



An Phríomh-Oifig Staidrimh
Central Statistics Office

PIAAC 2012

Survey Results for Ireland
from the OECD's Programme for the International Assessment of Adult Competencies

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Contents

	Page
Summary	1
Chapter 1 - Background, Implementation and Design	11
Background	12
Survey Implementation	12
Assessment Domains	15
Survey Results	16
Chapter 2 - PIAAC International Results	21
Summary Results	22
Literacy	23
Numeracy	32
Problem Solving in Technology-Rich Environments	36
Relationship Between Scales	41
Chapter 3 - PIAAC Results for Ireland	45
National Trends	46
Literacy	46
Numeracy	56
Problem Solving in Technology-Rich Environments	65
Chapter 4 - Trends in Adult Literacy	75
IALS – Trends in Literacy Proficiency	76
International Trends: IALS vs PIAAC	77
National Trends	81
Comparing PIAAC with PISA	90
Chapter 5 - Skill Use in Ireland	98
Skill Use at Work	96
Skill Use in Everyday Life	108
Qualification and Skills Mismatch	112
References	115
Background Notes	117
Annex 1	125

Summary

SUMMARY

Introduction

This report presents the results for Ireland of the OECD's Survey of Adult Skills, also known as the Programme for the International Assessment of Adult Competencies or PIAAC. The survey was carried out in Ireland between August 2011 and March 2012 by the Central Statistics Office on behalf of the Department of Education and Skills.

PIAAC is designed to collect information about adult skills in the traditional domains of literacy and numeracy, and in the new area of problem solving skills in technology-rich environments. PIAAC builds on the work of two previous international surveys, the International Adult Literacy Survey (IALS) and the Adult Literacy and Life skills survey (ALL). Ireland participated in IALS in 1994 but not in ALL.

The survey was conducted in 24¹ countries under the direction and supervision of the OECD and a consortium of international institutions. The OECD has published a comprehensive international report outlining the findings of PIAAC across all participating countries (OECD 2013a - <http://www.oecd.org/site/piaac/>), along with a reader's companion (OECD, 2013b) and detailed technical report (OECD, 2013c). Each element of the survey, from questionnaire design and data collection to weighting and the calculation of the final estimates was executed in accordance with the Technical Standards and Guidelines (OECD, 2011) set down by the OECD.

Ireland had the third highest response rate of participating countries at 72%, with almost 6,000 adults between the ages of 16 and 65 responding to the survey.

Adult skills assessment

PIAAC focuses on three specific skill areas or domains: literacy, numeracy and problem solving in technology-rich environments. The OECD has labelled these areas "key information processing skills" because they are necessary for fully "participating in the labour market, education and training, and social and civic life". A comprehensive framework constructed by expert groups underlies each of the skill domains (OECD, 2012), and these groups also guided the development of the assessment items. The assessment tasks were designed to imitate tasks that an individual might face in everyday life.

The literacy tasks generally required the respondent to read through texts of varying complexity to find specific pieces of information. The structure of the presented texts included, for example, newspaper articles, websites and posters. As with literacy, the numeracy tasks were based on real-world problems and ranged from simple addition and subtraction to the calculation of averages, percentages and the estimation of quantities. The format of the tasks included supermarket price tags, food labels, graphs and tables containing numbers.

In the third skill area, problem solving tasks required the respondent to interact with one or more common computer applications to solve a problem. In some cases this was as straightforward as responding to a simple email, whereas other tasks involved navigating through a series of web pages to find the answer to a question. For example, one task required the respondent to find specific information on a spreadsheet and enter it in a web-based form. Some examples of the types of items used in all three skill areas are contained in Annex 1.

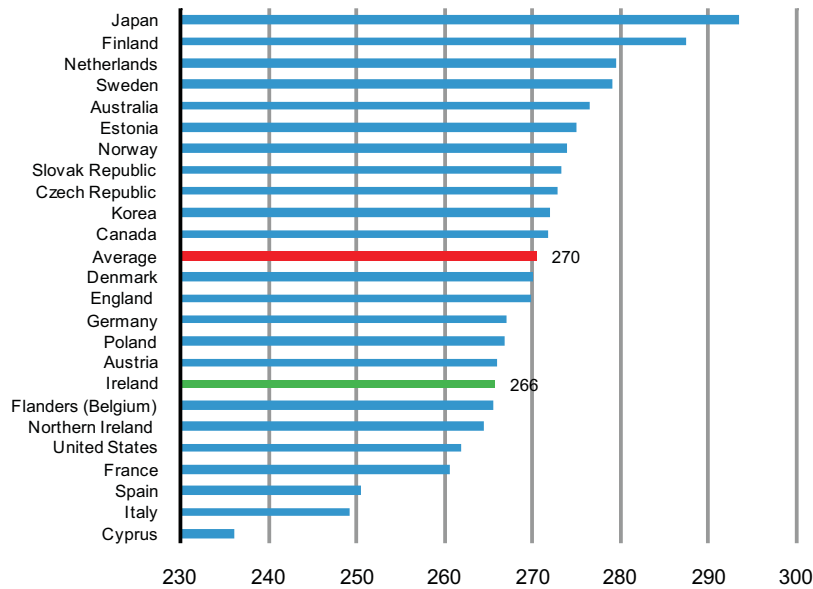
The survey itself consisted of two main stages: a comprehensive background questionnaire and the assessment of skills using a series of tasks presented to the respondent on a laptop computer or in paper booklet form. The respondent's performance on these individual tasks was converted into an average or mean score for each domain, representing his/her proficiency in that area. With the use of these average scores it is possible to calculate the percentage of the population who fall within different levels of each skill domain. Literacy and numeracy proficiency have been split into five levels and problem solving in technology-rich environments has been split into three. Each level is considered to represent a qualitative shift in proficiency along a continuum.

¹ Although 24 countries participated in the data collection phase of PIAAC, data for Russia was not processed in time for inclusion in this report or the international report. However, data for England and Northern Ireland are presented separately in this report so on most tables there are still 24 'countries'.

Literacy skills of adults in Ireland

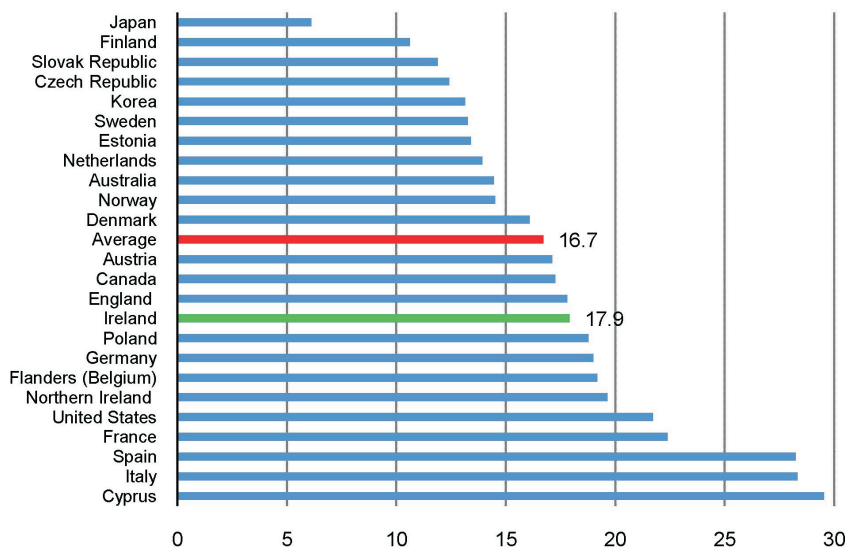
Adults in Ireland have an average (mean) score on the literacy scale of 266 compared to the study average of 270. This adjusted² mean score places Ireland 17th out of 24 participating countries, and in a group with Germany (267), Poland (267), Austria (266), Flanders (Belgium) (266) and Northern Ireland (265), whose literacy mean scores are not statistically different from that of Ireland (Figure A.1). Japan (294) and Finland (288) have the highest literacy mean scores (adjusted).

Figure A.1
Literacy (adjusted) mean scores



Across the levels of the literacy scale 17.9% of respondents in Ireland are found at or below Level 1, compared to 16.7% on average across participating countries. The proportion of Irish adults found at this level is statistically not different from the study average or the percentage of eight other countries, including Canada (17.3%), England (17.8%), Poland (18.8%), Germany (19.0%) and Northern Ireland (19.6%). Japan (6.1%) and Finland (10.6%) have the lowest proportions of adults at or below Level 1 (Figure A.2).

Figure A.2
Percentage of adults (16-65) at or below Level 1 of literacy proficiency



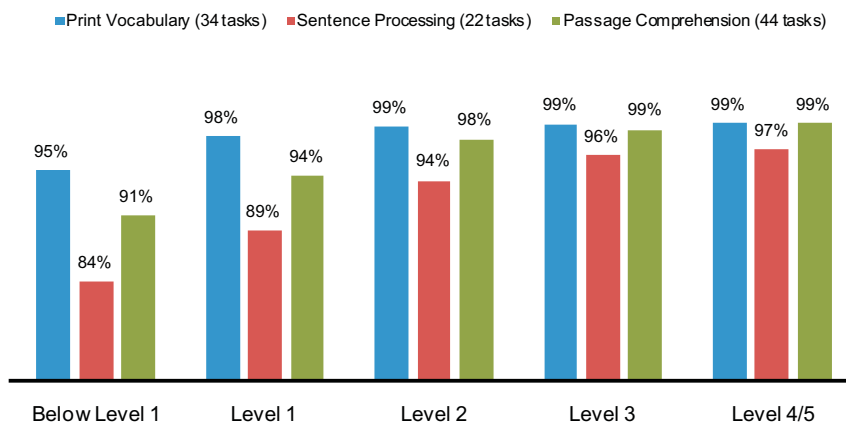
² See Chapter 1 for a technical note about the difference between adjusted and unadjusted mean scores.

At the other end of the literacy scale, on average half (50.0%) of adults in the participating countries score at Levels 3, 4 or 5, compared to 44.5% in Ireland. Ireland has statistically the same percentage at the upper levels of literacy proficiency as Northern Ireland (44.2%), Poland (44.7%), Austria (45.7%) and the United States (45.7%). Japan (71.1%) and Finland (62.9%) have the highest percentage of adults at Levels 3, 4 and 5.

