for respondents who did not have sufficient computer skills to take a digital assessment. The 2023 Survey of Adult Skills relied solely on tablets. A digital stylus was also available, to replicate to the extent possible the experience respondents would have with paper-based instruments. In contrast, both IALS and ALL were exclusively based on paper-and-pencil instruments: respondents received printed booklets and responded to questions in writing. During the field trial of the first cycle of the Survey of Adult Skills, a study was conducted into the comparability of results across the two delivery modes (paper and computer; see OECD (2013[16])). In the second cycle, parameters of linking items that were also administered in the first were rather stable, despite being administered on a tablet rather than on a laptop, providing evidence that the change from laptop to tablet had no impact on the comparability of results across the two cycles.

Box 6.1. Assessment framework references for the adult skills surveys

2023 Survey of Adult Skills

OECD (2021[6]), *The Assessment Frameworks for Cycle 2 of the Programme for the International Assessment of Adult Competencies*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/4bc2342d-en.

First cycle of the Survey of Adult Skills

OECD (2012[11]), *Literacy, Numeracy and Problem Solving in Technology-Rich Environments: Framework for the OECD Survey of Adult Skills*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264128859-en.

ALL

Murray, S., Y. Clermont and M. Binkley (eds) (2005[10]), *Measuring Adult Literacy and Life Skills: New Frameworks for Assessment*, Statistics Canada, Ottawa, Catalogue No. 89-552-MIE, No. 13.

IALS

Murray, S., I. Kirsch and L. Jenkins (eds) (1998[8]), *Adult Literacy in OECD Countries: Technical Report on the First International Adult Literacy Survey*, National Center for Education Statistics, Office of Educational Research and Improvement, Washington, DC.

OECD/Statistics Canada (2000[9]), *Literacy in the Information Age: Final Report of the International Adult Literacy Survey*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264181762-en.

Comparability of background questionnaires

The extent to which comparisons can be made between the two cycles of the Survey of Adult Skills and their predecessors does not just depend on the psychometric links between them. If the results for subgroups of the population are to be reliably compared between surveys, the definitions of the relevant subgroups must also be similar over time.

The background questionnaire from the 2023 Survey of Adult Skills took great care in ensuring the comparability of questions with those administered in previous surveys. Moreover, it enriched the range of information collected by including: 1) a new section on social and emotional skills; 2) new items to capture changes in working environments and societies (e.g. use of digital skills); 3) improved measurement of education and training; 4) an improved process for implementing national adaptations and adding national extensions; and 5) new items to capture more information about being out of work and respondents' social background. More information on the content of the background questionnaire in the 2023 Survey of Adult Skills can be found in Chapter 4 and in (OECD, forthcoming[17]).

In areas such as the personal characteristics of respondents, language background, immigration status, educational attainment and participation, and labour-force status, there is a high degree of similarity between the questions and response categories used in the two cycles of the Survey of Adult Skills and those used in IALS and ALL. Some caution must be exercised when comparing levels of educational attainment between the first and the second cycle of the survey, as some countries have changed the classification of some of their qualifications within the International Standard Classification of Education (ISCED) framework (OECD, forthcoming[18]).

Care must also be taken when comparing levels of education with previous surveys. For four countries participating in IALS (Czechia, Germany, Poland and the United Kingdom), the proportion of the adult population classified as having educational attainment below upper secondary level (ISCED 0-2) is considerably lower and the proportion with upper secondary and post-secondary non-tertiary attainment (ISCED 3-4) is considerably higher than is found in other statistics on educational attainment for the years when the IALS data were collected (1994 or 1996 depending on the country) such as those published by the OECD in *Education at a Glance* (Gesthuizen, Solga and Künster, 2010[19]). Analysts should bear this in mind when comparing results between IALS and ALL and the Survey of Adult Skills for these countries. Gesthuizen, Solga and Künster (2010[19]) propose a method to correct the attribution of respondents to levels of educational attainment in the IALS data set that provides distributions in line with other attainment statistics.

Concerning the items which were designed to capture the frequency of use of certain skills, the information collected regarding reading at home and work, influence, and task discretion is comparable across the two cycles of the Survey of Adult Skills. In the case of ICT use at work and home, learning at work, numeracy

use at work and home, and writing at work and at home, however, the innovations that were introduced to better measure some concepts have compromised the comparability over time. The codebook for the Survey of Adult Skills database clearly identifies whether variables are comparable through the variable names; more detailed information is contained in the Survey of Adult Skills Data Analysis Manual (OECD, forthcoming[17]).

Survey methods and operational standards and procedures

Other things being equal, differences in design, methodology and operational procedures may have a potentially significant effect on the comparability of different assessments. This section presents a comparison of the extent of comparability between IALS, ALL and the two cycles of Survey of Adult Skills in terms of:

- the target population
- sample design and procedures
- survey operations
- survey response rates.

The target population

The target population defined for both IALS and ALL is identical to that of the two cycles of the Survey of Adult Skills, i.e. civilian, non-institutionalised persons aged 16-65[6]. In each of the four surveys, participating countries/economies were required to use sampling frames that covered the target population. Exclusions of up to a maximum of 5% of the target population were permitted, and all countries met the requirement of including 95% or more of the target population in their sampling frames.[7]

Sample design

In all four surveys, participating countries and economies were required to use a probability sample representative of the target population. There were no deviations from this requirement in either cycle of the Survey of Adult Skills or ALL. In IALS, there was one deviation: Germany employed a non-probability selection method at the second stage of its three-stage sample design (Murray, Kirsch and Jenkins, 1998[8]). However, the extent of deviation from strict probability sampling was assessed to be "relatively minor" and was not believed to have "introduced significant bias into the survey estimates".

In the second cycle of the Survey of Adult Skills there was evidence that in Lithuania and in the Slovak Republic not all eligible persons in a household were given a chance to be selected to participate in the survey, which could lead to undercoverage bias. Measures were taken to reduce undercoverage bias (weight calibration). While some additional caution should be taken when analysing data from these countries, the results of additional analysis, including non-response bias analysis (NRBA), suggest that the effect of this deviation from the sampling standards is rather small (OECD, forthcoming[18]).

Survey operations and the introduction of the doorstep interview

Both the degree of standardisation of survey procedures and the effort put into monitoring compliance with these standards have been greater in the two cycles of the Survey of Adult Skills than was the case in either IALS or ALL. An external review of the implementation of the first round of IALS[8] conducted in the second half of 1995 concluded that while there were no concerns regarding the development of instrumentation: "The variation in survey execution across countries is so large that we recommend that all comparative analyses across countries should be interpreted with due caution" (Kalton, Lyberg and Rempp, 1998, p. 4[20]). In particular, while guidance on survey procedures was provided to the participating countries and economies, the reviewers found that little was done to "enforce adherence to specific

procedures" (Kalton, Lyberg and Rempp, 1998, p. 4[20]). Quality assurance procedures were subsequently improved for the second and third rounds of IALS (OECD/Statistics Canada, 2000[9]) and in ALL.[9]

Maximising standardisation in processes and procedures, and therefore minimising any differentials in error resulting from variation in implementation, was a central objective of the Survey of Adult Skills. The quality assurance and quality control procedures put in place are among the most comprehensive and stringent ever implemented for an international household-based survey. The standards that participating countries and economies are required to meet in implementing the two cycles of the Survey of Adult Skills were set out in two comprehensive sets of Technical Standards and Guidelines. These were accompanied by a quality assurance and quality control process at key stages of implementation (e.g. sampling designs) and data collection throughout the project. The results of the quality control activity fed into an assessment of the overall quality of the data from each participating country (see also Chapter 5).

