1

Overview: Why skills matter

A note regarding Israel

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

The Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), assesses adults' (16-65 year-olds) proficiency in three key information-processing skills: literacy, numeracy and problem solving in technology-rich environments. It provides a rich source of data for policy makers, analysts and researchers concerned with issues such as the development and maintenance of a population's skills, the relationships between the education system and the labour market, the efficiency of the labour market in matching workers and jobs, inequality, and the social and labour market integration of certain subgroups of the population, such as immigrants. Beyond offering an insight into the level and distribution of information-processing skills across the population as a whole and for key subgroups, it provides information on the benefits these skills provide in the labour market and in everyday life. Information about what the survey assesses and how it was carried out can be found in Box 1.1.

The results from the first round of the survey, covering 24 countries/economies, were released in October 2013 (OECD, 2013). Results are now available for a further nine countries/economies that collected data during 2014-15. This report presents the main findings for the 33 countries/economies that have participated in the study over the two rounds.

Box 1.1 Key facts concerning the Survey of Adult Skills (PIAAC)

What PIAAC assesses

The Survey of Adult Skills (PIAAC) assesses the proficiency of 16-65 year-olds in literacy, numeracy and problem solving in technology-rich environments. These are "key information-processing skills" that are relevant to adults in many social contexts and work situations, and necessary for fully integrating and participating in the labour market, education and training, and social and civic life.

In addition, the survey collects a range of information on the reading- and numeracy-related activities of respondents, the use of information and communication technologies at work and in everyday life, and on the practice of a range of other generic skills, such as collaborating with others and organising one's time, required of individuals in their work. Respondents are also asked whether their skills and qualifications match their work requirements and whether they have autonomy over key aspects of their work.

Methods

The Survey of Adults Skills was conducted over two rounds of data collection.

In the first round, around 166 000 adults aged 16-65 years in 24 countries/economies were surveyed. In 21 countries – Australia, Austria, Canada, Cyprus,[1] the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, the Slovak Republic, Spain, Sweden and the United States – the entire national population was covered. In Belgium, data were collected in Flanders; in the United Kingdom, data were collected in England and Northern Ireland (data are reported separately for England and Northern Ireland in the report). In the Russian Federation, the data do not cover the Moscow municipal area.

Data collection for Round 1 of the Survey of Adult Skills took place from 1 August 2011 to 31 March 2012 in most participating countries/economies. In Canada, data were collected from November 2011 to June 2012; and France collected data from September to November 2012.

Nine countries took part in the second round of the assessment: Chile, Greece, Indonesia, Israel, Lithuania, New Zealand, Singapore, Slovenia and Turkey. A total of 50 250 adults were surveyed. In all countries except Indonesia the entire national population was covered. In Indonesia, data were collected in the Jakarta municipal area only.

Data collection for Round 2 of the Survey of Adult Skills took place from April 2014 to end-March 2015. The duration of fieldwork varied from around 100 to 330 days, depending on the country.

The language of assessment was the official language(s) of each participating country/economy. In some countries, the assessment was also conducted in widely spoken minority or regional languages.

Three domains of skills were assessed: literacy, numeracy and problem solving in technology-rich environments. In addition, a separate assessment of "reading components" that tested basic reading skills, such as vocabulary knowledge, understanding of the logic of sentences and fluency in the reading of passages of text, was also conducted.

...

Among Round-1 countries, four chose not to conduct the problem-solving assessment (Cyprus,[1] France, Italy and Spain), while four (France, Finland, Japan and the Russian Federation) chose not to conduct the assessment of reading components.

All countries/economies participating in Round 2 administered all components of the assessment, with the exception of Jakarta (Indonesia), where the assessment of problem solving in technology-rich environments was not conducted. This was because the problem-solving assessment existed only in a computer-based format, and Indonesia chose to administer all the components of the assessment exclusively in paper-and-pencil format.

The target population for the survey was the non-institutionalised population of 16-65 year-olds residing in the country or region at the time of the data collection, irrespective of nationality, citizenship or language status.

Sample sizes depended primarily on the number of cognitive domains assessed and the number of languages in which the assessment was administered. Some countries boosted sample sizes in order to have reliable estimates of proficiency for the residents of particular geographical regions and/or for certain subgroups of the population, such as indigenous inhabitants or immigrants. The achieved national samples ranged from a minimum of approximately 4 000 persons to a maximum of nearly 27 300 persons.

The survey was administered under the supervision of trained interviewers either in the respondent's home or in a location agreed between the respondent and the interviewer. The background questionnaire was delivered in Computer-Aided Personal Interview (CAPI) format by the interviewer. Depending on the situation of the respondent, the time taken to complete the questionnaire ranged between 30 and 45 minutes.

After having answered the background questionnaire, the respondent completed the assessment either on a laptop computer or by completing a paper version using printed test booklets, depending on the respondent's computer skills. Respondents could take as much or as little time as needed to complete the assessment. On average, respondents took 50 minutes to complete the cognitive assessment.

Identical instruments were used in Rounds 1 and 2 of the survey. The one exception was in Jakarta (Indonesia) where, since only paper-based instruments were used, additional test items were added to the paper-based instruments used in the other countries/economies. Specifically, the Indonesian instruments contained 49 literacy items and 49 numeracy items compared to the 20 items in both domains contained in the paper-based instruments used in other countries/economies.

Respondents with very low literacy skills bypassed the full literacy, numeracy and problem solving in technology-rich environments assessments and went directly to the test of basic "reading component" skills instead. As part of this test, the time taken by respondents to complete the tasks was recorded in addition to their answers. The reading components assessment was also taken by all respondents taking the paper version of the assessment.