Reading components

An important new feature of literacy assessment introduced by the PIAAC survey is an assessment of basic reading skills, namely word meaning (print vocabulary), sentence processing and passage comprehension. This was designed to shed more light on the literacy skills of those who score towards the bottom of the literacy proficiency scale. Adults in Ireland whose literacy proficiency is assessed as being below Level 1 answer, on average, 95% of the word meaning, 84% of the sentence processing and 91% of the passage comprehension tasks correctly (Figure A.3). This illustrates that many adults at the lower end of the literacy spectrum have basic literacy skills.

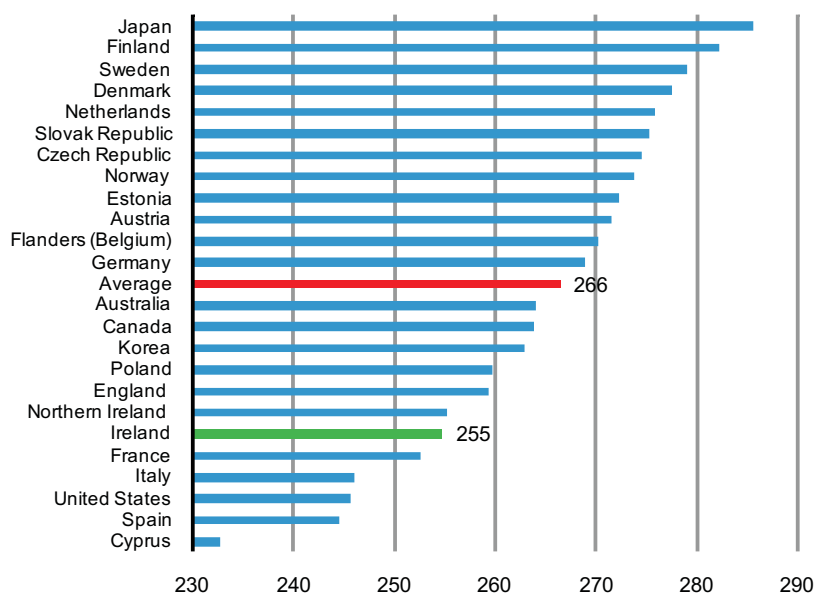
Figure A.3
Average percentage of reading component tasks answered correctly by level of literacy (Ireland)



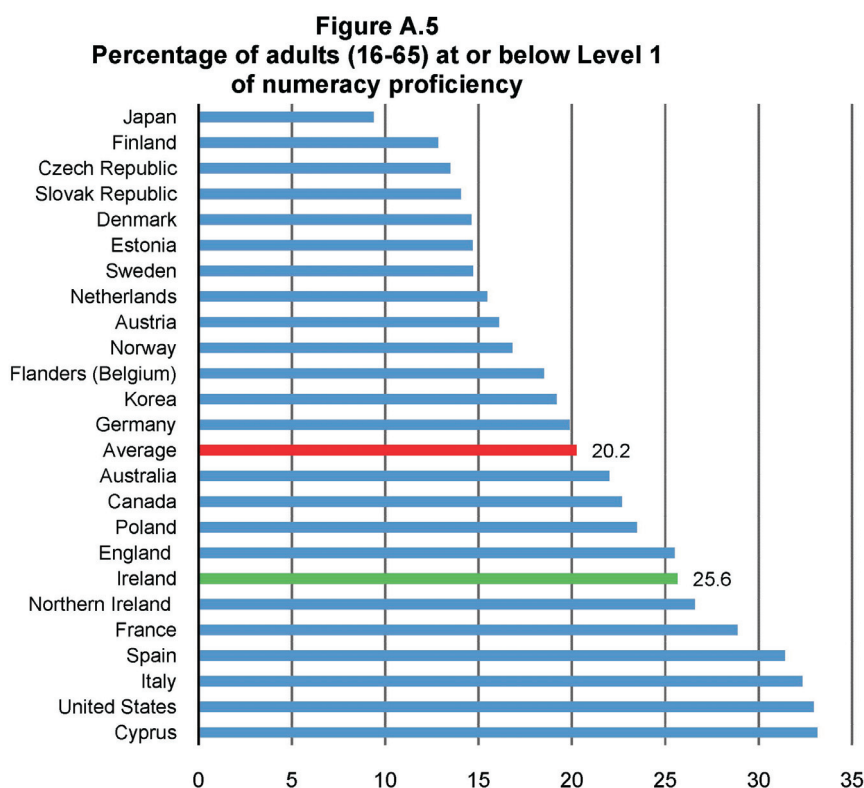
Numeracy of adults in Ireland

Adults in Ireland aged 16–65 have a mean score of 255 on the numeracy scale, significantly below the PIAAC average score of 266. This adjusted mean score places Ireland 19th out of 24 participating countries and in a group with Northern Ireland (255) and France (253). Japan and Finland score the highest on numeracy with adjusted mean scores of 286 and 282 respectively (Figure A.4).

Figure A.4
Numeracy (adjusted) mean scores



About one quarter (25.6%) of adults in Ireland score at or below Level 1 on the numeracy scale compared to just 20% (20.2%) on average across participating countries (Figure A.5). This percentage is not statistically different from Poland (23.5%), England (25.5%) and Northern Ireland (26.6%), but is lower than the percentage at this level in France (28.9%), Spain (31.4%), Italy (32.3%) and the United States (32.9%). Japan is the only country that has less than 10% of adults at or below Level 1 on numeracy proficiency.



At the other end of the numeracy proficiency scale 36.3% of adults in Ireland are at Levels 3, 4 and 5 compared to 46.8% on average across participating countries. The percentage of adults at the upper levels of numeracy proficiency is statistically the same as Poland (38.9%), Northern Ireland (37.5%), France (37.3%) and the United States (34.4%). Japan (62.6%) and Finland (57.9%) once again have the highest percentages at levels 3, 4 and 5.

Problem solving in technology-rich environments

The problem solving in technology-rich environments domain assessed the respondent's ability on laptop computer to use a number of common computer applications (e.g. email, spreadsheets, word processing, internet browser) to complete various tasks. The tasks ranged in complexity from answering emails to buying tickets using an online booking system given certain criteria and restrictions.

A number of important factors should be borne in mind when considering the problem solving data.

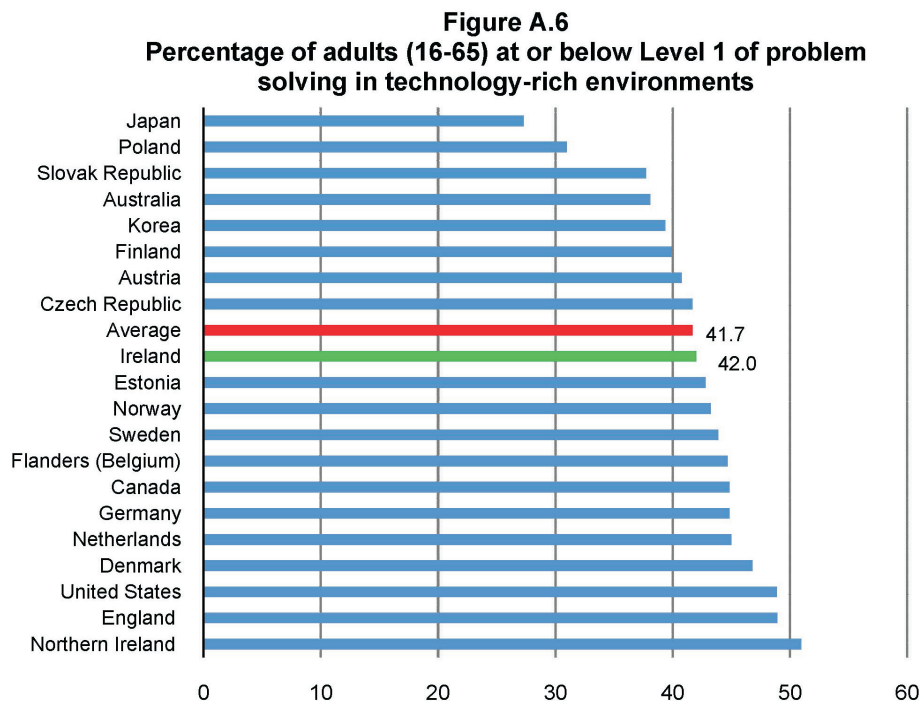
- This is the first time that an assessment of this type has been attempted for an adult population. Consequently, a small pool of items was developed and no historical or trend data exists. As such the problem solving assessment represents a narrow assessment of this skills domain, and only three proficiency levels were created, compared with five levels for literacy and numeracy.
- The problem solving assessment was originally designed for laptop computers using a point and click mouse interface in 2008, whereas by the time the survey went into the field the use of touch screen technology and handheld devices to access the internet had become commonplace. As such it may be that the PIAAC assessment used in 2011-2012 did not measure the full range of ICT skills in use at that time.

- The design of the survey allowed respondents who had some computer experience opt to take the assessment on paper rather than computer. In Ireland about 17% of the sample opted to take a paper rather than a computer-based assessment even though they had indicated some prior computer experience, compared to about 9% internationally. This means that no problem solving data exists for this group.

Consequently the distribution of adults in Ireland across the levels of problem solving proficiency is affected by the percentage of respondents who opted out of the computer-based assessment, but it is difficult to say to what degree. The OECD have cautioned that problem solving mean scores are not representative of the full population of computer-users across countries, and that problem solving mean scores are not suitable for international comparisons.

Instead the OECD uses the percentage of adults within each level of the problem solving scale as a more robust measure of proficiency for comparison purposes.

In Ireland more than two-fifths (42%) of adults score at or below Level 1 (29.5% at Level 1, 12.6% below Level 1) on the problem solving scale the same as the study average (41.7%). Ireland is in a large group of six other countries with a similar proportion at this level, including Finland (39.9%), Estonia (42.8%) and Sweden (43.9%). Of the 20³ countries who implemented the problem solving assessment, 14 have between 40% and 50% at or below Level 1 on this scale, including Ireland. The country rated highest on problem solving, Japan, still has 27.3% of adults at or below Level 1 on the problem solving scale (Figure A.6).