An important innovation in design and operations introduced in the second cycle of the Survey of Adult Skills is the administration of a doorstep interview to adults who were not able to participate in the survey because of language barriers (literacy-related non-respondents). In previous adult skills surveys, no information was collected on such adults, effectively leading to a small undercoverage of the target population and an upward bias in the estimation of the average proficiency of the population[10].

In the 2023 Survey of Adult Skills, such adults were administered a very short questionnaire available in many languages (the doorstep interview). Respondents completed this on a tablet by themselves. The limited information collected through this doorstep interview (age, gender, level of education, employment status and migration history) was used to generate plausible values for these respondents, thus allowing them to contribute to the estimation of the average proficiency of the population. A separate population model was used for estimating the proficiency of such respondents, which was constrained not to exceed the proficiency of respondents who failed the locator assessment (OECD, forthcoming[18]).

The introduction of the doorstep interview creates a small misalignment between the populations for which proficiency estimates are available across different surveys. For this reason, it is recommended to systematically exclude doorstep interview cases when comparing results from the 2023 Survey of Adult Skills with those of previous surveys.

Survey response rates

Non-response is a potentially significant source of error in any survey. In comparing results across the adult skills surveys, it is important to be aware of their different response rates. Table 6.7 presents the response rates of the four surveys for those countries/economies for which repeated observations are available. As is evident in the table, response rates have declined over time in most countries. This is a general trend common to all surveys, and has possibly been accelerated in the aftermath of the COVID-19 pandemic when data for the 2023 Survey of Adult Skills were collected. Low response rates increase the possibility that results of the survey are affected by non-response bias. For this reason, NRBA has been conducted in the first and second cycle of the survey for countries with response rates below 70%. More details on this analysis and its results are presented in Chapter 5, as well as in the Technical Report of the 2023 Survey of Adults Skills (OECD, forthcoming[18]). For the first cycle of the survey, the results of the NRBA can be found in OECD (2019[5]; 2019[1]).

Table 6.7. Response rates across adult skills surveys (%)

OECD countries and economies	IALS (1994-98)	ALL (2003-07)	Survey of Adult Skills (first cycle, 2011-18)	Survey of Adult Skills (second cycle, 2022-23)
OECD countries				
Australia	96	79	71	-
Austria	-	-	53	39
Canada	69	66	59	28
Chile	74	-	66	56
Czechia	61	-	66	40
Denmark	66	-	50	27
Estonia	-	-	63	50
Finland	69	-	66	34
France	-	-	67	55
Germany	69	-	55	45
Hungary	-	63	57	59
Ireland	60	-	72	47
Israel	-	-	61	61
Italy	35	44	56	29
Japan	-	-	50	41
Korea	-	-	75	73
Latvia	-	-	-	28
Lithuania	-	-	54	44
Netherlands	45	47	51	40
New Zealand	74	64	63	48
Norway	61	56	62	41
Poland	75	-	56	57
Portugal	-	-	-	39
Slovak Republic	-	-	66	70
Slovenia	70	-	62	-
Spain	-	-	48	61
Sweden	60	-	62	31
Switzerland	55	-	-	30
United States	60	66	68 (2012/14) 56 (2017)	28
Subnational entities				
England (UK)	63	-	59	38
Flemish Region. (Belgium)	36	-	62	35
Partner countries				
Croatia	-	-	-	36
Singapore	-	-	63	62

Source: OECD/Statistics Canada (2000[9]; 2011[21]) and OECD (2019[1]).

The relationship between the Survey of Adult Skills and PISA

All the countries and economies participating in the Survey of Adult Skills have also participated in at least some rounds of the OECD Programme for International Student Assessment. As a result, some of the adults sampled for the Survey of Adult Skills will have been eligible to participate in PISA at some point in time.

PISA and the Survey of Adult Skills assess ostensibly similar skills. In particular, literacy and numeracy as assessed in the Survey of Adult Skills have clear similarities with reading and mathematics assessed in PISA. Given the overlap in terms of the cohorts assessed and the content of the assessments, this section illustrates the similarities and differences between the two studies and the extent to which the results of the two studies can be compared.

The conceptualisation of literacy and numeracy skills in the Survey of Adult Skills has much in common with the skills of reading literacy and mathematical literacy in PISA. However, the Survey of Adult Skills was not designed to be linked psychometrically to PISA. Even in those areas in which conceptual links are strongest (in the domains of literacy/reading literacy and numeracy/mathematical literacy), the measurement scales are distinct.

PISA cohorts in the target population of the Survey of Adult Skills

The target population for the two cycles of the Survey of Adult Skills includes cohorts who were eligible to participate in PISA 2000, 2003, 2006, 2009, 2012, 2015, 2018 and 2022. Table 6.8 shows how old the cohorts assessed in the eight rounds of PISA between 2000 and 2022 would have been at the time when the data for the two cycles of the Survey of Adult Skills were being collected.

Table 6.8. Age of PISA cohorts in 2022-23

	Survey of Adult Skills (first cycle, 2011-18)			Survey of Adult Skills (second cycle, 2022-23)
	Age in 2011-12	Age in 2014-15	Age in 2017-18	Age in 2022-23
PISA 2000	26-27	29-30	32-33	37-38
PISA 2003	23-24	26-27	29-30	34-35
PISA 2006	20-21	23-24	26-27	31-32
PISA 2009	17-18	20-21	23-24	28-29
PISA 2012	-	17-18	20-22	25-26
PISA 2015	-	-	17-18	22-23
PISA 2018	-	-	-	19-20
PISA 2022	-	-	-	16-17

Differences in the target population

As noted above, several “PISA cohorts” are included in the population assessed in the two cycles of the Survey of Adult Skills. There are differences in coverage of these cohorts, which need to be considered when comparing the results from these surveys. In particular, the target population of the Survey of Adult Skills is broader than that of PISA; as a result, not all adults in these “PISA cohorts” were in fact part of the PISA target population.