Reporting the results

The results from the assessment are reported on a 500-point scale; a higher score indicates greater proficiency. To help interpret the scores, the scale is divided into proficiency levels. There are six levels for literacy and numeracy (from below Level 1 – the lowest – to Level 5 – the highest) and four in problem solving in technology-rich environments (from below Level 1 – the lowest – to Level 3 – the highest).

At each level, individuals can successfully complete certain types of tasks. For example, a person who scores at Level 1 in literacy can successfully complete reading tasks that require reading relatively short texts to locate a single piece of information, which is identical to or synonymous with the information given in the question or directive and in which there is little competing information. A person proficient at Level 5 in literacy can perform tasks that involve searching for and integrating information across multiple, dense texts, constructing syntheses of similar and contrasting ideas or points of view, or evaluating evidence and arguments. He or she can apply and evaluate logical and conceptual models, and evaluate the reliability of evidentiary sources and select key information. He or she is also aware of subtle, rhetorical cues and can make high-level inferences or use specialised background knowledge.

Results are reported in this publication for 33 countries/economies. In the case of the United Kingdom, results are presented separately for the two devolved administrations of England and Northern Ireland that implemented the Survey of Adult Skills.

...

Comparisons of the results of countries/economies in Round 1 and Round 2

Identical data-collection instruments and methodology were used in Rounds 1 and 2 of the survey. The one difference is that data collection for Rounds 1 and 2 occurred some three years apart. The difference in reference dates for the two rounds of the study is unlikely to have a major impact on the proficiency of the adult populations in Round-1 countries/economies compared to that of adults in Round-2 countries/economies. However, data were collected at different points in the economic cycle in the two rounds; this may have some effect on the relationships observed between proficiency and labour market outcomes and jobs characteristics, in particular, in the countries/economies in the two different rounds.

1. *Note by Turkey:* The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Figure 1.1 ■ **Snapshot of performance in literacy, numeracy and problem solving**

Mean proficiency scores of 16-65 year-olds in literacy and numeracy, and the percentage of 16-65 year-olds scoring at Level 2 or 3 in problem solving in technology-rich environments

Significantly **above** the average
Not significantly different from the average
Significantly **below** the average

	Literacy	Numeracy	Problem solving in technology-rich environments
	Mean score	Mean score	% at Level 2 or 3
OECD countries and economies			
Australia	280	268	38
Austria	269	275	32
Canada	273	265	37
Chile	220	206	15
Czech Republic	274	276	33
Denmark	271	278	39
England (UK)	273	262	35
Estonia	276	273	28
Finland	288	282	42
Flanders (Belgium)	275	280	35
France	262	254	m
Germany	270	272	36
Greece	254	252	14
Ireland	267	256	25
Israel	255	251	27
Italy	250	247	m
Japan	296	288	35
Korea	273	263	30
Netherlands	284	280	42
New Zealand	281	271	44
Northern Ireland (UK)	269	259	29
Norway	278	278	41
Poland	267	260	19
Slovak Republic	274	276	26
Slovenia	256	258	25
Spain	252	246	m
Sweden	279	279	44
Turkey	227	219	8
United States	270	253	31
OECD average	**268**	**263**	**31**
Partners			
Cyprus[1]	269	265	m
Jakarta (Indonesia)	200	210	m
Lithuania	267	267	18
Russian Federation[2]	275	270	26
Singapore	258	257	37

Notes: Cyprus,[1] France, Italy, Jakarta (Indonesia) and Spain did not participate in the problem solving in technology-rich environments assessment.
1. See note 1 in Box 1.1.
2. See note at the end of this chapter.
Countries and economies are listed in alphabetical order.
Source: Survey of Adult Skills (PIAAC) (2012, 2015), Tables A2.3, A2.5 and A2.6.
StatLink http://dx.doi.org/10.1787/888933365695