At the other end of problem solving proficiency 25.3% of adults are at Levels 2 and 3 in Ireland compared to 34.0% on average internationally. This is significantly more than Poland (19.2%) but not statistically different from Northern Ireland (28.7%), Estonia (27.6%) or the Slovak Republic (25.6%).

³ France, Spain, Italy and Cyprus did not administer the problem solving assessment.

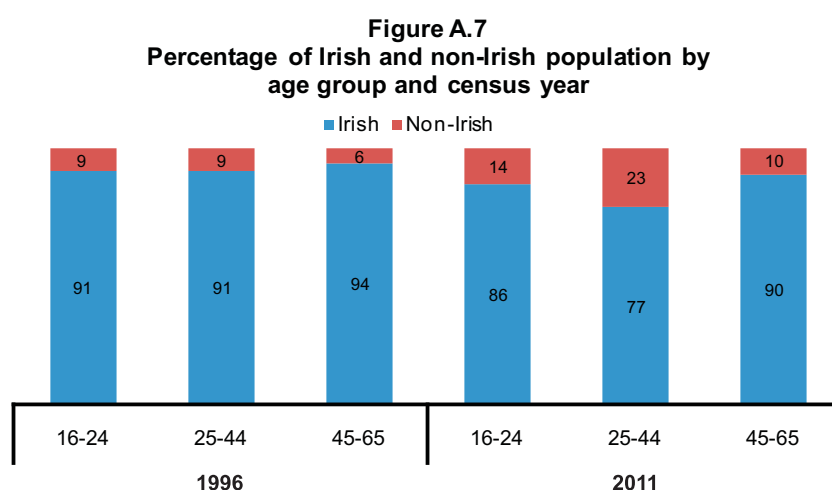
Literacy trend over time 1994 – 2012

In 1994 the International Adult Literacy Survey (IALS) was conducted in Ireland by the Educational Research Centre, St. Patrick's College, Drumcondra (Morgan et al., 1997). The use of common or so-called linking items in the IALS and PIAAC surveys and Item Response Theory methodology allows the results of both surveys to be compared in a general but meaningful way.

Population change

The adult population of Ireland has changed considerably in the 18 years (1994 - 2012) since the International Adult Literacy Survey (IALS) was conducted, and it is important to consider these changes when reviewing the trends in adult literacy over that period.

- The population of Ireland aged 16 to 65 has increased by almost 700,000 to 2.994m between 1996 and 2012. At the same time the age profile has changed and there has been a significant reduction in the percentage of adults aged 16-24 in the population, down from 27% in 1996 to 19% in 2011.
- Another important change in the same period concerns the percentage of non-Irish born residents in the country, which has more than doubled (Figure A.7). In 1996 9% of the population aged 25-44 were born outside Ireland whereas by 2011 this had increased to 23%. Furthermore, the nationalities of those non-Irish living in Ireland in 1996 suggests that they were predominantly (85%) native English speakers, while the equivalent 2011 data indicates that almost half of the non-Irish born population were not native English speakers⁴.



- A final point to note about the underlying population changes is the increase in the level of education attained across the population. For example, in the 1996 Census almost a quarter of the population aged 16-65 reported that their highest level of education was at primary level, but this had dropped to 10% in 2011. At the other end of the educational spectrum in 1996 22% of the population aged 16-65 reported that they had a third level qualification of some sort, but this figure had increased to almost 50% (48%) by 2011.

⁴ In 1996 8% of the population were born outside of Ireland, and 85% of this group were born in English-speaking countries. In 2011 17% of the population were born outside Ireland and 43% of this group were born in English-speaking countries (Census of Population 1996 and 2011).

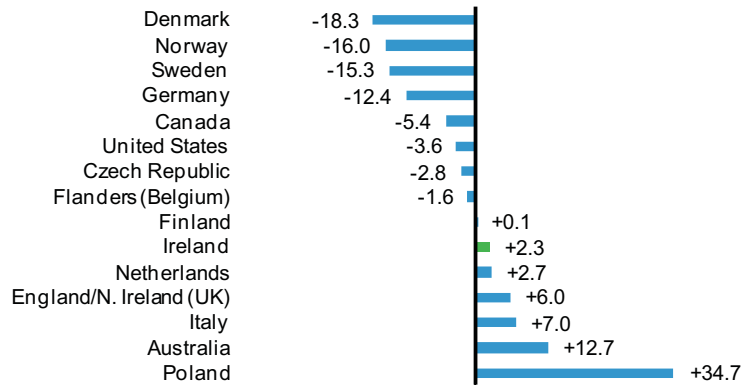
Literacy trend

PIAAC provides an estimate of the change in literacy proficiency amongst adults in Ireland over time by comparing the PIAAC mean score for literacy with an equivalent score from the International Adult Literacy Survey (IALS). This comparison is possible because PIAAC uses some test items that were also used in IALS and the OECD has also recalculated the IALS literacy data, which was originally on three separate scales, and placed it on a single literacy scale.

Average literacy score

Using this rescaled data for IALS the 1994 literacy mean score was 264 compared to 267 (unadjusted mean score) in PIAAC. In statistical terms there is no difference in the average score of those aged 16-65 living in Ireland now and those of the same age in 1994. Internationally, comparing countries who participated in both surveys, some countries have experienced a drop in their literacy mean score, such as Denmark (-18), Norway (-16) and Sweden (-15), while some are showing an increase most notably Poland (+35) and Australia (+13) (Figure A.8).

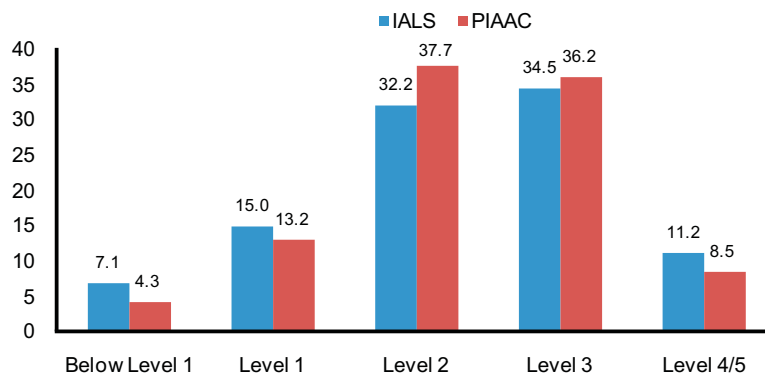
Figure A.8
Literacy mean score change
(IALS 1994 vs PIAAC 2012)



Distribution across levels of literacy scale

Following the recalculation of the IALS data by the OECD, the revised data now suggests that 22% (22.1%) of adults in Ireland were at or below Level 1 on the literacy scale in 1994⁵. This compares to 18% (17.5% unadjusted) at this level on PIAAC (Figure A.9).

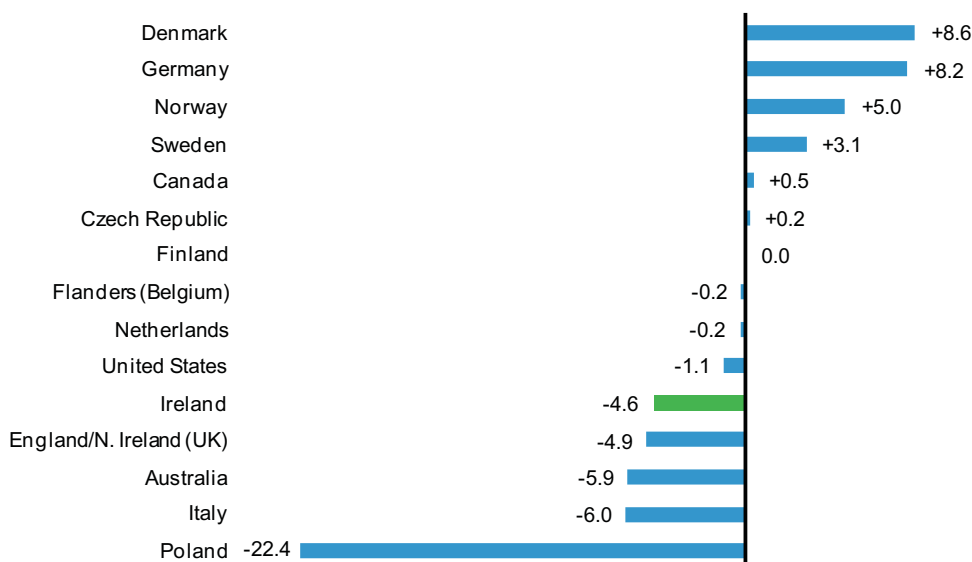
Figure A.9
Percentage of adults (16-65) across levels
of literacy proficiency
(IALS 1994 vs PIAAC 2012)



⁵ The original IALS data estimated this figure at 25%.

Of the fifteen countries who participated in both IALS and PIAAC, eight have seen a drop in the percentage of adults at or below level 1 on literacy (including Ireland), while six countries have seen an increase. There was no change in Finland (Figure A.10).

Figure A.10
Change in percentage of adults at or below Level 1
on the literacy proficiency scale between IALS and PIAAC



PIAAC and PISA

The Programme for International Student Assessment (PISA) is another OECD international survey regularly conducted in Ireland which has as its objective the assessment of how well students at age 15 are prepared to meet the challenges they may encounter in future education and life. The PISA assessment began in 2000 and is conducted in three-yearly cycles. Ireland has participated in all rounds of PISA – 2000, 2003, 2006, 2009 and 2012. PISA results for 2012 were not available for inclusion in this report and are scheduled for publication in December 2013.

Due to the similarities between the PIAAC and PISA surveys there is an obvious interest in seeing if the results of the two surveys can be considered together to observe any continuous trend in the skills of those in the middle of their secondary education through to adults at retirement age. However, there are significant methodological differences between both surveys. There are no test items common to both surveys and it is not possible to identify any respondents who took both surveys. As a result direct comparisons of mean scores and proficiency levels are not possible.