The target population of PISA is young people aged from 15 years and 3 months to 16 years and 2 months at the beginning of the assessment period who were enrolled in an educational institution in Grade 7 or above. Fifteen-year-olds who are not enrolled at an educational institution are not tested as part of PISA, and in all countries participating in the eight rounds of PISA between 2000 and 2022, a proportion of 15-year-olds were out of school or in grades lower than Grade 7, and therefore excluded from the PISA target population. In 2018, for example, the PISA sample represented around 90% of the 15-year-old population in most countries that participated in the 2023 Survey of Adult Skills. The coverage was lowest in Israel (81%) and highest in Germany (99%) (OECD, 2019[22]). In contrast, the target population for the Survey of Adult Skills is the entire resident population. Therefore, the “PISA cohorts” surveyed in the Survey of Adult Skills include, in addition to persons who were at school at age 15 (and, therefore, part of the PISA target population), those who were out of school at the age of 15 (and, therefore, outside the PISA target

population). Irrespective of any other considerations, the different rates of coverage are relevant to comparisons of the results of the two surveys for these cohorts. In particular, it seems likely that, in most countries, the mean proficiency scores for the full 15-year-old cohort would have been lower than those observed for 15-year-olds who were in school,[11] as the available evidence suggests that early school-leavers are less proficient than students who continue in schooling (Spaull and Taylor, 2015[23]; Taylor and Spaull, 2015[24]; OECD, 2019[22]).

Skills assessed

Table 6.9 compares the skill domains assessed in the Survey of Adult Skills and those assessed across the PISA rounds that have been administered since 2000. As can be seen, both studies assess skills in the domains of literacy/reading, numeracy/mathematics. They also assess problem solving, but these are considered innovative domains in PISA, and the domains have changed across the two cycles of the Survey of Adult Skills. As a result, the comparability of the different problem-solving assessments across the two studies is not discussed here. The one area in which there is certainly no overlap is that of science, which the Survey of Adult Skills does not cover.

Table 6.9. Comparison of the skill domains assessed by the Survey of Adult Skills and PISA

Survey of Adult Skills (second cycle, 2022-23)	Survey of Adult Skills (first cycle, 2011-17)	PISA
Literacy	Literacy	Reading (2000, 2003, 2006, 2009, 2012, 2015, 2018, 2022) Electronic reading (2009)
Numeracy	Numeracy	Mathematics (2000, 2003, 2006, 2009, 2012, 2015, 2018, 2022)
		Science
Adaptive problem solving	Problem solving in technology-rich environments	Problem solving (2003, 2012), Collaborative problem solving (2015)

Psychometric links

The two cycles of the Survey of Adult Skills were not designed to allow direct comparisons of their results with those of PISA. Despite similarities in the broad approach to defining the skills assessed, the Survey of Adult Skills and PISA share no common items, and their results cannot be treated as being on the same scale in any of the domains that they ostensibly have in common.

An objective of the first round of PISA was to establish a psychometric link between PISA and the International Adult Literacy Survey (IALS) in the domain of literacy (OECD, 1999[25]). Fifteen prose items from IALS were embedded in the PISA 2000 test booklets for the main study. Items from IALS were not included in the assessments of reading literacy conducted in subsequent rounds of PISA, however.

The outcomes of an analysis investigating whether students taking the PISA 2000 assessment could be placed on the IALS prose literacy scale are reported in Yamamoto (2002[26]) and OECD (2002[27]). Yamamoto concluded that PISA students could be placed on the IALS prose literacy scale.[12] OECD (2002[27]) presents the distribution of students in participating countries across the five IALS proficiency levels.

More recently, concordance between the PISA and PIAAC scales was established through a statistical link that exploited a pseudo-equivalent group design (Borgonovi et al., 2017[28]; Pokropek and Borgonovi, 2019[29]). In 2012, when both PISA and the Survey of Adult Skills were administered in Poland, some students who participated in PISA were selected on the basis of attending Grade 10. They were therefore older than 15, and thus also eligible to participate in the Survey of Adult Skills. Scale concordance scores for reading/literacy and for mathematics/numeracy were used to map PISA and PIAAC scales to one

another on the basis of this partial sample overlap in Poland and the existence of comparable background information in the Polish questionnaires for the two surveys.

The relationship between constructs in the domains of literacy and numeracy

While there has been no attempt to link the cycles of the Survey of Adult Skills to the cycles of PISA in any assessment domain, the two studies share a similar approach in terms of the definition of the domains assessed.

Both the Survey of Adult Skills and PISA hold an action-oriented or functional conception of skills. The object of interest is the application and use of knowledge and know how in common life situations as opposed to the mastery of a body of knowledge or a repertoire of techniques. In defining assessment domains, the emphasis is placed on the purposive and reflective use and processing of information to achieve a variety of goals. To this end, in both surveys, the skills assessed are defined in terms of a set of behaviours through which the skill is manifested and a set of goals that the behaviours in question are intended to achieve.

The Survey of Adult Skills and PISA also share a common approach to the specification of the constructs measured.[13] The frameworks defining the constructs specify their features in terms of three dimensions: content, cognitive processes and context. The dimension of content ("knowledge domain" in PISA) relates to the artefacts, tools, knowledge, representations, cognitive challenges, etc., that constitute the corpus to which an individual (an adult, in the case of the Survey of Adult Skills; a 15-year-old student in the case of PISA) must respond or that they must use. Cognitive processes ("competencies" in PISA) cover the mental processes that individuals bring into play to respond to or appropriately use given content. Context ("context and situation" in PISA) refers to the different situations in which individuals read, display numerate behaviour, solve problems or use scientific knowledge.

The similarities and differences between the conceptualisation of the domains of literacy, numeracy and problem solving in the Survey of Adult Skills and those of reading, mathematics and problem solving in PISA are compared below through definitions taken from their respective assessment frameworks. It focuses on the latest PISA assessment frameworks – 2018 for reading and 2022 for mathematics.

Literacy and reading

Table 6.10 summarises the definition, content, processes and context dimensions of the literacy framework of the two cycles of the Survey of Adult Skills with the latest reading literacy frameworks for PISA 2018.

Table 6.10. Comparison of the Survey of Adult Skills and PISA: Literacy and reading

	Survey of Adult Skills (second cycle, 2022-23)	Survey of Adult Skills (first cycle, 2011-18)	PISA 2018
Definition	Literacy is accessing, understanding, evaluating, and reflecting on written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society.	The ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential.	Reading literacy is understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, develop one's knowledge and potential and participate in society.
Cognitive processes	• accessing text • understanding • evaluating	• access and identify information in the text • integrate and interpret (relating parts of text to one another) • evaluate and reflect	• locate information ○ access and retrieve information within a piece of text ○ search and select relevant text. • understand ○ represent literal meaning ○ integrate and generate inferences • evaluate and reflect