PROFICIENCY IN INFORMATION-PROCESSING SKILLS AMONG ADULTS

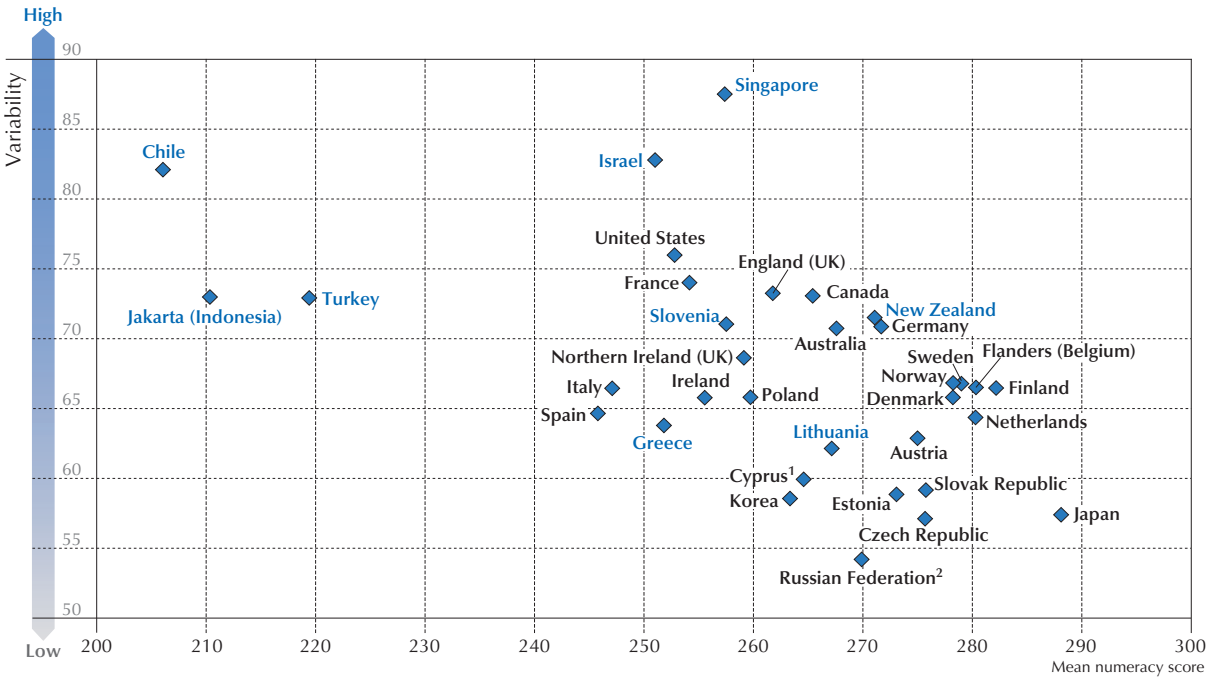
Average adult proficiency in information-processing skills varies considerably among the 33 countries/economies covered by the Survey of Adult Skills, although many countries/economies have average scores that fall within a relatively limited range. Some 97 score points[2] separate the average adult proficiency in literacy in Japan and Jakarta (Indonesia) – the highest- and lowest-scoring countries/economies, respectively. The differences between countries/economies reflect, in part, the different starting points and pathways of economic, educational and social development that the countries/economies in the study have followed over the past half century, as well as current institutional arrangements and policies. For example, the rapid economic development and educational expansion over the post-war period in Korea and Singapore are reflected in low levels of educational attainment and proficiency among older generations and high attainment and proficiency among younger adults. In some countries/economies, high average proficiency in literacy and numeracy is not necessarily accompanied by high proficiency in problem solving in technology-rich environments. This could reflect historical differences across countries in how access to ICT was expanded among the population.

There are also considerable differences in the extent of the variation or dispersion of proficiency across countries/economies. Furthermore, the extent of the score variation within countries/economies is inversely related to their average level of proficiency. In other words, good average performance is usually associated with less variation in performance within a country/economy. Nevertheless, it is important to be cautious when interpreting this correlation as it is relatively weak and overwhelmingly relies on the few (outlier) countries.

In almost all countries/economies, a sizeable proportion of adults has poor reading skills (18.9% of adults, on average) and poor numeracy skills (22.7% of adults, on average). The share of adults proficient at or below Level 1 in literacy ranges from 69.3% in Jakarta (Indonesia) to 4.9% in Japan and, in numeracy, from 61.9% in Chile to 8.1% in Japan. These are adults who can successfully complete reading tasks that involve only short and simple texts, and mathematics tasks involving only basic operations.

Figure 1.2 ■ **Average and variability of numeracy scores**

Relationship between mean numeracy proficiency score and variability



Note: The measure of variability used is the interquartile range (difference between the third quartile and the first quartile).

1. See note 1 in Box 1.1.

2. See note at the end of this chapter.

Source: Survey of Adult Skills (PIAAC) (2012, 2015), Table A2.5.

StatLink http://dx.doi.org/10.1787/888933365704

Yet there are very few adults in any of the participating countries/economies who can be described as illiterate in the language of the test. As part of the assessment, information was collected on the vocabulary knowledge, the level of understanding of the logic of sentences, and fluency in reading paragraphs of text of adults with poor reading skills. In most cases, adults with poor reading skills displayed a good knowledge of basic print vocabulary, but they had somewhat limited understanding of sentence logic and had some difficulty reading passages of text fluently. They also took considerably more time to complete the vocabulary, sentence-processing and fluency tasks than adults with better reading skills. In other words, they had not reached the level of automaticity that characterises efficient reading.

Many adults in all countries/economies have no experience using computers, or extremely limited ICT skills, or have low proficiency in problem solving in technology-rich environments. Around one in four adults has no or only limited experience with computers or lacks confidence in their ability to use computers. In addition, nearly one in two adults is proficient only at or below Level 1 in problem solving in technology-rich environments, which translates into being able to use only familiar applications to solve problems that involve few steps and explicit criteria, such as sorting e-mails into pre-existing folders.

A close relationship is found among low proficiency in literacy and numeracy, low proficiency in problem solving in technology-rich environments, and limited familiarity with computers. Low proficiency in literacy and numeracy can be a significant barrier to using ICT applications to manage information. First, poor literacy may hinder the acquisition of basic ICT skills. Second, even if adults have some computer skills, those with poor literacy and numeracy skills will find it difficult to handle many of the information-management and information-processing tasks encountered in online environments. This implies that, in some countries/economies, adults with poor proficiency in literacy and numeracy may be slow to adopt and use information technologies, which could undermine their labour market outcomes. Given these findings, policies to improve adults' ICT competence should focus as much on improving literacy and numeracy skills as on improving access to technology (OECD, 2015).

PROFICIENCY AND SOCIO-DEMOGRAPHIC CHARACTERISTICS

Within countries/economies there is considerable variation in proficiency in information-processing skills across adults with different socio-demographic characteristics. In particular, proficiency is closely associated with age, educational attainment, parents' level of education and immigrant background, but only weakly associated with gender.

In general, proficiency in literacy and numeracy peaks at around age 30, while proficiency in problem solving in technology-rich environments peaks at around age 25. On average, older adults (55-65 year-olds) score around 30 score points lower in literacy than 25-34 year-olds. A substantial share of the age-related differences in proficiency is associated with other individual characteristics, particularly adults' level of educational attainment. Accounting for other background characteristics strongly reduces observed age-related differences in proficiency, especially in countries/economies that expanded access to higher education over the past three decades; however, in the majority of countries, those differences are not completely eradicated. Still, variations in age-related proficiency across countries/economies suggest that the evolution of proficiency over a lifetime is not determined solely by biological factors; policy, too, can influence the maintenance or loss of proficiency among older adults.