In addition, the OECD have warned that “it is not possible to identify with any accuracy where a 15-year-old with a particular reading literacy or mathematics score in PISA would be located on the literacy or numeracy scales of the Survey of Adult Skills” and “in the absence of evidence from a study linking the two assessments, caution is advised in comparing the results of the two assessments” (OECD, 2013b).

Notwithstanding these technical issues, a broad analysis is presented in this report using standard scores to facilitate comparisons between 15 countries who participated in both PIAAC and PISA. PIAAC is compared with PISA by isolating four age groups in PIAAC that are considered the equivalent of those 15-year olds who participated in PISA in 2000, 2003, 2006 and 2009 (e.g those aged 26-28 are compared with those who took the PISA assessment in 2000 as 15 year-olds).

Internationally, some countries (e.g. Finland) perform at more or less the same level on both surveys whereas in others, including Ireland, Canada, Germany, the Czech Republic and to some extent Australia, there is a contrast between the level of literacy and numeracy proficiency as measured by PISA and PIAAC. In Ireland, both the literacy and numeracy mean scores of the four PIAAC comparison groups are below the average, while the PISA mean scores for literacy are above the average and the PISA mean scores for numeracy are just slightly below the average.

Skill use

The PIAAC survey collected information about the use of information-processing skills and other more generic skills at work and in everyday life. PIAAC assesses whether workers have the necessary qualifications and skills for their current roles.

In Ireland almost 30% (27.2%) of workers considered that they had higher educational qualifications than would be required to get their own job today, compared to 21.4% on average. This percentage is amongst the highest of the participating countries along with Japan (31.1%), England (30.2%) and Australia (27.8%), while the countries with the lowest percentage of workers in this category are Italy (13.3%) and the Netherlands (14.8%).

In Ireland 80.4% of workers are considered to have a level of literacy proficiency that is well-matched to their current roles and 82.5% are considered to have a level of numeracy proficiency that is well-matched. This compares to 86.2% for literacy and 86.4% for numeracy on average across participating countries. The percentages of over-skilled workers in Ireland for literacy (15.1%) and numeracy (13.0%) proficiency are above the study averages (literacy 10.3% and numeracy 10.0%).

Conclusion

This report for Ireland summarises the main findings of the PIAAC survey from both a national and international perspective. However, given the size of the international database there are many variables and analyses that could not be included in the current report. The OECD international report offers a more comprehensive view of the international comparisons between countries and also suggests some broad policy implications and further research questions. The OECD has already planned a series of thematic releases to further mine the PIAAC data during 2014 and 2015.

International report: <http://skills.oecd.org/skillsoutlook.html>

The OECD has also released a microdata file for each participating PIAAC country, along with a series of tools to drill-down into the data.

PIAAC Public Use Files: <http://www.oecd.org/site/piaac/publicdataandanalysis.htm>

Chapter 1

**Background,
Implementation
and Design**

OECD'S SURVEY OF ADULT SKILLS (PIAAC)

BACKGROUND

The OECD's Programme for the International Assessment of Adult Competencies¹ (PIAAC) is a major new international survey of adult skills. The survey builds on the concepts and methodology of previous international studies, the International Adult Literacy Survey (IALS) and the Adult Literacy and Life skills survey (ALL), but PIAAC is unprecedented in the broad range of its analysis objectives and the large number of countries (24) that participated (Table 1.1).

PIAAC has been designed primarily to provide data on key adult skills, namely literacy, numeracy and problem solving in technology-rich environments, which are considered to underlie the success of the individual, and in turn to contribute to the overall success of society. PIAAC also seeks to understand which factors are related to skills development, and how the use of skills in different environments can support skills maintenance and development over time (OECD, 2012).

What is PIAAC trying to measure?

The basic premise of PIAAC is that adults require certain foundation skills to achieve successful economic and social outcomes. The survey sets out to assess the ability of adults along three of these foundation skills or dimensions: literacy, numeracy and problem solving in technology-rich environments. In some countries, including Ireland, the survey also incorporates an extra dimension which focuses on the individual components of reading. The framework (OECD, 2012) underlying each dimension has grown out of the work of previous international assessments and the work of the PIAAC Subject Matter Expert groups for each area.

SURVEY IMPLEMENTATION

Participating countries

There were 24 national participants in PIAAC, comprising 20 OECD member countries, regional entities from two OECD member countries (UK and Belgium) and two partner countries. At the time this national report was being prepared data for Russia was not available. The tables in this report present the data for England and Northern Ireland separately. Comparison tables containing estimates for all participating countries are available within the OECD's international report (OECD, 2013a) and public use datasets for all participating countries are also available online (<http://www.oecd.org/site/piaac/surveyofadultskills.htm>).

Table 1.1 Countries participating in PIAAC 2012

OECD member countries			Partners
National entities		Sub-national entities	
Australia	Italy	Flanders (Belgium)	Cyprus
Austria	Japan	England	Russia*
Canada	Korea	Northern Ireland	
Czech Republic	Netherlands		
Denmark	Norway		
Estonia	Poland		
Finland	Slovak Republic		
France	Spain		
Germany	Sweden		
Ireland	United States		

* Data for Russia is not included in this national report as it was not available prior to the finalisation of the report.

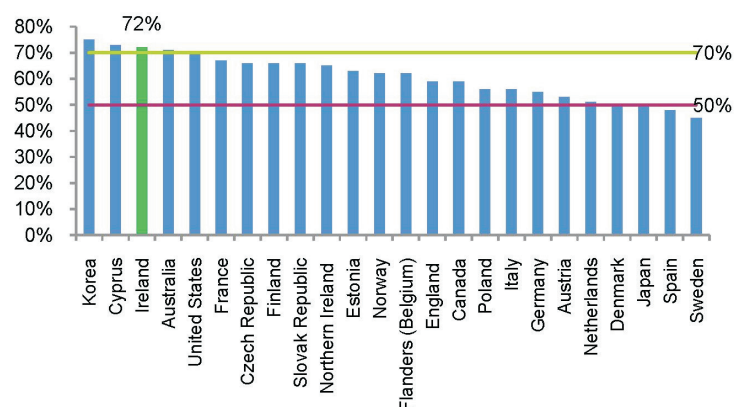
¹ The project is now known internationally as the "OECD Survey of Adults Skills (PIAAC)".

PIAAC in Ireland

Following a field trial in the summer of 2010, the main PIAAC survey was administered in Ireland between August 2011 and March 2012 by the Central Statistics Office on behalf of the Department of Education and Skills. The survey was based on a three-stage sample, with areas, households and adults selected at random within each county. The sample of respondents was selected to be representative of the geographical distribution and socio-demographic characteristics of the population. Data was collected face-to-face by CSO interviewers in the homes of respondents using a mix of laptop computers and paper test booklets.

Each selected person who fully completed the survey received a gift voucher worth €30. Almost 6,000 adults (5,983) aged 16-65 responded to the survey in Ireland. The overall response rate for Ireland was 72% which was the third highest achieved by participating countries (Figure 1.1). Four countries, including Ireland, exceeded the OECD's response rate target of 70%, while the response rates of four other countries (Denmark 50%, Japan 50%, Spain 48% and Sweden 45%) were either at or below the minimum response rate standard of 50% set by the OECD.

Figure 1.1
Achieved response rate by country



Survey Design

PIAAC was designed and executed by an international consortium of institutions contracted by the OECD and each country participating in the survey followed this overall design. Work on the project formally commenced internationally in 2008, a field trial was conducted in the summer of 2010 and most countries started data collection for the main study in August 2011. Considerable effort went into the standardisation of the survey questions and assessment tasks in order to maximise the comparability of results across countries. A comprehensive set of standards and guidelines covering the design and methodology of the survey was developed, and each country was closely monitored throughout the project by the OECD to ensure that these standards were being met.

All phases of the survey in Ireland, from sample design and data collection to data processing and weighting were conducted in strict accordance with the PIAAC Technical Standards and Guidelines (OECD, 2011). The OECD Consortium monitored and verified each stage of the survey in all participating countries, including Ireland, to ensure the comparability of the survey processes and ultimately the survey estimates themselves (See Background Notes in this report for more information). The data adjudication report for Ireland and the non-response bias report both confirm the quality and comparability of the Irish data (full reports available online at:

<http://www.cso.ie/en/surveysandmethodology/education/piaac/>).

Assessment design

The survey was centrally designed and controlled by the OECD consortium to ensure that equivalent assessments were delivered in each participating country, and that a culturally valid and internationally comparable survey would be achieved. The electronic background questionnaire and assessment materials were translated and localised by countries but verified and constructed by the OECD. The localisation phase ensured that the wording and contexts for the questions and assessment tasks were appropriate for Ireland's respondents (e.g. all assessment items mentioning currency were changed to euros; and metric rather than imperial measurements were used for most items).