	Survey of Adult Skills (second cycle, 2022-23)	Survey of Adult Skills (first cycle, 2011-18)	PISA 2018
			○ assess quality and credibility ○ reflect on content and form ○ detect and handle conflict • reading fluency
Content	Texts characterised by their: • type (description, narration, exposition, argumentation, instruction, transaction) • format (continuous, non-continuous, mixed) • organisation (the amount of information and the density of content representation and access devices) • source (single vs. multiple texts)	Texts characterised by their medium (print-based or digital) and by format: • continuous or prose texts which involve narration, argumentation or descriptions, for example • non-continuous or document texts, for example, tables, lists and graphs • mixed texts which involve combinations of prose and document elements • multiple texts which consist of the juxtaposition or linking of independently generated elements	Text format: • single-source and multiple-source • static and dynamic • continuous and non-continuous Text type: • description • narration • exposition • argumentation • instruction • transaction
Context	• work and occupation • personal • community and citizenship • education and training	• personal • work • community • education	• personal • occupational • public • educational
Factors affecting task difficulty	• text factors (length, type of text, familiarity of content, presence of content signalling devices) • task factors (length of stem, explicitness of guidance) text-by-task factors (type of match, presence of distracting or irrelevant information)	• transparency of the information • degree of complexity in making inferences • semantic complexity and syntactic complexity • amount of information needed • prominence of the information • text features (such as text cohesion signals)	• process • text format
Assessment mode	Computer-based (tablet device). One-to-one administration with the presence of an interviewer.	Computer-based (laptop device) and paper-based option. One-to-one administration with the presence of an interviewer.	Computer-based, with paper-based option for countries that were unable to implement a digital survey. Exam-style administration in a school context.

The two cycles of the Survey of Adult Skills and PISA 2018 share similar conceptualisations of literacy and reading literacy. This is evident in the similarity of cognitive processes that are identified as parts of the assessment domains, the content types and the range of contexts for reading.

Numeracy and mathematics

Table 6.11 summarises the definition, content, processes and context dimensions of the numeracy framework of the two cycles of the Survey of Adult Skills with the latest mathematical literacy frameworks for PISA 2022.

Table 6.11. Comparison of the Survey of Adult Skills and PISA: Numeracy and mathematics

	Survey of Adult Skills (second cycle, 2022-23)	Survey of Adult Skills (first cycle, 2011-17)	PISA 2022
Definition	Numeracy is accessing, using and reasoning critically with mathematical content, information and ideas represented in multiple ways in order to engage in and manage the mathematical demands of a range of situations in adult life.	The ability to access, use, interpret and communicate mathematical information and ideas in order to engage in and manage the mathematical demands of a range of situations in adult life	Mathematical literacy is an individual's capacity to reason mathematically and to formulate, employ and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to know the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective 21st century citizens.
Cognitive processes	• access and assess situations mathematically • act on and use mathematics • evaluate, critically reflect, make judgements	• identify, locate or access • act upon and use (order, count, estimate, compute, measure, model) • interpret, evaluate and analyse • communicate	• mathematical reasoning • mathematical problem solving ○ formulating situations mathematically ○ employing mathematical concepts, facts and procedures ○ interpreting, applying and evaluating mathematical outcomes
Content	Mathematical content information and ideas: • quantity and number • space and shape • change and relationships • data and chance Mathematical representations: • text or symbols • images of physical objects • structured information • dynamic applications	Mathematical content, information and ideas: • quantity and number • dimension and shape • pattern, relationships, change • data and chance Representations of mathematical content: • objects and pictures • numbers and symbols • diagrams, maps, graphs, tables • texts • technology-based displays	• change and relationships • space and shape • quantity • uncertainty and data
Context	• personal • work • social/community	• everyday life • work-related • community and society • education and training	• personal • occupational • societal • scientific
Assessment mode	Computer-based (tablet device). One-to-one administration with the presence of an interviewer.	Computer-based (laptop device) and paper-based option. One-to-one administration with the presence of an interviewer.	Computer-based, with paper-based option for countries that were unable to implement a digital survey. Exam-style administration in a school context.

In sum, the two cycles of the Survey of Adult Skills and PISA 2022 have overlapping conceptualisations of numeracy and mathematical literacy. This overlap is evident in the similarity of cognitive processes that are identified as part of the assessment domains. However, second cycle of the Survey of Adult Skills includes an additional content type, mathematical representations, that is not explicitly included in the assessment frameworks of the first cycle or PISA, although these frameworks are likely to implicitly include it. The range of contexts also differs. PISA includes a scientific context, covering mathematical problems in the context of mathematics as a science or field of human endeavour, which includes mathematics as it is typically studied at school. The first cycle of the Survey of Adult Skills incorporated this as an aspect of the education and training context. In contrast, the second cycle has subsumed this into the social/community context, and it is no longer separately specified.

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Notes

[1] See OECD/Statistics Canada (2000[9]; 2005[30]; 2011[21]), for information on the methods and results of IALS and ALL, and OECD (2019[32]) for information on the methods and results of the first cycle of the Survey of Adult Skills.

[2] Information about LAMP can be found at https://unesdoc.unesco.org/ark:/48223/pf0000217138 and information regarding STEP in Gaëlle et al. (2014[31]).

[3] In IALS and ALL, prose literacy was defined as the knowledge and skills needed to understand and use continuous texts – information organised in sentence and paragraph formats. Document literacy represented the knowledge and skills needed to process documents (or non-continuous texts) in which information is organised in matrix structures (i.e. in rows and columns). The type of documents covered by this domain included tables, signs, indexes, lists, coupons, schedules, charts, graphs, maps and forms.

[4] Reading components items were scaled in three steps. First, only the (other) literacy items were scaled. Second, these literacy items were finalised and item fits were evaluated in a way that was not affected by the reading component items. Third, reading component items were added to the scaling procedure and item fits were evaluated.

[5] Numeracy components items were scaled in three steps. First, only the (other) numeracy items were scaled. Second, these numeracy items were finalised and item fits were evaluated in a way that was not affected by the numeracy component items. Third, numeracy component items were added to the scaling procedure and item fits were evaluated.

[6] See chapter 5 for more information on which adults were excluded from the target population.

[7] Exclusions were permitted for "practical operational" reasons in ALL (OECD/Statistics Canada, 2005[30]). Murray, Kirsch and Jenkins (1998, p. 27[8]) provide a list of exclusions in participating countries for the first wave of IALS.

[8] The first round involved nine countries: Canada, France, Germany, Ireland, the Netherlands, Poland, Sweden, Switzerland and the United States. France withdrew from the study in 1995 citing concerns regarding data quality.

[9] A technical report covering the first wave of IALS was published in 1998 (Murray, Kirsch and Jenkins, 1998[8]). Some information on the implementation of the 2nd and 3rd rounds of IALS and the implementation of ALL is available in the methodological appendices of OECD/Statistics Canada (2000[9]) OECD/Statistics Canada (2005[30]) and OECD/Statistics Canada (2011[21]). However, no technical reports covering the second and third rounds of IALS and the two rounds of ALL have been released.