As expected, in all countries/economies there is a close association between the educational attainment of adults and their proficiency in information-processing skills. This is likely because, on the one hand, adults with higher proficiency are more likely to participate in higher levels of education and, on the other, longer periods of study provide the opportunity to develop higher levels proficiency in information-processing skills. Among 25-65 year-olds (i.e. adults who have generally completed formal education), proficiency is highest among those with tertiary qualifications and lowest among those whose highest qualification is less than secondary education. On average, some 61 score points separate the estimated literacy proficiency of a 25-65 year-old with a tertiary qualification from someone whose highest qualification is less than secondary education.

Parents' educational background exerts a significant influence on adults' proficiency in literacy. Having at least one parent with tertiary qualifications is associated with a 40 score-point advantage over adults with neither parent having attained an upper secondary degree. A significant portion of this difference (about half) is explained by other socio-demographic characteristics, most notably the fact that children of high-educated parents are themselves more likely to attain higher levels of education.

Immigrants who were brought up speaking a different language from that of the assessment have significantly lower average proficiency. Native-born adults whose first or second language learned as a child is the same as that of the assessment scored 30 points higher than foreign-born adults whose native language is different from that of the assessment, on average.

Immigrants whose native language is the same as that of the host country tend to score significantly better than other immigrants, and are often nearly as proficient as native-born adults. The magnitude of the differences, and the extent to which other background characteristics might account for them, varies enormously across countries/economies, reflecting countries' vastly different migration histories and policies.

There are a number of countries/economies in which immigrants' reading proficiency in the language of the host country is extremely low in absolute terms as well as relative to that of adults who were born in the country and have spoken the local language from birth. While this is partly related to the age at arrival in the country, it is also an indication of possible difficulties in integrating into the host country's labour market.

The difference in literacy proficiency between men and women is negligible. In numeracy, men have a more substantial advantage, scoring about 10 score points higher than women, on average. Gender gaps in proficiency are more pronounced among older adults. This could reflect either the fact that gender gaps in educational attainment are wider among older adults, or that women's skills depreciate more over time, possibly because they participate less in the labour market.

Figure 1.3 ▪ **Literacy proficiency, by educational attainment**

Mean literacy proficiency scores, by educational attainment (adults aged 25-65)

Notes: All differences are statistically significant. Lower than upper secondary education includes ISCED 1, 2 and 3C short. Upper secondary education includes ISCED 3A, 3B, 3C long and 4. Tertiary education includes ISCED 5A, 5B and 6. Where possible, foreign qualifications are included as per their closest correspondance to the respective national education systems.

1. See note 1 in Box 1.1.

2. See note at the end of this chapter.

Countries and economies are ranked in descending order of the mean score in literacy for adults aged 25-65 who have attained tertiary education.

Source: Survey of Adult Skills (PIAAC) (2012, 2015), Table A3.2 (L).

StatLink http://dx.doi.org/10.1787/888933365719

INFORMATION-PROCESSING SKILLS AND WELL-BEING

Proficiency in information-processing skills is positively associated with many aspects of individual well-being, notably health, beliefs about one's impact on the political process, trust in others, and participation in volunteer activities. This is true both on average across the countries/economies that participated in the Survey of Adult Skills and in most countries/economies. In most countries/economies, adults who scored at lower levels of proficiency in literacy were more likely than those who scored at high levels to have reported poor health, that they have little impact on the political process, and that they do not participate in associative or volunteer activities. Individuals with lower proficiency were also more likely than those with higher proficiency to have reported less trust in others. These relationships hold even after accounting for educational attainment and other socio-demographic characteristics, such as age, gender and family background. As is discussed in more detail in the next section, adults with higher proficiency in these skills also tend to have better outcomes in the labour market.

INFORMATION-PROCESSING SKILLS AND THE LABOUR MARKET

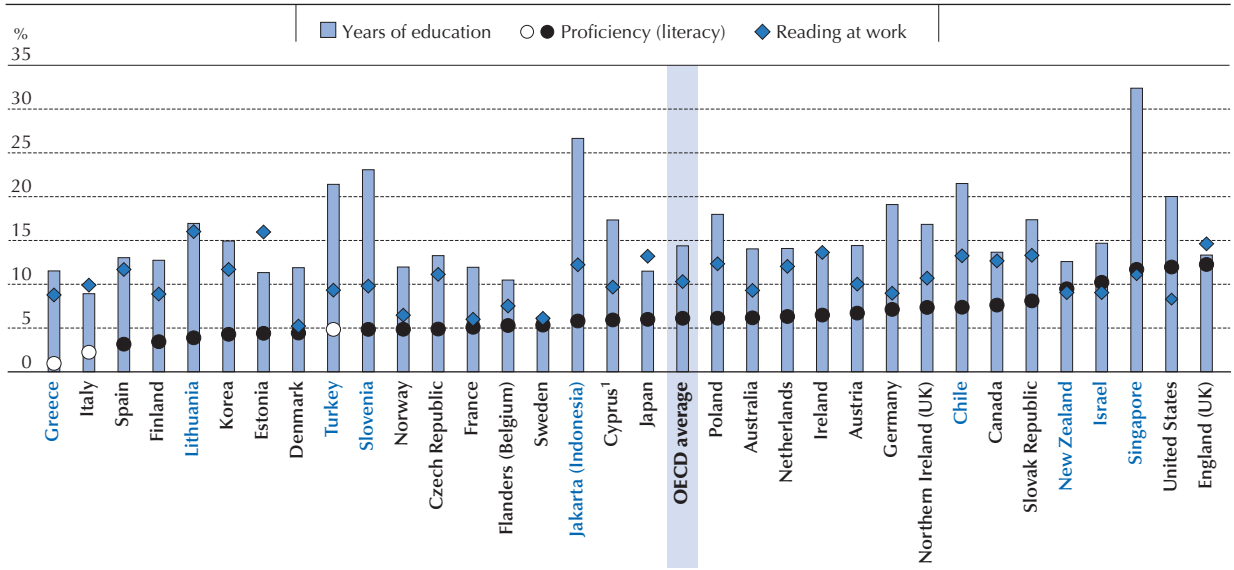
The Survey of Adult Skills provides a rich source of data for analysing a number of labour market issues, such as the relationship of proficiency in information-processing skills and other components of human capital to employment and wages; the extent to which workers use information-processing skills in their jobs and the factors that encourage more or less frequent use of such skills; and the effectiveness of the labour market in ensuring a good match between workers' qualifications and skills and the demands of their jobs.