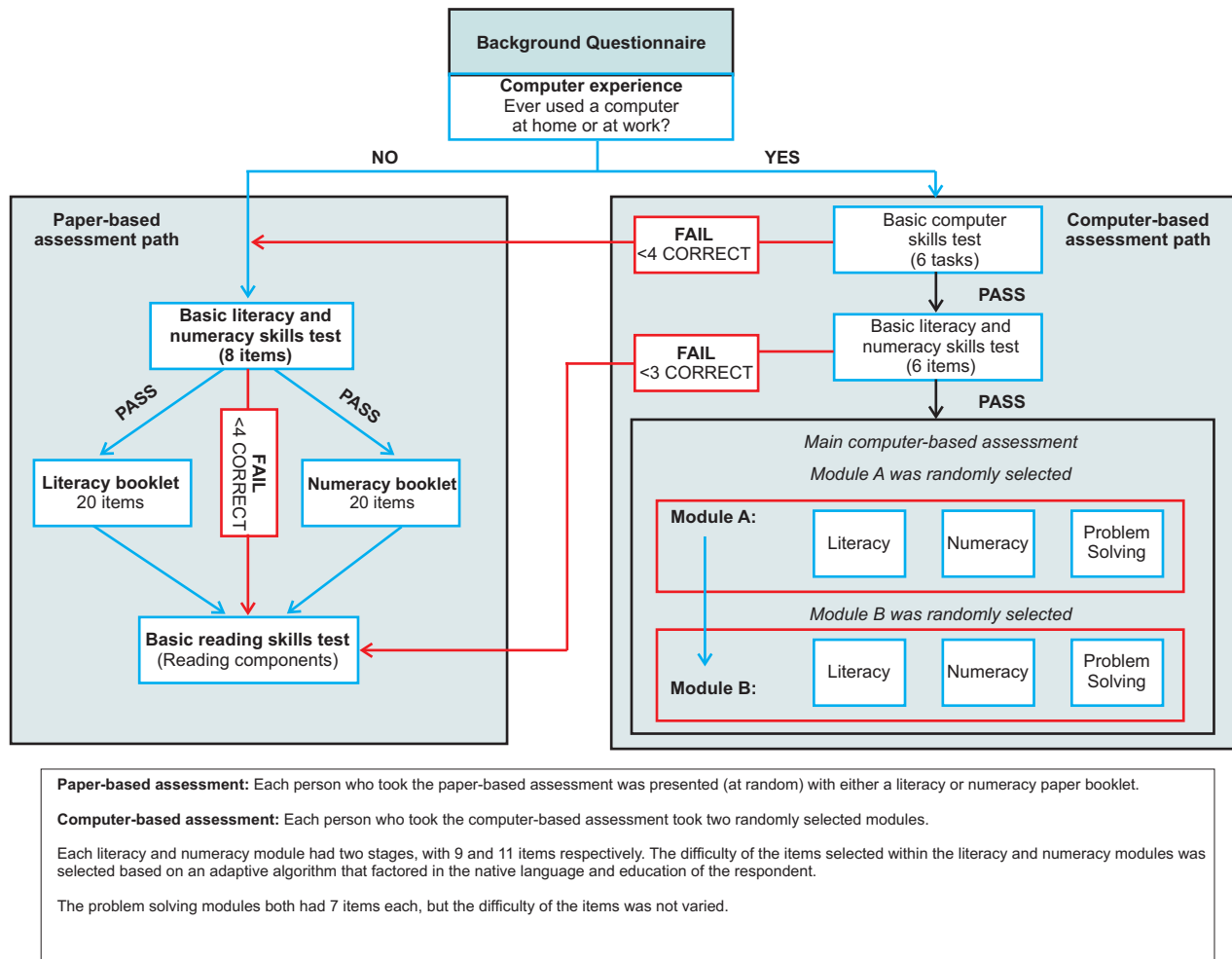
The PIAAC survey consisted of three stages. In the first stage a field interviewer used a detailed background questionnaire² to capture demographic details and information about the respondent's education, employment and skill use. The second stage consisted of two short tests: a basic computer skills test to determine whether the assessment would be taken on laptop computer or paper booklet; and a basic literacy and numeracy test to establish that the respondent had sufficient ability to complete the main proficiency assessment. The third stage of the survey was the main proficiency assessment that was taken by the respondent either on laptop computer or paper booklet in the presence of the interviewer. Those who failed the basic literacy and numeracy test in the second stage did not take the main assessment and were instead directed to a basic reading skills assessment.

PIAAC was designed (Figure 1.2) to allow respondents to take the proficiency assessment stage on paper or computer depending on their level of computer ability. Those who completed the assessment on paper were given either a literacy or numeracy test booklet. Those who took the assessment on computer were randomly assigned two of the three domains (literacy, numeracy and problem solving). As part of the assessment design, a proportion of those taking the assessment on computer were only assigned problem solving test items.

Those who took the literacy or numeracy assessment on laptop computer received test items or tasks from within each of these domains, selected for them by the computer (see Annex 1 for examples of test items). The computer factored in the respondent's level of education completed, native language and to some extent performance on previous items in selecting the test items. In this way, no respondent took all of the available items from within the domains of literacy and numeracy. The adaptive nature of the item selection process maximised the available interview time by tailoring the difficulty of assessment items as closely as possible to respondent ability. The problem solving items were not adaptively selected but organised in two fixed sets of tasks.

² The international 'master' version of the questionnaire is available here: <http://www.oecd.org/dataoecd/1/41/48442549.pdf>. The version used in Ireland can be accessed at <http://www.cso.ie/en/surveysandmethodology/education/piaac/>

Figure 1.2 PIAAC Assessment Design



ASSESSMENT DOMAINS

PIAAC assesses proficiency in three main areas or domains: literacy, numeracy and problem solving in technology-rich environments.

Literacy

PIAAC defines literacy as “understanding, evaluating, using and engaging with written texts to participate in society, to achieve one’s goals, and to develop one’s knowledge and potential” (OECD, 2013a). PIAAC broadens the definition of literacy compared to that used in previous international studies and no longer distinguishes between Prose and Document literacy. It also recognises the importance of expanding the definition of literacy to include the reading of digital texts.

There were 58 unique test items used to measure literacy in PIAAC, of which approximately 60% were drawn from previous studies, while 40% were newly created in order to extend the literacy framework more effectively to electronic texts. Importantly, nine of the items used to measure literacy in PIAAC were also used for IALS in 1994, in which Ireland participated.

Literacy: Reading Components

An important new literacy element introduced by PIAAC is the inclusion of a basic reading skills test which was specifically designed to provide more information about the abilities of those with low levels of literacy. This ‘reading components’ test was presented in paper booklet form to all respondents taking the main assessment in paper form and also to those who failed the basic literacy and numeracy skills assessment. Those who took the main assessment on the computer did not take the reading components test. Interviewers provided respondents with some instructions and examples before each section of the booklet and also timed the respondents’ progression through each section.

The PIAAC reading components assessment consisted of three sections: tests of vocabulary, sentence processing and basic passage comprehension. Both accuracy and speed were used in assessing ability. Examples of the types of items in each section are provided with summary results in Chapter 3.

The reading components assessment was an optional element of PIAAC and 21 of the 24 participating countries (i.e. all countries except for Finland, France and Japan) implemented it.

Numeracy

The definition of numeracy that underlies the PIAAC assessment is quite broad and extends beyond traditional mathematical competency to encompass the skills required for everyday tasks such as using maps and planning travel, and work-related tasks such as using spreadsheets and managing schedules. PIAAC defines numeracy “as 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” (OECD, 2013a).

There were 56 unique test items used to assess numeracy in PIAAC. About two-thirds of these items were previously used in the ALL survey, though Ireland did not participate in ALL.

Problem solving in technology-rich environments

The problem solving element of the PIAAC assessment is specifically focused on the use of Information and Communication Technology (ICT) on laptop computers across a limited set of applications. Problem solving in technology-rich environments is defined as “using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks” (OECD, 2012). The tasks presented to respondents were characterised by features of the current ICT environment and required an understanding and familiarity with common ICT tools such as spreadsheet, internet and email applications to resolve them.

This is the first time that problem solving in a technology-rich environment has been assessed on such a large scale and along a single dimension. For that reason and because of the breadth and continual evolution of technologies this assessment is seen as a starting point for future assessments in this area. In PIAAC, problem solving “focuses on the abilities to solve problems for personal, work and civic purposes by setting up appropriate goals and plans, and accessing and making use of information through computers and computer networks” (OECD, 2013a).

The problem solving assessment domain was an optional element of the PIAAC assessment and 20 of the 24 participating countries implemented it; France, Italy, Spain and Cyprus did not. The problem solving assessment was only available to those respondents who took the assessment on computer rather than paper.

PIAAC SURVEY RESULTS

The results of the survey are presented in two main ways in this report; mean scale scores and the distribution of the population across the levels of each scale.

The mean scale score provides an estimate of the average ability of the population on a particular domain (e.g. literacy). The distribution provides estimates of the proportion of the population with different levels of ability along each dimension. In isolation the average or mean score provides a limited way of understanding the level of ability within the population and it is necessary to examine the accompanying distribution to understand the factors that underlie the mean score.

Scale scores

Once the data was collected nationally, the performance of each respondent on the individual test items was analysed and transformed using Item Response Theory (IRT) methodology by Education and Testing Services (ETS) in the USA on behalf of the OECD. This methodology allows every respondent in the sample to be given a ‘scale score’ for each of the three assessment domains representing his/her level of proficiency in that domain, even though respondents will have answered different subsets of the assessment items and may not even have taken any items in a particular domain³. The scores on each scale range from 0 to 500 and the overall performance of the population and subgroups within it are considered in terms of their average or mean score on each scale.

³ Technically, each respondent is assigned a series of scores or ‘plausible values’ based on his/her performance.

Levels

Another important feature of the IRT process is the hierarchy of assessment items it creates based on the proportion of people who get each task correct or in other words the difficulty of the task. Within this hierarchy, groups of items that lie close together and share common characteristics are clustered and then scores on the scale can be aligned with specific groups of items. In this way the underlying construct (e.g. literacy) can be broken down into meaningful levels. Both the literacy and numeracy scales are broken down into five levels whereas the problem solving scale uses just three (Table 1.2).

Table 1.2 Benchmark levels for PIAAC Assessment Domains

Literacy and Numeracy		Problem solving in technology-rich environments	
Level	Range of scale scores	Level	Range of scale scores
Below Level 1	0-175	Below Level 1	0-240
Level 1	176-225	Level 1	241-290
Level 2	226-275	Level 2	291-340
Level 3	276-325	Level 3	341-500
Level 4	326-375		
Level 5	376-500		

For example, at Level 1 on the Literacy scale there are a set of tasks that respondents who score between 176 and 225 have a reasonably high probability (67%) of getting consistently correct. The corollary of this is that as respondents whose scale score puts them at Level 1 face more difficult tasks from higher levels their probability of getting these items correct diminishes. A full description of proficiency level tasks for all three domains is provided in Annex 1 of this report. The characteristics of these tasks are described below (Table 1.3) and examples of the types of tasks that are likely to be answered correctly by respondents at different levels of each proficiency scale are presented in Annex 1.