[10] To minimise literacy-related non-responses, it was possible to rely on translators or interpreters (either family members or staff of the survey organisation) to help respondents answering the background questionnaire. Sweden is the only country that, in both cycles of the survey, was able to provide a sufficient number of interpreters so that all respondents, even those with severe language barriers, were able to complete the full background questionnaire. For this reason, no respondent in Sweden was classified as literacy-related non-respondent in the first cycle, and no respondent took the doorstep interview in the second cycle. This improved the precision of the estimates of proficiency for such respondents in Sweden because richer information is available for them. However, it also introduced a small difference in survey operations between Sweden and other countries, as adults who were not able to participate in the survey because of language barriers were treated slightly differently in Sweden than in other countries. As such adults constitute a very small percentage of the population, threat to comparability remains low. However, some caution is warranted when analysing results of subgroups of the population (for example, recent immigrants) where adults with very low language proficiency can constitute a larger share.

[11] Fifteen-year-olds in home schooling may be an exception.

[12] Some block-order effects (responses were affected by where the items were placed in the assessment) were found in respect of the IALS items in PISA that were not present in IALS.

[13] This reflects the influence of the IALS frameworks on the development of both the PISA literacy framework (OECD, 1999[25]) and the literacy framework of the Survey of Adult Skills.

Annex A. Characteristics of all items used in the 2023 Survey of Adult Skills

Table A A.1. Literacy item map

Difficulty score	Level	Unit name	Item ID	Status	Cognitive processes	Source	Format	Context
75	Below 1	SGIH	C301C05	Trend	Accessing text	Single	Non-continuous	CC
260	2	TMN Antitheft	C305215	Trend	Accessing text	Single	Continuous	CC
309	3	TMN Antitheft	C305218	Trend	Understanding	Single	Continuous	CC
244	2	CANCO	D306110	Trend	Accessing text	Single	Continuous	WO
372	4	CANCO	D306111	Trend	Understanding	Single	Continuous	WO
169	Below 1	MEDCO	D307401	Trend	Understanding	Single	Continuous	P
288	3	MEDCO	D307402	Trend	Accessing text	Single	Continuous	P
272	2	Memory Training	C310406	Trend	Accessing text	Single	Continuous	P
312	3	Memory Training	C310407	Trend	Understanding	Single	Continuous	P
303	3	Civil Engineering	E318001	Trend	Understanding	Single	Continuous	ET
316	3	Civil Engineering	E318003	Trend	Understanding	Single	Continuous	ET
281	3	Discussion Forum	E320001	Trend	Understanding	Multiple	Continuous	WO
286	3	Discussion Forum	E320003	Trend	Evaluating	Multiple	Continuous	WO
285	3	Discussion Forum	E320004	Trend	Evaluating	Multiple	Continuous	WO
251	2	Internet Poll	E321001	Trend	Accessing text	Multiple	Mixed	CC
238	2	Internet Poll	E321002	Trend	Understanding	Multiple	Mixed	CC
283	3	Lakeside Fun Run	E322001	Trend	Accessing text	Single	Non-continuous	P
240	2	Lakeside Fun Run	E322002	Trend	Accessing text	Single	Non-continuous	P
294	3	Lakeside Fun Run	E322003	Trend	Accessing text	Single	Non-continuous	P
293	3	Lakeside Fun Run	E322004	Trend	Accessing text	Single	Non-continuous	P
244	2	Lakeside Fun Run	E322005	Trend	Evaluating	Single	Non-continuous	P
348	4	Library Search	E323002	Trend	Understanding	Multiple	Non-continuous	P
289	3	Library Search	E323003	Trend	Accessing text	Multiple	Non-continuous	P
329	4	Library Search	E323004	Trend	Evaluating	Multiple	Non-continuous	P
324	3	Library Search	E323005	Trend	Evaluating	Multiple	Non-continuous	P
298	3	Summer Streets	E327001	Trend	Evaluating	Single	Continuous	CC
211	1	Hiccups	C501P001	New	Accessing text	Multiple	Non-continuous	P
217	1	Hiccups	C501P002	New	Understanding	Single	Continuous	P
231	2	Hiccups	C501P003	New	Understanding	Single	Continuous	P
241	2	Shades	C502P001	New	Accessing text	Single	Non-continuous	P
239	2	Shades	C502P002	New	Accessing text	Single	Non-continuous	P
161	Below 1	Banking	C503P001	New	Accessing text	Single	Non-continuous	P
198	1	Crayons	C504P001	New	Accessing text	Single	Non-continuous	P
200	1	Eye Protection	C505P001	New	Accessing text	Single	Non-continuous	WO
196	1	Photography Class	C507P001	New	Accessing text	Single	Non-continuous	P
251	2	Photography Class	C507P002	New	Accessing text	Single	Non-continuous	P

208	1	Restaurants	C508P001	New	Accessing text	Multiple	Non-continuous	P
288	3	BiciMAD	C509P001	New	Understanding	Single	Mixed	CC
235	2	BiciMAD	C509P002	New	Accessing text	Single	Mixed	CC
215	1	BiciMAD	C509P003	New	Accessing text	Single	Mixed	CC
265	2	Arts Center	C510P001	New	Accessing text	Single	Mixed	CC
359	4	Arts Center	C510P002	New	Understanding	Single	Mixed	CC
302	3	Arts Center	C510P003	New	Understanding	Single	Mixed	CC
296	3	Arts Center	C510P005	New	Accessing text	Single	Mixed	CC
278	3	Arts Center	C510P006	New	Understanding	Single	Mixed	CC
301	3	App Comparison	C511P001	New	Understanding	Single	Non-continuous	P
288	3	App Comparison	C511P002	New	Understanding	Single	Non-continuous	P
229	2	App Comparison	C511P003	New	Accessing text	Multiple	Non-continuous	P
230	2	App Comparison	C511P004	New	Evaluating	Multiple	Non-continuous	P
241	2	App Comparison	C511P005	New	Understanding	Multiple	Non-continuous	P
285	3	App Comparison	C511P007	New	Understanding	Multiple	Non-continuous	P
321	3	Accessibility	C512P001	New	Understanding	Single	Continuous	ET
358	4	Accessibility	C512P002	New	Understanding	Single	Continuous	ET
358	4	Accessibility	C512P004	New	Understanding	Single	Continuous	ET
284	3	Candidate Forum	C513P001	New	Understanding	Multiple	Continuous	CC
310	3	Candidate Forum	C513P002	New	Understanding	Multiple	Continuous	CC
320	3	Candidate Forum	C513P003	New	Evaluating	Multiple	Continuous	CC
303	3	Candidate Forum	C513P004	New	Accessing text	Multiple	Continuous	CC
230	2	Desk Cycling	C514P001	New	Understanding	Single	Continuous	WO
307	3	Desk Cycling	C514P002	New	Evaluating	Single	Continuous	WO
362	4	Desk Cycling	C514P004	New	Understanding	Multiple	Continuous	WO
245	2	Ink Stains	C515P001	New	Evaluating	Multiple	Continuous	P
309	3	Ink Stains	C515P002	New	Understanding	Multiple	Continuous	P
368	4	Ink Stains	C515P003	New	Understanding	Single	Continuous	P
298	3	Ink Stains	C515P004	New	Accessing text	Multiple	Continuous	P
248	2	Online Learning	C516P001	New	Understanding	Single	Continuous	ET
275	2	Online Learning	C516P002	New	Understanding	Single	Continuous	ET
326	3	Online Learning	C516P004	New	Evaluating	Multiple	Continuous	ET
309	3	Online Learning	C516P005	New	Evaluating	Single	Continuous	ET
298	3	Online Learning	C516P006	New	Evaluating	Single	Continuous	ET
310	3	Recycling Guide	C517P001	New	Accessing text	Multiple	Mixed	CC
280	3	Recycling Guide	C517P003	New	Understanding	Multiple	Mixed	CC
270	2	Recycling Guide	C517P004	New	Accessing text	Multiple	Mixed	CC
280	3	Recycling Guide	C517P005	New	Understanding	Multiple	Mixed	CC
280	3	Recycling Guide	C517P007	New	Accessing text	Multiple	Mixed	CC
274	2	Scalds	C518P001	New	Understanding	Single	Continuous	CC
292	3	Scalds	C518P002	New	Understanding	Single	Continuous	CC
302	3	Scalds	C518P003	New	Evaluating	Single	Continuous	CC
306	3	Summer Streets	E327002	Trend	Evaluating	Single	Continuous	CC
320	3	Summer Streets	E327003	Trend	Understanding	Single	Continuous	CC