Proficiency in information-processing skills and labour market outcomes

Adults with higher proficiency in literacy, numeracy and problem solving in technology-rich environments tend to have better outcomes in the labour market than their less-proficient peers. They have somewhat greater chances of being employed and, if employed, of earning higher wages. This holds true also when accounting for other factors commonly associated with better outcomes in the labour market, such as educational attainment, work experience, occupation and field of study.

Figure 1.4 ▪ **Impact of education, literacy proficiency and use of reading at work on wages**

Percentage change in wages associated with a change of one standard deviation in years of education, proficiency in literacy and use of reading at work



Notes: Hourly wages, including bonuses, in PPP-adjusted USD (2012). Coefficients from the OLS regression of log hourly wages on years of education, proficiency and use of reading skills at work, directly interpreted as percentage effects on wages. Coefficients adjusted for age, gender, foreign-born status and tenure. The wage distribution was trimmed to eliminate the 1st and 99th percentiles. One standard deviation in proficiency in literacy is 48 points. One standard deviation in years of education is 3.2 years. The analysis excludes the Russian Federation because wage data obtained through the survey do not compare well with those available from other sources. Hence further checks are required before wage data for this country can be considered reliable. Statistically significant values (at the 10% level) are shown in a darker tone.

1. See note 1 in Box 1.1.

Countries and economies are ranked in ascending order of the effect of literacy proficiency on wages.

Source: Survey of Adult Skills (PIAAC) (2012, 2015), Table A5.4.

StatLink http://dx.doi.org/10.1787/888933365726

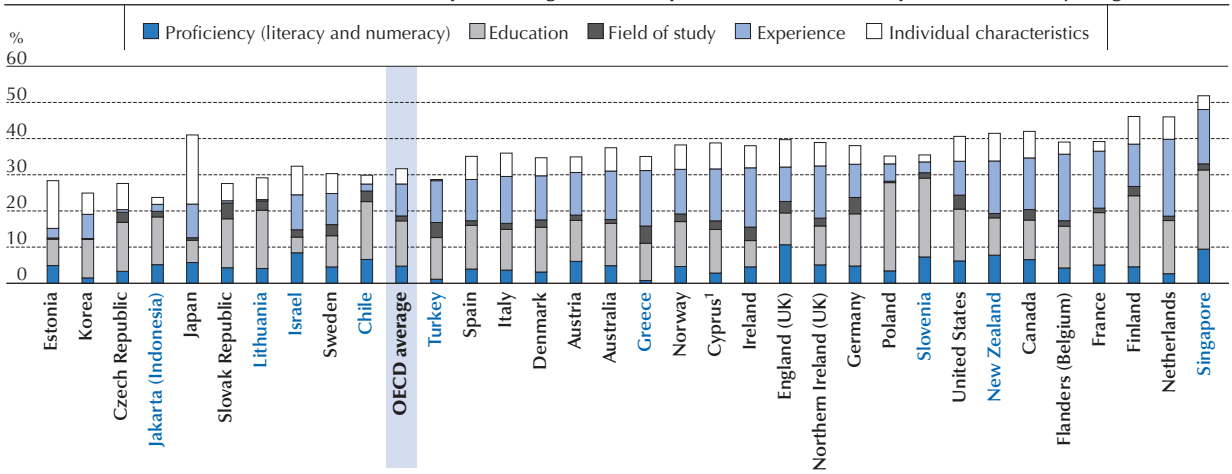
Across the countries/economies that participated in the Survey of Adult Skills, an adult who scores 48 points higher than another on the literacy scale (the equivalent of one standard deviation) is 0.8 percentage point more likely to be employed than unemployed, on average, after accounting for other factors, including educational attainment. The relationship between literacy proficiency and employment varies considerably among countries/economies. While in most countries/economies the relationship between literacy proficiency and the chances of being employed is strong and positive, it is weak or even negative in a few countries/economies. This may reflect differences in the support and incentives available to unemployed workers with different skill levels across countries/economies. In countries/economies with weak support schemes for the unemployed, the low skilled may need to find a job – any job – to maintain certain income security; in these countries only the high skilled with capacity to save may be able to spend time in unemployment. In countries/economies with more comprehensive income support for the unemployed, the low- and high- skilled may be able to take time to find a well-matched job.

The relationship between literacy proficiency and employment is not as strong as that between educational attainment[3] and employment. An increase of 3.4 years of completed formal education (the equivalent of one standard deviation) is related to a 3.1 percentage point increase in the likelihood of being employed. This is not surprising, given the breadth and variety of skills that are developed in education and training, and the role of education qualifications as a signal of an individual's level of skills.