Table 1.3 Description of tasks at Level 1 on the Literacy scale

Level Scale scores	Task descriptions
1 (176 - 225)	Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information which is identical to or synonymous with the information given in the question or directive. Some tasks may require the respondent to enter personal information onto a document, in the case of some non-continuous texts. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognising basic vocabulary, evaluating the meaning of sentences, and reading of paragraph text is expected.

Levels 4 and 5

The percentage of people scoring at Level 5 in literacy and numeracy is very low across all countries, so in some tables and graphs these levels are presented together as Level 4/5.

UNDERSTANDING THE RESULTS

A number of technical issues and terms common to international assessments of this type are explained in the following section.

Comprehensive detail on the design and development of the PIAAC project is available in the OECD's technical report (OECD, 2013c). More details on the technical aspects of PIAAC in Ireland are contained within the Background Notes for this report and in a forthcoming technical report which will be available online at:

<http://www.cso.ie/en/surveysandmethodology/education/piaac/>.

Response rates and non-response bias

The comparisons made between participating countries are an important feature of this report, and in comparing the estimates of two countries the assumption is that the underlying quality of both estimates is exactly the same. However, there is considerable variation in the achieved response rates of countries that participated in PIAAC (from 45% in Sweden to 75% in Korea) and in countries with high levels of non-response there is the possibility that the estimates are not representative of the population in those countries. Although considerable efforts have been made through the use of sampling weights to adjust the samples for potential non-response bias, and the OECD has judged the overall non-response bias as low, there remains the possibility that survey estimates based on low overall response rates are biased.

As a result caution should be exercised when making comparisons with any country that has a low response rate because the estimates for that country may not be fully representative of the population.

Standard errors

Every survey produces an estimate of where the true value of the population lies along a particular dimension (e.g. literacy proficiency), and every survey estimate is subject to some degree of uncertainty or error because it is based on a sample and not the entire population. The estimated means and percentages contained in this report are accompanied by their standard errors (S.E.) to provide an indication of how close they are to the true population value. Statistically, the true population value is said to lie within a number of standard errors of the estimate with a certain degree of certainty.

Example: If males in the PIAAC survey had a mean score for literacy proficiency of 250, with a standard error of 0.9, then it could be said with 95% certainty that the actual population mean score for males lies somewhere between 248.2 and 251.8 ($250 \pm (0.9 \times 2)$).

Statistically significant differences

In this report and the OECD international report, differences between means or percentages are sometimes described as being 'statistically significant' at the 5% level. This means that the observed difference between two estimates is not due to chance and would most likely be observed again 95 times out of 100 if the survey were repeated.

Standard errors are used to determine whether there are 'statistically significant' differences between estimates. Statistically significant differences give an indication that the difference between two estimates has not occurred by chance and that the difference between two numbers would be likely to occur again if the survey was repeated. However, it is important to note that statistical significance does not necessarily imply that the difference observed between two numbers is of practical relevance or application in the real world.

Interpreting differences

In comparing the Irish data with that of other countries it is important to note that in general there is far less variation between countries than there is within countries. The OECD has noted that:

"...the variation in proficiency between the adult populations in participating countries is relatively small. Most countries (19 out of 21) have [literacy] mean scores which differ by 21 score points or less and fourteen countries have scores within the range 267 to 276 (9 score points)." (OECD, 2013a)

While there are differences in mean scores between countries the overall spread of scores across countries is not that wide and there are far larger differences between various subgroups within countries. Although statistical significance is a useful indicator when considering the difference between two estimates, it is also necessary to take the size of the difference into account. In addition statistical significance does not take account of non-sampling error or a range of other possible sources of error, including error associated with non-response. Although PIAAC non-response bias has been assessed by the OECD as minimal or low for most participating countries, the possibility of some biases cannot be ruled out. Caution should therefore be exercised and statistical differences may not necessarily be meaningful when drawing conclusions from small score point differences between countries or population groups.

Country average

The average reported in each table or graph is the average of the participating countries who are members of the OECD. The average excludes the scores of OECD partner countries, Cyprus and Russia who also participated in PIAAC. It is important to note that only 22 of the 34 OECD member countries participated in some way in this survey, so the average in the tables should be considered a study rather than an “OECD” average.

Standard deviation

In some tables the standard deviation of the mean score is also provided to give a sense of the distribution of the individual scores around the mean.

Example: If the numeracy mean score for females is 250 with a standard deviation of 40, this indicates that approximately 50% of the numeracy scores for females lie within 40 (one standard deviation) points of the mean or between 210 and 290 (250 ± 40). It also means that approximately 95% of the numeracy scores for females lie within 80 points (two standard deviations) of the mean between 170 and 330.

NATIONAL REPORT

This report for Ireland summarises some of the main international comparisons but focuses primarily on the patterns and relationships within the Irish data. The OECD has released a comprehensive report (OECD, 2013a) that presents a detailed analysis of the survey results across all participating countries in far greater detail and complexity than is possible to achieve here. The OECD international report is the first in a series of publications based on the PIAAC data that OECD has planned.

Chapter 2

PIAAC
International Results

SUMMARY RESULTS

This chapter looks at the comparative performance of adults in Ireland aged 16-65 on the three assessment domains; literacy, numeracy and problem solving in a technology-rich environment.

For both the literacy and numeracy domains a table of the mean scale scores for the participating countries is presented and then a table with the distribution of the population of each country across the levels of each scale is provided. Mean scores are not presented for problem solving because the considerable variation in the underlying sample sizes across countries makes them less meaningful (OECD, 2013a).

Adjusted and unadjusted mean scores

In the international report the OECD have presented both an adjusted and unadjusted mean score, for both the literacy and numeracy scales, as part of a 'sensitivity' analysis.

The reason for this is that each participating country had a proportion of respondents who did not complete more than five background questions or any assessment tasks for 'literacy-related' reasons (e.g. language problems, mental disability, reading difficulty). The adjusted mean score attempts to take account of this non-response by assigning a mean score of 85 to those who did not complete the survey for literacy-related reasons. The assumption here is that those who did not respond are likely to have particularly low literacy and numeracy ability in the language of the test, and that this should be reflected in the population mean scores.

In this way the adjusted mean scores provide a more complete picture of the skills of the adult population aged 16-65 in each country, even though the adjustment is based on assigning a somewhat arbitrary low score. In most countries this adjustment of the mean scores makes little difference, as most countries have very low levels of this type of non-response (2% on average across countries). In Ireland, for example, the adjustment results in a mean score change from 267 to 266 in literacy and from 256 to 255 in numeracy. However, in some countries the level of literacy related non-response is higher (e.g. Cyprus 17.7%, Flanders (Belgium) 5.2% and United States 4.2%), so the adjustment is more significant and this in turn makes a difference to the international comparison tables.

The mean score tables in this chapter for literacy and numeracy contain both the adjusted and unadjusted mean scores to allow the reader to have a sense of how literacy-related non-response impacts on each of these domains across countries. The tables showing the comparative distributions across the levels of the proficiency scales also take account of the literacy-related non-response, and assume that those who failed to respond to the survey for literacy-related reasons are at Level 1 or below on the literacy and numeracy scales.

An adjusted mean score is not provided for the problem solving scale because problem solving is only asked of a subset of the full population who have some computer ability, and an estimate of the proficiency of this group is unaffected by literacy-related non-response.

LITERACY

Mean scores and levels

The respondent's performance across the literacy test items is transformed into an overall 'mean scale score' for the domain. This score is then used to place the respondent within one of five 'levels' on the literacy scale. The scale scores corresponding with each level of the literacy scale are outlined below:

Literacy	
Level	Range of scale scores
Below Level 1	0-175
Level 1	176-225
Level 2	226-275
Level 3	276-325
Level 4	326-375
Level 5	376-500

Literacy mean proficiency score

In Ireland, adults aged 16-65 achieved an adjusted mean score of 266 (unadjusted 267) on the literacy scale, below the survey average score of 270 (Table 2.1). The adjusted mean score places Ireland 17th out of 24¹ participating countries, and in a group with Germany (267), Poland (267), Austria (266), Flanders (Belgium) (266) and Northern Ireland (265), whose literacy mean scores are not statistically different from that of Ireland. The adjusted literacy mean scores for England and Denmark lie just above this group at 270, while the scores of the United States, France, Spain and Italy are significantly lower than that of Ireland².

Distribution of adults across the levels of literacy proficiency

In assessing the distribution of all adults across the five levels of the literacy scale it is necessary to take account of the proportion of adults in each country who did not respond to the survey for literacy-related reasons. This group were assigned a score of 85 for calculating the adjusted mean score (Table 2.2), and under the assumption that they have low levels of literacy proficiency (OECD, 2013a) they were added to the bottom of the proficiency distribution (at or below Level 1).

At or below Level 1 on literacy scale

Across the countries who participated in PIAAC, 16.7% of adults score at or below Level 1 for literacy proficiency, when literacy-related non-response is taken into account. Ireland has 17.9% of adults at this level (0.5% literacy-related non-response, 4.3% below Level 1 and 13.2% at Level 1), giving a rank of 15 out of 24 countries, and statistically not different from the study average. The proportion of adults at or below Level 1 in Ireland is also not statistically different from eight other countries, including England (17.8%), Poland (18.8%), Germany (19.0%) and Northern Ireland (19.6%). Japan (6.1%) and Finland (10.6%) have the lowest proportions of adults at or below Level 1 (Table 2.2 and Figure 2.1).

¹ Although data for Russia is not included in this report, Northern Ireland and England are treated separately in these tables and hence there are 24 rather than 23 participating countries.

² Technically, the adjusted literacy mean score for Cyprus is also significantly lower than that of Ireland but as this is based on a very high level of literacy-related non-response (17.7%) it is not referred to within the text of this report for this reason.