Note: under “Status”, New items are those that have been newly developed for the second cycle of the Survey of Adult Skills, and Trend items are those that have been used also in the first cycle of the survey. Item context has been abbreviated as follows: CC stands for Community and citizenship, ET for Education and training, P for Personal, WO for Work and occupation.

Table A A.2. Numeracy item map

Difficulty score	Level	Unit name	Item ID	Status	Cognitive processes	Content	Context	Representation
129	Below 1	Bottles	C601C06	Trend	Act on	SS	Personal	IO
228	2	Gas Gauge	C604505	Trend	Act on	QN	Personal	IO
273	2	Solution	C606509	Trend	Access	SS	Work	IO
239	2	TV	C607510	Trend	Act on	CR	Personal	TS
261	2	Temp Scale	C611516	Trend	Act on	SS	Social	SI
296	3	Temp Scale	C611517	Trend	Act on	SS	Social	SI
185	1	Watch	C614601	Trend	Access	QN	Personal	TS
221	1	Candles	C615602	Trend	Act on	SS	Work	IO
231	2	Candles	C615603	Trend	Act on	QN	Work	IO
217	1	SixPack1	C618607	Trend	Act on	QN	Personal	TS
297	3	SixPack1	C618608	Trend	Act on	CR	Personal	TS
282	3	Tiles	C619609	Trend	Access	SS	Personal	SI
221	1	BMI	C624619	Trend	Access	DC	Personal	SI
320	3	BMI	C624620	Trend	Act on	CR	Personal	SI
354	4	Educational Level	C632P001	Trend	Access	DC	Social	SI
266	2	Educational Level	C632P002	Trend	Evaluate	DC	Social	SI
305	3	Peanuts	C634P001	Trend	Act on	CR	Personal	SI
318	3	Peanuts	C634P002	Trend	Act on	CR	Personal	SI
179	1	Parking Map	C635P001	Trend	Access	SS	Work	SI
294	3	Lab Report	C636P001	Trend	Evaluate	QN	Work	SI
317	3	NZ Exports	C644P002	Trend	Act on	DC	Social	SI
231	2	Airport Timetable	C645P001	Trend	Act on	SS	Personal	SI
256	2	Rug Production	C646P002	Trend	Act on	DC	Work	SI
260	2	Urban Population	C650P001	Trend	Act on	DC	Social	SI
314	3	Fertiliser	C651P002	Trend	Act on	CR	Work	TS
249	2	Path	C655P001	Trend	Act on	CR	Personal	TS
315	3	Package	C657P001	Trend	Evaluate	SS	Work	SI
308	3	Study fees	C661P001	Trend	Evaluate	DC	Social	SI
315	3	Study fees	C661P002	Trend	Evaluate	DC	Social	SI
307	3	Orchestra tickets	C664P001	Trend	Act on	CR	Work	SI
234	2	Cooper test	C665P001	Trend	Access	DC	Personal	SI
326	4	Cooper test	C665P002	Trend	Act on	CR	Personal	SI
198	1	Bike Tour	C801P001	New	Act on	QN	Personal	TS
295	3	Boxes	C802P001	New	Evaluate	SS	Work	IO
326	4	Boxes	C802P002	New	Evaluate	SS	Work	IO
291	3	Car routes	C804P002	New	Evaluate	SS	Personal	DA
297	3	Car routes	C804P003	New	Act on	SS	Personal	DA
256	2	Child medication	C806P001	New	Act on	CR	Work	TS
351 (274)	4 (2)	Child medication	C806P002	New	Act on	CR	Work	TS
364	4	Child medication	C806P003	New	Evaluate	CR	Work	TS
280	3	Coupons	C807P001	New	Act on	QN	Personal	TS
331 (299)	4 (3)	Coupons	C807P002	New	Act on	QN	Personal	TS
355	4	E-bikes	C808P001	New	Access	DC	Social	SI
356	4	E-bikes	C808P002	New	Evaluate	DC	Social	SI
308	3	E-waste	C809P001	New	Evaluate	DC	Social	SI
306	3	E-waste	C809P002	New	Evaluate	DC	Social	SI
301	3	Electric cars	C810P001	New	Evaluate	CR	Social	SI
348	4	Electric cars	C810P002	New	Evaluate	CR	Social	SI

Difficulty score	Level	Unit name	Item ID	Status	Cognitive processes	Content	Context	Representation
238	2	Expenses	C811P001	New	Access	DC	Personal	DA
229	2	Expenses	C811P002	New	Access	DC	Personal	DA
257	2	Flying Hours	C812P001	New	Act on	DC	Social	SI
351	4	Flying Hours	C812P002	New	Evaluate	DC	Social	DA
496	5	Flying Hours	C812P003	New	Access	DC	Social	DA
200	1	Holiday stay	C813P001	New	Act on	CR	Personal	TS
340	4	Inflation rate	C814P001	New	Act on	CR	Work	TS
138	Below 1	Moving	C815P001	New	Access	QN	Work	IO
174	Below 1	Moving	C815P002	New	Access	QN	Work	IO
192	1	Nutrition	C816P001	New	Access	DC	Social	SI
245	2	Nutrition	C816P002	New	Act on	DC	Social	SI
285	3	Running	C820P001	New	Act on	DC	Personal	SI
331	4	Running	C820P002	New	Act on	SS	Personal	TS
243 (237)	2 (2)	Sales Figures	C821P001	New	Access	QN	Work	SI
244 (240)	2 (2)	Sales Figures	C821P002	New	Access	QN	Work	SI
275	2	School Attendance	C823P001	New	Act on	QN	Social	DA
342	4	School Attendance	C823P002	New	Act on	QN	Social	DA
359	4	Stacking glasses	C824P001	New	Access	CR	Work	IO
276	3	Tile pattern	C825P001	New	Access	SS	Work	IO
287	3	Train	C827P001	New	Evaluate	QN	Personal	SI
269	2	Vaccines	C828P001	New	Access	DC	Social	DA
271	2	Vaccines	C828P002	New	Access	DC	Social	DA
422	5	Vaccines	C828P003	New	Evaluate	DC	Social	DA
262	2	Wood scraps	C830P001	New	Act on	SS	Social	DA
305 (302)	3 (3)	Wood scraps	C830P002	New	Act on	QN	Social	DA
304	3	Wood scraps	C830P003	New	Access	QN	Social	DA
225	1	Work hours	C831P001	New	Access	DC	Social	SI
264	2	Work hours	C831P002	New	Evaluate	DC	Social	SI
163	Below 1	Workplace accidents	C832P001	New	Access	DC	Work	SI
214	1	Workplace accidents	C832P002	New	Act on	DC	Work	DA
222	1	Zoo Visitors	C833P001	New	Act on	QN	Work	SI
280	3	Zoo Visitors	C833P002	New	Evaluate	QN	Work	SI