The importance of literacy proficiency relative to education qualifications for employment increases with age. This is consistent with the phenomenon known as "employer learning" (OECD, 2014). In the case of young people with little work experience, employers are likely to rely on the available, albeit imperfect, signals of skills, such as education qualifications, when hiring or firing. For adults who have worked more years and whose performance has been observed over time, actual proficiency is a stronger predictor of labour market outcomes than qualifications.

Figure 1.5 ■ **Contribution of education, literacy and numeracy to the variation in wages**

Contribution of each factor to the percentage of the explained variance (R-squared) in hourly wages



Notes: Results obtained using a regression-based decomposition following the methods in Fields (2004). Each bar summarises the results from one regression and its height represents the R-squared of that regression. The sub-components of each bar show the contribution of each factor (or set of regressors) to the total R-squared. The Fields decomposition is explained in more detail in Box 5.4 of the *OECD Employment Outlook 2014* (OECD, 2014).

The dependent variable in the regression model is the log of hourly wages, including bonuses in PPP-adjusted USD (2012). The regressors for each factor are: years of working experience and its squared term for "Experience"; proficiency in literacy and numeracy for "Proficiency"; years of education for "Education"; and gender, marital status, migration status and language spoken at home for "Individual characteristics".

The analysis excludes the Russian Federation because wage data obtained through the survey do not compare well with those available from other sources. Hence, further checks are required before wage data for this country can be considered reliable.

1. See note 1 in Box 1.1.

Countries and economies are ranked in ascending order of the sum of the contributions of education, proficiency, field of study and experience.

Source: Survey of Adult Skills (PIAAC) (2012, 2015), Table A5.5.

StatLink http://dx.doi.org/10.1787/888933365732

Higher literacy proficiency is also associated with higher wages. The increase in wages associated with a one standard deviation increase in literacy proficiency is 6%, on average across the 33 participating countries/economies. It varies from 4% or less in Finland, Greece, Italy, Lithuania, Slovenia and Spain, to 10% or more in England (United Kingdom), Israel, Singapore and the United States. As with employment, other factors, particularly educational attainment and length

of work experience, also have an impact on wages. The increase in wages associated with a one standard deviation rise in years of education (around 3.2 years) is larger (14%), ranging from less than 7% in Sweden to more than 20% in Chile, Jakarta (Indonesia), Slovenia, Turkey and the United States, and more than 30% in Singapore.

A different way to assess the relative influence of proficiency and other factors on wages is to look at the share of explained variation by each factor. According to the survey, some 32% of the variation observed in wages on average across countries/economies is explained by factors such as age, skills use, experience and job characteristics, years of education and skills proficiency. Proficiency in information-processing skills accounts for 5% of the variation, compared to 13% for educational attainment, 1% for field of study, and 9% for work experience. Individual characteristics, such as gender, immigrant background, marital status and language spoken at home, account for a further 4% of the variation. In summary, proficiency in literacy and numeracy, educational attainment, field of study and work experience can all be considered different aspects of workers' human capital that contribute independently to adults' productivity and wages.

THE USE OF INFORMATION-PROCESSING SKILLS AT WORK

As noted above, workers who use information-processing skills more intensely in their jobs also tend to earn higher wages, even after accounting for differences in educational attainment, skills proficiency and occupation. Writing and problem solving are the skills most frequently used at work; reading skills follow close behind, while numeracy and ICT skills are least used. The use of ICT and reading skills are the most closely related to hourly wages. In contrast, while using numeracy and problem-solving skills at work matters as much as proficiency, its correlation with wages is much weaker than using ICT and reading skills.