Table 2.1 Comparison of the average literacy proficiency of adults (adjusted and unadjusted)

Adjusted				Unadjusted			
Country		Mean Score	S.E. S.D.	Country		Mean Score	S.E. S.D.
Japan	»	294 (0.7)	(45.8)	Japan	»	296 (0.7)	(39.6)
Finland	»	288 (0.7)	(50.8)	Finland	»	288 (0.7)	(50.8)
Netherlands	»	280 (0.7)	(56.3)	Netherlands	»	284 (0.7)	(48.5)
Sweden	»	279 (0.7)	(50.2)	Australia	»	280 (0.9)	(50.1)
Australia	»	277 (1.0)	(56.4)	Sweden	»	279 (0.7)	(50.2)
Estonia	»	275 (0.7)	(45.8)	Norway	»	278 (0.6)	(47.2)
Norway	»	274 (0.6)	(54.8)	Estonia	»	276 (0.7)	(44.3)
Slovak Republic	»	273 (0.6)	(41.4)	Flanders (Belgium)	»	275 (0.8)	(47.3)
Czech Republic	»	273 (1.1)	(43.5)	Czech Republic	»	274 (1.0)	(41.0)
Korea	»	272 (0.6)	(42.4)	Slovak Republic	»	274 (0.6)	(40.3)
Canada	»	272 (0.6)	(53.6)	Canada	»	273 (0.6)	(50.9)
Average	»	270 (0.2)	(50.6)	Average	»	273 (0.2)	(46.7)
Denmark	»	270 (0.6)	(49.0)	England	»	273 (1.1)	(48.4)
England	»	270 (1.0)	(52.9)	Korea	»	273 (0.6)	(41.4)
Germany	—	267 (0.9)	(52.3)	Denmark	»	271 (0.6)	(47.7)
Poland	—	267 (0.6)	(48.0)	Germany	»	270 (0.9)	(47.7)
Austria	—	266 (0.8)	(50.0)	United States	»	270 (1.0)	(49.2)
Ireland	—	266 (0.9)	(49.0)	Austria	»	269 (0.7)	(43.8)
Flanders (Belgium)	—	266 (0.9)	(62.5)	Cyprus	—	269 (0.8)	(40.3)
Northern Ireland	—	265 (1.9)	(52.7)	Northern Ireland	—	269 (1.9)	(45.8)
United States	«	262 (1.1)	(60.8)	Poland	—	267 (0.6)	(48.0)
France	«	261 (0.6)	(51.4)	Ireland	—	267 (0.9)	(47.5)
Spain	«	251 (0.7)	(51.0)	France	«	262 (0.6)	(49.0)
Italy	«	249 (1.2)	(46.2)	Spain	«	252 (0.7)	(49.0)
Cyprus	«	236 (0.9)	(79.2)	Italy	«	250 (1.1)	(44.4)

Significantly above average

Not significantly different from average

Significantly below average

» Significantly above Ireland

— Not significantly different from Ireland

« Significantly below Ireland

Notes: Statistical significance is at the five percent level. The adjusted mean shows the effect on mean scores if literacy-related non-respondents are included in the calculation and attributed a score of 85. This shows a lower bound for the mean score in each country assuming all literacy-related non-respondents have very low proficiency scores. The unadjusted mean excludes literacy-related non-respondents (missing) from the calculation.

Countries are sorted in descending order of the adjusted mean score and the unadjusted mean score.

Table 2.2 Percentage of 16-65 year-olds scoring at each level on the literacy scale (including literacy-related non-response)

Countries	Missing (Literacy-related) % S.E.	Proficiency levels						
		Below Level 1 % S.E.	Level 1 % S.E.	At or below Level 1 (incl. literacy-related non-response) % S.E.	Level 2 % S.E.	Level 3 % S.E.	Level 4 % S.E.	Level 5 % S.E.
Japan	1.2 (0.1)	0.6 (0.2)	4.3 (0.4)	» 6.1 (0.4)	22.8 (0.8)	48.6 (1.0)	21.4 (0.7)	1.2 (0.2)
Finland	0.0 (0.0)	2.7 (0.2)	8.0 (0.5)	» 10.6 (0.5)	26.5 (0.9)	40.7 (0.8)	20.0 (0.6)	2.2 (0.3)
Slovak Republic	0.3 (0.1)	1.9 (0.2)	9.7 (0.5)	» 11.9 (0.6)	36.2 (1.0)	44.4 (0.9)	7.3 (0.5)	0.2 (0.1)
Czech Republic	0.6 (0.2)	1.5 (0.3)	10.3 (0.7)	» 12.4 (0.8)	37.5 (1.6)	41.4 (1.4)	8.3 (0.8)	0.4 (0.2)
Korea	0.3 (0.1)	2.2 (0.2)	10.6 (0.5)	» 13.1 (0.5)	37.0 (0.9)	41.7 (0.9)	7.9 (0.5)	0.2 (0.1)
Sweden	0.0 (0.0)	3.7 (0.3)	9.6 (0.6)	» 13.3 (0.6)	29.1 (1.0)	41.6 (0.9)	14.9 (0.6)	1.2 (0.2)
Estonia	0.4 (0.1)	2.0 (0.2)	11.0 (0.5)	» 13.4 (0.6)	34.3 (0.7)	40.6 (0.8)	11.0 (0.5)	0.8 (0.2)
Netherlands	2.3 (0.2)	2.6 (0.3)	9.1 (0.5)	» 13.9 (0.5)	26.4 (0.7)	41.5 (0.8)	16.8 (0.6)	1.3 (0.2)
Australia	1.9 (0.2)	3.1 (0.3)	9.4 (0.5)	14.5 *	29.2 (0.7)	39.4 (0.9)	15.7 (0.7)	1.3 (0.2)
Norway	2.2 (0.2)	3.0 (0.3)	9.3 (0.6)	» 14.5 (0.6)	30.2 (0.8)	41.6 (0.8)	13.1 (0.6)	0.6 (0.1)
Denmark	0.4 (0.1)	3.8 (0.3)	11.9 (0.6)	— 16.1 (0.6)	34.0 (0.9)	39.9 (0.8)	9.6 (0.5)	0.4 (0.1)
Average	1.2 (0.0)	3.3 (0.1)	12.2 (0.1)	— 16.7 (0.1)	33.3 (0.2)	38.2 (0.2)	11.1 (0.1)	0.7 (0.0)
Austria	1.8 (0.2)	2.5 (0.3)	12.8 (0.7)	— 17.1 (0.6)	37.2 (0.9)	37.3 (0.9)	8.2 (0.5)	0.3 (0.1)
Canada	0.9 (0.1)	3.8 (0.2)	12.6 (0.5)	17.3 *	31.7 (0.7)	37.3 (0.7)	12.8 (0.5)	0.9 (0.1)
England	1.4 (0.2)	3.3 (0.4)	13.1 (0.7)	— 17.8 (0.7)	33.1 (1.0)	36.0 (1.0)	12.4 (0.7)	0.8 (0.2)
Ireland	0.5 (0.1)	4.3 (0.4)	13.2 (0.8)	— 17.9 (0.9)	37.6 (0.9)	36.0 (0.9)	8.1 (0.5)	0.4 (0.1)
Poland	0.0 (0.0)	3.9 (0.3)	14.8 (0.6)	— 18.8 (0.6)	36.5 (0.9)	35.0 (0.9)	9.0 (0.5)	0.7 (0.1)
Germany	1.5 (0.2)	3.3 (0.4)	14.2 (0.7)	— 19.0 (0.8)	33.9 (1.0)	36.4 (0.9)	10.2 (0.6)	0.5 (0.2)
Flanders (Belgium)	5.2 (0.2)	2.7 (0.3)	11.3 (0.5)	— 19.2 (0.6)	29.6 (0.8)	38.8 (0.9)	11.9 (0.5)	0.4 (0.2)
Northern Ireland	2.2 (0.3)	2.5 (0.5)	14.9 (0.9)	— 19.6 (1.1)	36.2 (1.5)	34.3 (1.6)	9.4 (0.6)	0.5 (0.2)
United States	4.2 (0.6)	3.9 (0.5)	13.6 (0.7)	« 21.7 (0.8)	32.6 (1.2)	34.2 (1.0)	10.9 (0.7)	0.6 (0.2)
France	0.8 (0.1)	5.3 (0.3)	16.2 (0.5)	« 22.4 (0.5)	35.9 (0.8)	34.0 (0.7)	7.4 (0.4)	0.3 (0.1)
Spain	0.8 (0.1)	7.2 (0.5)	20.3 (0.8)	« 28.3 (0.8)	39.1 (0.7)	27.8 (0.7)	4.6 (0.4)	0.1 (0.1)
Italy	0.7 (0.2)	5.5 (0.6)	22.2 (1.0)	« 28.3 (1.1)	42.0 (1.0)	26.4 (1.0)	3.3 (0.4)	0.1 (0.0)
Cyprus	17.7 (0.4)	1.6 (0.2)	10.3 (0.5)	« 29.5 (0.6)	33.0 (0.9)	32.1 (0.9)	5.2 (0.4)	0.2 (0.1)

Significantly above average

Not significantly different from average

Significantly below average

» Significantly above Ireland

— Not significantly different from Ireland

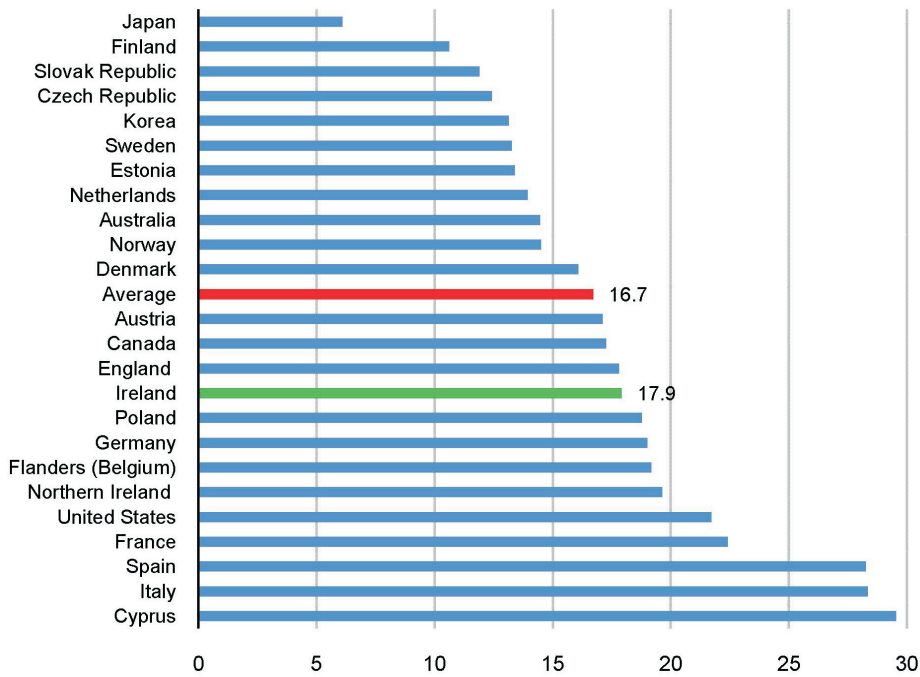
« Significantly below Ireland

Notes: Adults in the missing category did not receive a proficiency score because they were not able to answer more than five questions in the background questionnaire due to language difficulties or learning and mental disabilities (literacy related non-response).