Note: Numbers in parenthesis in the Difficulty score and Level columns indicate values related to partial credit. Under “Status”, New items are those that have been newly developed for the second cycle of the Survey of Adult Skills, and Trend items are those that have been used also in the first cycle of the survey. Cognitive processes have been abbreviated as follows: Access stands for Access and assess situations mathematically, Act on stands for Act on and use mathematics, Evaluate stands for Evaluate, critically reflect, make judgements. Item content has been abbreviated as follows: CR stands for Change and relationships, DC stands for Data and chance, QN stands for Quantity and number, SS stands for Space and shape. Under item context, Social is a shorthand for Social/community. Representation has been abbreviated as follows: DA stands for Dynamic applications, IO stands for Images of objects, SI stands for Structured information, TS stands for Text or symbols.

Table A A.3. Adaptive problem solving item map

Difficulty score	Level	Unit name	Item ID	Cognitive process	Metacognitive process	Information environment	Context
188	1	Transport	C101P001	Definition	None	Physical	Work
207	1	Transport	C101P002	Application	Definition	Physical	Work
217	1	Transport	C101P003	Searching	Searching	Physical	Work
280	3	Garden Time	C102P001	Definition	None	Digital	Personal
287	3	Garden Time	C102P002	Searching	None	Digital	Personal
274	2	Garden Time	C102P003	Searching	Searching	Digital	Personal
308	3	Garden Time	C102P004	Searching	Application	Digital	Personal
298	3	Garden Time	C102P005	Searching	Application	Digital	Personal
278	3	Shift Roster	C103P001	Definition	Searching	Digital	Work
325	3	Shift Roster	C103P002	Searching	Searching	Digital	Work
281	3	Shift Roster	C103P003	Searching	Definition	Digital	Work
271	2	Shift Roster	C103P004	Searching	Definition	Digital	Work
327	4	End of Year Party	C104P001	Searching	Searching	Digital	Work
319	3	End of Year Party	C104P002	Application	Definition	Digital	Work
313	3	End of Year Party	C104P003	Searching	Definition	Digital	Work
279	3	End of Year Party	C104P004	Definition	Searching	Digital	Work
198	1	Tickets	C105P001	Searching	Searching	Social	Social
268	2	Tickets	C105P002	Searching	Definition	Social	Social
277	3	Tickets	C105P003	Definition	Searching	Social	Social
231	2	TroubleShooting	C106P001	Searching	None	Digital	Personal
244	2	TroubleShooting	C106P002	Searching	Searching	Digital	Personal
219	1	TroubleShooting	C106P003	Definition	Searching	Digital	Personal
215	1	TroubleShooting	C106P004	Application	Definition	Digital	Personal
170	Below 1	Product Return	C107P001	Searching	None	Digital	Personal
181	1	Product Return	C107P002	Application	Definition	Digital	Personal
180	1	Product Return	C107P003	Application	Searching	Digital	Personal
238	2	Product Return	C107P004	Application	Searching	Digital	Personal
362	4	Power Plant	C108P001	Searching	Searching	Physical	Work
355	4	Power Plant	C108P002	Searching	Searching	Physical	Work
357	4	Power Plant	C108P003	Searching	Definition	Physical	Work
340	4	Power Plant	C108P004	Definition	Searching	Physical	Work
354	4	Power Plant	C108P005	Searching	Definition	Physical	Work
338	4	Travel Planning	C109P001	Searching	None	Digital	Social
309	3	Travel Planning	C109P002	Searching	Definition	Digital	Social
239	2	Travel Planning	C109P003	Application	Searching	Digital	Social
275	2	Travel Planning	C109P004	Searching	Definition	Digital	Social
284	3	Travel Planning	C109P005	Searching	Definition	Digital	Social
231	2	Renovation	C110P001	Definition	None	Digital	Personal
219	1	Renovation	C110P002	Searching	None	Digital	Personal
239	2	Renovation	C110P003	Searching	Definition	Digital	Personal
270	2	Post Office	C111P001	Searching	Searching	Digital	Personal
287	3	Post Office	C111P002	Searching	Searching	Digital	Personal
269	2	Post Office	C111P003	Application	Searching	Digital	Personal
265	2	Post Office	C111P004	Searching	Searching	Digital	Personal
266	2	Post Office	C111P005	Searching	Definition	Digital	Personal
326	4	Hiking	C112P001	Definition	Searching	Social	Social
311	3	Hiking	C112P002	Application	Definition	Social	Social

Difficulty score	Level	Unit name	Item ID	Cognitive process	Metacognitive process	Information environment	Context
252	2	Hiking	C112P003	Searching	Definition	Social	Social
283	3	Hiking	C112P004	Searching	Definition	Social	Social
323 (273)	3 (2)	Plumbing	C113P001	Definition	Application	Physical	Work
304 (267)	3 (2)	Plumbing	C113P002	Definition	Application	Physical	Work
310	3	Plumbing	C113P003	Definition	Application	Physical	Work
216	1	Plumbing	C113P004	Definition	Application	Physical	Work
304	3	Plumbing	C113P005	Searching	Searching	Physical	Work
311	3	Ships Ahoy	C114P001	Definition	Definition	Physical	Personal
335	4	Ships Ahoy	C114P002	Definition	Definition	Physical	Personal
299	3	Ships Ahoy	C114P003	Definition	Definition	Physical	Personal
350 (266)	4 (2)	Ships Ahoy	C114P004	Application	Application	Physical	Personal
242 (171)	2 (Bel. 1)	Ships Ahoy	C114P005	Application	Application	Physical	Personal
288 (200)	3 (1)	Ships Ahoy	C114P006	Application	Application	Physical	Personal
332 (149)	4 (Bel. 1)	Traffic Control	C115P001	Definition	Application	Physical	Work
324 (192)	3 (1)	Traffic Control	C115P002	Definition	Application	Physical	Work
332 (194)	4 (1)	Traffic Control	C115P003	Definition	Application	Physical	Work
266	2	Traffic Control	C115P004	Application	Definition	Physical	Work
313	3	Traffic Control	C115P005	Searching	Definition	Physical	Work

Note: Numbers in parenthesis in the Difficulty score and Level columns indicate values related to partial credit. Under item context, Social is a shorthand for Social/community.