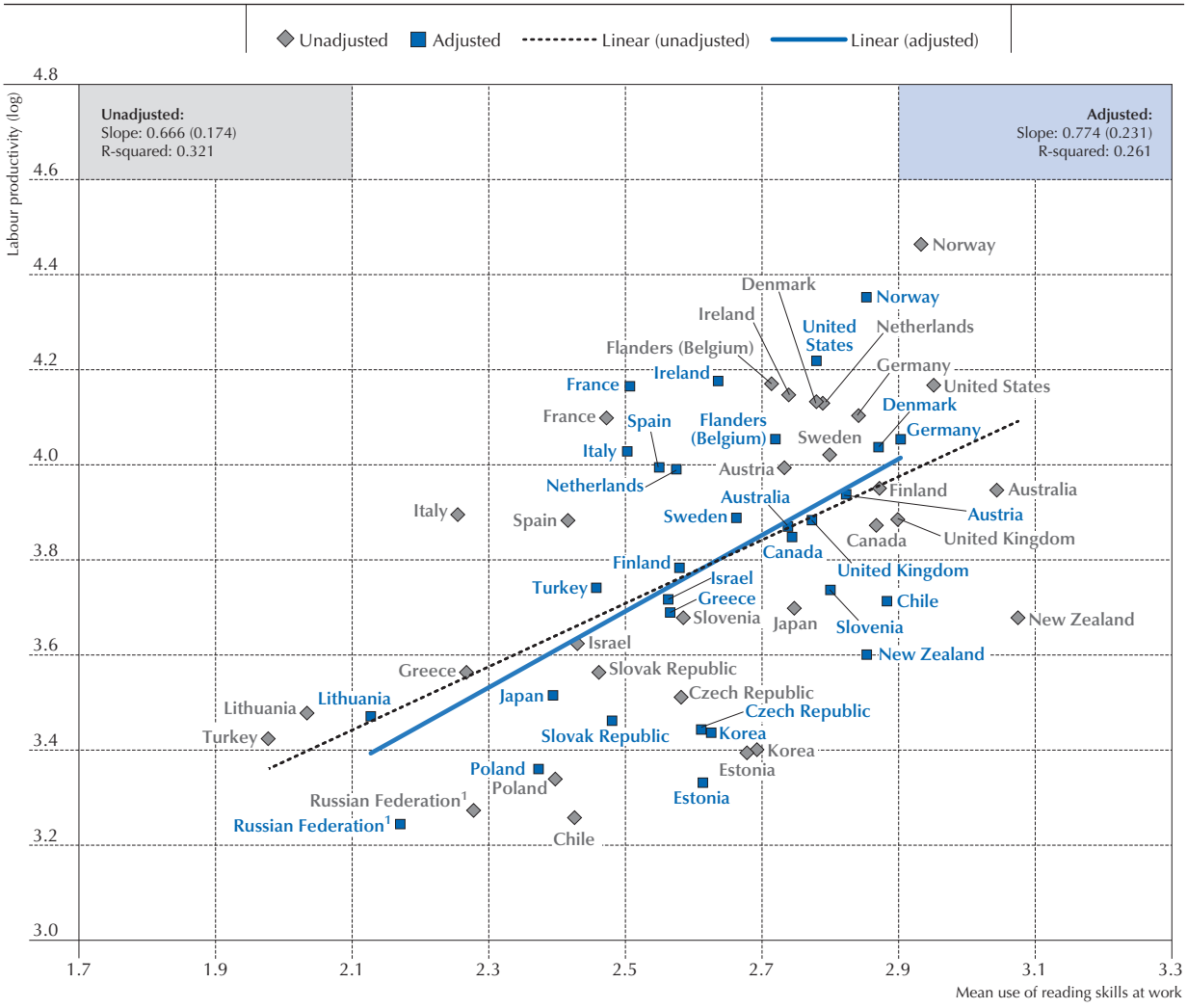
The tasks involved in a job are also linked to greater job satisfaction and employee well-being. This is in line with other research in which skills use has sometimes been associated with concepts of job quality (e.g. Green et al. 2013), with possible spill-over effects into life satisfaction, more generally, and better health. Across the countries/economies that participated in the survey, on average, the intensity of the use of information-processing skills is related to the likelihood of being extremely satisfied at work, even after taking into account proficiency, educational attainment, gross hourly wages and a number of socio-demographic characteristics. In fact, the use of information-processing skills has a stronger impact on job satisfaction than the level of proficiency or years of education. Although magnitudes vary, patterns across countries/economies are strikingly similar. The relationships between the use of reading, writing and ICT skills at work and job satisfaction are statistically significant in nearly all countries/economies, while this is rarely the case for the use of numeracy and problem-solving skills.

The intensity with which workers use information-processing skills is closely and positively related to the presence of management practices and forms of work organisation that can be described as High-Performance Work Practices (HPWP). HPWP include aspects of work organisation – team work, autonomy, task discretion, mentoring, job rotation, applying new learning – as well as management practices – employee participation, incentive pay, training practices and flexibility in working hours (Johnston and Hawke, 2002). Workers in jobs that benefit from these practices make greater use of reading, writing, numeracy, ICT and problem-solving skills. The extent to which workers are engaged in these practices accounts for between 14% and 27% of the variation in the intensity with which workers use information-processing skills. The way work is organised – the extent of team work, autonomy, task discretion, mentoring, job rotation and applying new learning – influences the degree of a firm's flexibility to adapt job tasks to the skills of new hires. Some management practices, such as offering bonus pay, training and/or flexible working hours, may provide incentives for workers to shape their own jobs or to adapt job tasks to their own skills and interests.

Some studies have shown a link between greater intensity of skills use and higher productivity (UKCES, 2014) and lower staff turnover at the firm level. Some have argued that intensive skills use stimulates investment, employees' engagement and innovation (Wright and Sissons, 2012). In the Survey of Adult Skills, the intensity of use of reading skills at work is found to correlate strongly with output per hour worked. This is also the case for writing skills. One possible explanation for this is that skills use simply reflects workers' proficiency in those skills. If so, the link between the use of reading skills at work and productivity could actually reflect a relationship between literacy proficiency and productivity.

But this is not what the data show. The positive link between labour productivity and reading at work remains strong even after accounting for average proficiency scores in literacy and numeracy.[4] Once these adjustments are made, the average use of reading skills explains less of the variation in labour productivity across countries/economies (26% compared to 32% before the adjustment), but the variation remains statistically significant. Put simply, the intensity with which workers use information-processing skills is important, in itself, in accounting for differences in labour productivity, beyond workers' level of proficiency.

Figure 1.6 ■ **Correlation between labour productivity and the use of reading skills at work**



Notes: Lines are best linear predictions. Labour productivity is equal to the GDP per hour worked, in USD current prices 2012 for Round-1 and 2014 for Round-2 countries/economies. Adjusted estimates are based on OLS regressions including controls for literacy and numeracy proficiency scores. Standard errors in parentheses.

1. See note at the end of this chapter.

Source: Survey of Adult Skills (PIAAC) (2012, 2015), Table A4.3.

StatLink http://dx.doi.org/10.1787/888933365746

Mismatches of qualifications and skills

While it is important to have an education and training system that ensures that adults develop the skills needed in the labour market, it is also important that the labour market matches workers to jobs in which they can put their human capital to the best use. This is crucial if countries are to make the most of their investments in human capital and promote strong and inclusive growth. This is also a desirable outcome for individuals. A mismatch between workers' skills and the demands of their job has potentially significant economic implications. At the individual level, it affects job satisfaction and wages. At the firm level, it increases the rate of turnover and may reduce productivity. At the macro-economic level, it increases unemployment and reduces GDP growth through the waste of human capital and the implied reduction in productivity.

The Survey of Adult Skills provides a unique source of information on the match between workers and the skills demands of their jobs, in terms of qualifications, field of study, and proficiency in literacy, numeracy and problem solving. Mismatches between adults' skills and what is required or expected of them at work are found to be pervasive, but generate negative outcomes for workers when related to overqualification (Montt, 2015) or negative outcomes for economies when related to over- or underskilling (Adalet McGowan and Andrews, 2015).

On average, about 22% of workers reported that they are overqualified (i.e. that they have higher qualifications than those required to get their jobs) and 13% reported that they are underqualified for their jobs (i.e. that their qualifications are lower than those required to get their jobs). Moreover, 11% have higher literacy skills than those typically required in their job (overskilled), and 4% are underskilled. Finally, some 40% of workers are employed in an occupation that is unrelated to their field of study.

Some level of mismatch is inevitable in a dynamic economy. Requirements regarding skills and qualifications are never fixed. The task content of jobs changes over time in response to technological and organisational change, the demands of customers, and in response to the evolution of the supply of labour. Young people leaving education and people moving from unemployment into employment, for example, may take jobs that do not necessarily fully match their qualifications and skills. Thus, for a number of reasons, some workers are likely to be employed in jobs for which they are too qualified while others may be in jobs, at least temporarily, for which they lack adequate schooling.

Qualifications mismatch is found to have a greater impact on wages than other forms of mismatch. On average across countries/economies, overqualified workers earn about 14% less than well-matched workers with the same qualifications and skills proficiency. When compared to workers in the same job, overqualified workers earn 4% higher wages. At the firm level, there may be incentives to hire overqualified workers: they are more productive, as indicated by their wages. But, on aggregate, these workers and the economy would be better off if they were working at their adequate qualifications level (Montt, 2015). The effect of overskilling on wages is small and often not statistically significant. Mismatch by field of study does not have a strong impact on wages; in many countries/economies, such mismatch is not necessarily negative. Only when workers are employed outside their field and become overqualified do field-mismatched workers suffer a significant wage penalty.

Notes

1. See note regarding Cyprus in Box 1.1.

2. Approximately 1.6 of a standard deviation.

3. It should be acknowledged here that separating the effects of proficiency and educational attainment is difficult due to the fact that they are mutually reinforcing. Adults with higher proficiency will be more likely to undertake higher levels of education which, in turn, facilitates the development of higher proficiency.

4. The adjustment is based on multivariate regression analysis. First, both labour productivity and the average use of reading skills at work are separately regressed on average proficiency scores in literacy and numeracy, i.e. they are adjusted to control for the effect of literacy and numeracy proficiency. Then, the residuals of the two regressions are, in turn, regressed on one another. The adjusted results displayed in Figure 1.6 come from such a regression. This is a standard econometric procedure, commonly known as *partitioned regression*.

A note regarding the Russian Federation

The sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in the Russian Federation but rather the population of the Russian Federation *excluding* the population residing in the Moscow municipal area.

More detailed information regarding the data from the Russian Federation as well as that of other countries can be found in the *Technical Report of the Survey of Adult Skills, Second Edition* (OECD, forthcoming).

References and further reading

Adalet McGowan, M. and **D. Andrews** (2015), "Labour market mismatch and labour productivity: Evidence from PIAAC data", *OECD Economics Department Working Papers*, No. 1209, OECD Publishing, Paris, http://dx.doi.org/10.1787/5js1pzx1r2kb-en.

Fields, G.S. (2004), *Regression-based Decompositions: A New Tool for Managerial Decision-making,* Department of Labor Economics, Cornell University, pp. 1-41.

Green, F., A. Felstead, D. Gallie and **H. Inanc** (2013), *Job-related Well-being in Britain, First Findings from the Skills and Employment Survey 2012,* Centre for Learning and Life Chances in Knowledge Economies and Societies, Institute of Education, London, www.cardiff.ac.uk/__data/assets/pdf_file/0003/118659/6.-Job-related-Well-being-in-Britain-mini-report.pdf.

Johnston, R. and **G. Hawke** (2002), *Case Studies of Organisations with Established Learning Cultures*, NCVER, Adelaide.

Montt, G. (2015), "The causes and consequences of field-of-study mismatch: An analysis using PIAAC", *OECD Social, Employment and Migration Working Papers*, No. 167, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jrxm4dhv9r2-en.

OECD (forthcoming), *Technical Report of the Survey of Adult Skills, Second Edition*.

OECD (2016), *Survey of Adult Skills (PIAAC)* (Database 2012, 2015), www.oecd.org/site/piaac/publicdataandanalysis.htm.

OECD (2015), *Adults, Computers and Problem Solving: What's the Problem?*, OECD Skills Studies, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264236844-en.

OECD (2014), *OECD Employment Outlook 2014*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2014-en.

OECD (2013), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264204256-en.

UKCES (2014), *The Labour Market Story: Skills Use at Work, Briefing Paper,* UK Commission for Employment and Skills, www.gov.uk/government/uploads/system/uploads/attachment_data/file/343457/The_Labour_Market_Story-_Skills_Use_at_Work.pdf.

Wright J. and **P. Sissons** (2012), *The Skills Dilemma - Skills Under-Utilisation and Low-Wage Work - A Bottom Ten Million Research Paper,* The Work Foundation, Lancaster University, www.theworkfoundation.com/DownloadPublication/Report/307_Skills%20Dilemma.pdf.