Annex B. Project participants in the 2023 Survey of Adult Skills

International Consortium

*indicates formerly in the position

Educational Testing Service (ETS) – Overall Management, Test Development, Platform Development, Psychometrics, Analysis and Data Products

Irwin Kirsch* (International Project Director)
Laura Halderman (International Project Manager)
Claudia Tamassia* (Strategic Advisor)
Eugenio Gonzalez* (Data Products, Training and Technical Report)
Luisa Langan* (Project Management, Background Questionnaire)
Judy Mendez (Project Support, Meetings and Contracts)
J. Franco (Project Support)
Dave Garber (Project Support)
Larry Hanover* (Project Support)
James Meadows (Project Support)
Rebecca Zanotti (Project Support)
Kentaro Yamamoto* (Director, Psychometrics and Analysis)
Frederic Robin (Director, Psychometrics and Analysis)
Usama Ali (Lead Psychometrician and Analyst)
Selene Lee (Psychometrics and Analysis)
Peter van Rijn (Psychometrics and Analysis)
Michael Wagner* (Director, Platform Development)
Paul Brost (Case Management System and Platform Development)
Chia-Chen Tsai (Questionnaire Authoring Tool and Platform Development)
Ramin Hemat* (Platform Development)
Debbie Pisacreta* (Platform Development)
Janet Stumper* (Platform Development)
Marylou Lennon* (Director, Test Development)
Kelly M. Bruce* (Test Development, Literacy and Reading Components)
Danielle Baum (Consultant, Paper Booklets)
Samuel Greiff (Consultant, Test Development, APS)
Juliana Gottschling (Consultant, Test Development, APS)
Jan Dörendahl (Consultant, Test Development, APS)
Kees Hoogland (Consultant, Test Development, Numeracy)
Isabelle Demonty (Consultant, Test Development, Numeracy)
Dave Tout (Consultant, Test Development, Numeracy)
Mathew Kandathil Jr. (Director, Data Analysis)
Carla Tarsitano* (Data Analysis Project Management Leader)
Kevin Bentley (Data Products)
Karen Castellano (Data Products)
Paul Hilliard (Data Analysis)
Lokesh Kapur (Data Analysis)
Phillip Leung (Data Products)
Tao Wang (Data Analysis)
Lingjun Wong (Data Analysis)
Wei Zhao (Data Analysis)

GESIS – Development of the Background Questionnaire

Beatrice Rammstedt (Scientific Director)
Silke Schneider (GESIS Project Lead, Lead Development and Validation of Formal Education Items and Variables, BQ Field Test Analysis Leader)
Natascha Massing (GESIS Project Co-Lead, Lead Development of Training Items and involved in BQ Field Test Analysis)
Verena Ortmanns (BQ Field Test Analysis)
Fabienne Kraemer (BQ Field Test Analysis)
Britta Gauly (Development of Training Items)
Anouk Zabal (Strategic Advisor)
Dorothée Behr (Lead BQ Translation, also involved in mixed-method online pretest)
Katharina Meitinger* (Mixed-method online pretest Leader)
J. Patricia Hadler (Mixed-method online pretest)
Timo Lenzner (Mixed-method online pretest)
Natalja Menold (Mixed-method online pretest)
Cornelia Neuert (Mixed-method online pretest)
Clemens Lechner (Lead Development and Analysis of Social and Emotional Skills Module)
Mattias Bluemke* (Co-Lead Development and Analysis of Social and Emotional Skills Module)
Ranjit Konrad Singh (Co-Lead Analysis of Social and Emotional Skills Module)
Matthias Roth (Analysis of Social and Emotional Skills Module)
Nivedita Bhaktha* (Analysis of Social and Emotional Skills Module)
Melanie Partsch* (Analysis of Social and Emotional Skills Module)
Isabelle Schmidt* (Analysis of Social and Emotional Skills Module)
Stefan Zins* (Lead Sampling Consultant)
Matthias Sand (Lead Sampling Consultant)
Christian Bruch (Sampling Consultant)

cApStAn – Linguistic Quality Control

Steve Dept (Verification Operations)
Andrea Ferrari (Verification Methodology and Management)
Laura Wäyrynen (Verification Methodology and Management)

Danina Lupsa* (Project Manager)
Grace DeLee (Project Manager)
Manuel Souto Pico (Translation Technologist)
Marielle Lerner* (Project Manager)
Shinoh Lee* (Project Manager)
Treonna Adams* (Project Manager)
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Research Centre for Education and the Labour Market (ROA), Maastricht University – Development of the Background Questionnaire

Rolf van der Velden* (Coordinator, Background Questionnaire Development)
Tim Huijts (Coordinator, Background Questionnaire Development)
Jim Allen (Background Questionnaire Development)
Babs Jacobs (Background Questionnaire Development)
Evie Graus (Background Questionnaire Development)
Nadine van Guilik (Background Questionnaire Development)
Roy Meijer (Background Questionnaire Development)

International Association for the Evaluation of Educational Achievement (IEA) – Data Cleaning and Database Preparation

Tim Daniel (Lead International Data Management)
Darrell Gwaltney (Co-Lead International Data Management)
Abdullah Al-Azzawi* (Data Processing Systems)
Adeoye Oyekan* (Meta-Data and Derived Variables)
Ahmed Aboelela* (Data Processing Support)
Ankita Kulkarni* (Software Requirements and Testing)
Christian Harries (Software Development)
Christine Busch* (Meta-Data and Quality Control)
Clara Beyer* (Co-Lead International Data Management)
Daniel Ugurel (Data Processing and Material Receipt)
Deepti Kalamadi* (Software Development)
Delnaz Mohebi (Software Development)
Duygu Uyar (Data Processing Systems and Testing)
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OECD Skills Studies

Survey of Adult Skills – Reader's Companion

The 2023 Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), provides a comprehensive overview of adults' literacy, numeracy, and adaptive problem solving skills – skills that are fundamental for personal, economic, and societal development. These key information-processing skills provide the foundation for access to employment, higher wages and continuous learning, while enabling individuals to navigate the complexities of their personal and civic lives.

The *Survey of Adult Skills 2023 – Reader's Companion* describes the design and methodology of the survey and its relationship to other international skills assessments conducted by the OECD. It is a companion volume to *Do Adults Have the Skills They Need to Thrive in a Changing World?: Survey of Adult Skills 2023*, which reports initial results from the 31 countries and economies that participated in the latest edition of the Survey of Adult Skills and collected data in 2022/23.

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