* It was not possible to generate a S.E. for these estimates as the Australian and Canadian public use files were not available.

Countries are sorted in ascending order of the proportion of adults at or below Level 1 (including literacy-related non-response)

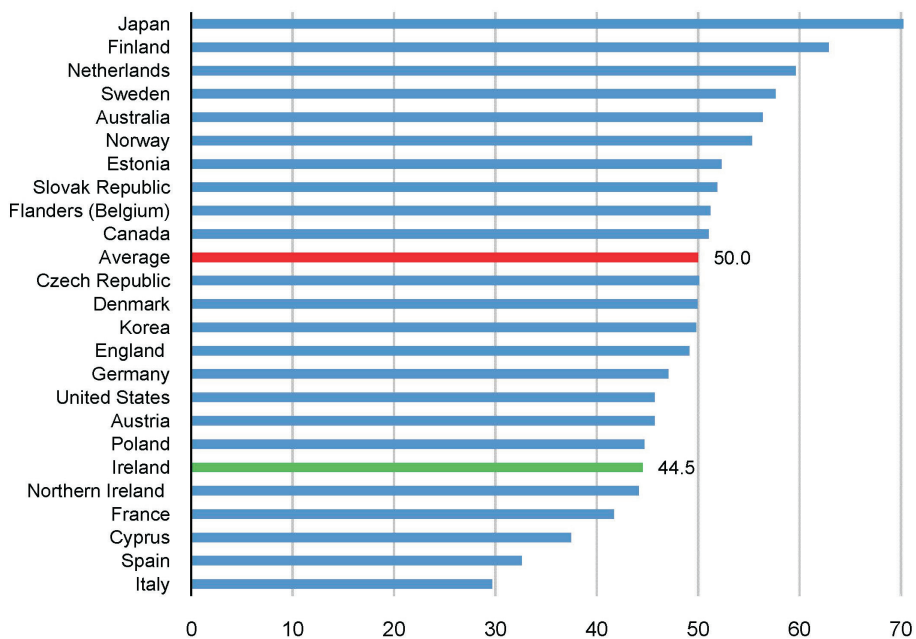
Figure 2.1
Percentage of adults (16-65) at or below Level 1
of literacy proficiency



Literacy - Levels 3, 4 and 5

At the top end of the literacy scale, on average half (50.0%) of adults in the participating countries score at Levels 3, 4 or 5, compared to 44.5% in Ireland. Ireland has statistically the same proportion at the upper levels of literacy proficiency as Northern Ireland (44.2%), Poland (44.7%), Austria (45.7%) and the United States (45.7%) (Figure 2.2). Japan (71.1%) and Finland (62.9%) had the highest proportion of adults at Levels 3, 4 and 5.

Figure 2.2
Percentage of adults (16-65) at Levels 3-4-5
of literacy proficiency

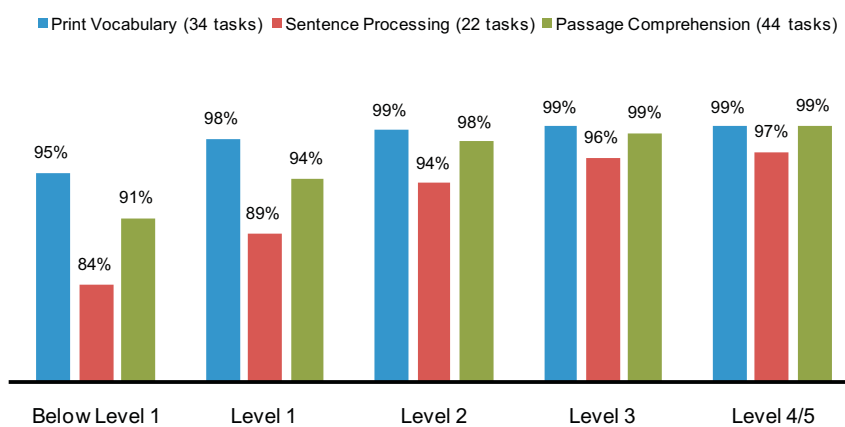


LITERACY: READING COMPONENTS

An important new element of the PIAAC survey is the introduction of an assessment designed to examine basic literacy skills. This 'reading components' assessment was presented in a single booklet to all those who took the main assessment on paper as well as those who failed the literacy and numeracy basic skills assessment in the computer-based version (1,868 respondents). The specific aim of this test was to learn more about the skills of those with low levels of literacy.

This section provides information about the performance of those at the lowest levels of literacy proficiency as measured by PIAAC. There has been a common misconception that those at the lowest levels of literacy proficiency, typically Level 1 or below have little or no literacy skill. In fact the reading component tests administered as part of the PIAAC survey show that even at the lowest levels of literacy proficiency there are significant levels of reading skill (Figure 2.3).

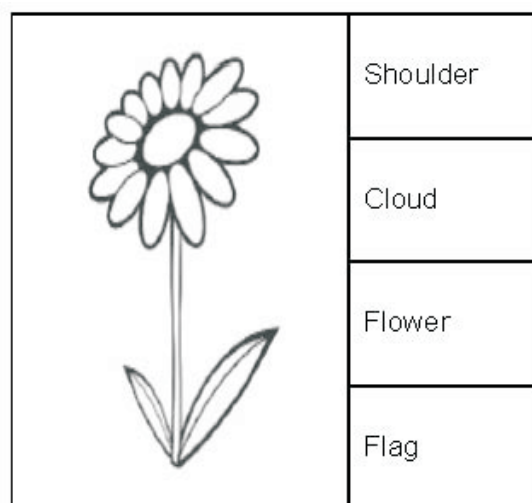
Figure 2.3
Average percentage of reading component tasks answered correctly by level of literacy (Ireland)



The PIAAC components assessment consisted of three elements; tests of vocabulary, sentence-processing and basic passage comprehension.

1. Word Meaning (Print Vocabulary)

In the first part of the reading components assessment respondents were required to select from four words, the one which matched the accompanying picture. There were 34 tasks in this section (see example below).



The following table (Table 2.3) shows the average percent correct for the 34 items that adults at different levels of literacy proficiency got correct. These tasks are relatively easy for most respondents, and a very high percentage (98%+) of items were answered correctly across countries by those who score between Levels 1 and 5 on the literacy proficiency scale.

Furthermore, those at the lowest level of literacy proficiency (below Level 1) got on average 96% of the items correct, or approximately 33 out of 34 word-picture matches. In Ireland those whose literacy ability is below Level 1 got 95% of these items correct on average.

Table 2.3 Average percent correct of Print Vocabulary tasks by literacy proficiency level

	Literacy Proficiency				
	Below Level 1	Level 1	Level 2	Level 3	Level 4/5
Print Vocabulary (34 tasks)	% correct	% correct	% correct	% correct	% correct
Countries					
Slovak Republic	100	100	100	100	100
Czech Republic	99	100	100	100	100
Netherlands	98	99	100	100	100
Poland	98	99	99	100	100
Estonia	98	99	100	100	100
Korea	97	98	99	100	100
Italy	97	98	99	99	99
Germany	96	99	100	100	100
Australia	96	99	100	100	100
Average	96	98	99	100	100
Spain	96	99	99	100	100
England	96	98	99	100	100
Sweden	96	97	99	100	100
Denmark	96	99	99	100	100
Cyprus	96	99	100	100	100
Austria	95	98	99	100	100
Ireland	95	98	99	99	99
Northern Ireland	94	98	99	100	100
Flanders (Belgium)	94	99	100	99	100
Canada	94	98	99	100	100
Norway	91	96	99	99	100
United States	90	96	99	100	100

Notes: Finland, France and Japan did not participate in the reading components assessment. Countries are sorted in descending order of percentage correct below Level 1.

2. Sentence Processing

In the second part of the reading component test respondents had to read short sentences and decide whether or not they made sense. There were 22 sentences requiring a 'Yes' or 'No' answer (see example below).

Three girls ate the song	YES	NO
The man drove the green car	YES	NO
A comfortable pillow is soft and rocky	YES	NO
The lightest balloon floated in the bright sky	YES	NO

This set of tasks proved more difficult, and the percentage answered correctly on average ranged from 90% for those at Level 1 on the literacy scale, to 98% for those at Level 5 (Table 2.4). Those at the lowest level of literacy (below Level 1) answered 84% of the items correctly on average across countries, or approximately 18 out of 22 sentences. In Ireland those at the lowest level of literacy proficiency (below Level 1) also answered 84% of the items correctly on average.

Table 2.4 Average percent correct of Sentence Processing tasks by literacy proficiency level

	Literacy Proficiency				
	Below Level 1	Level 1	Level 2	Level 3	Level 4/5
Sentence Processing (22 tasks)	% correct	% correct	% correct	% correct	% correct
Countries					
Slovak Republic	100	100	100	100	100
Czech Republic	91	93	95	97	96
Poland	90	93	95	97	98
Denmark	87	92	95	97	98
Italy	87	93	96	97	98
Spain	87	92	95	97	98
Estonia	86	93	95	97	98
Netherlands	86	89	94	96	98
Ireland	84	89	94	96	97
Korea	84	89	94	97	98
Average	84	90	95	97	98
Northern Ireland	84	90	95	97	98
Sweden	84	90	95	97	99
Cyprus	82	89	93	94	95
Australia	81	89	95	97	98
England	81	87	93	95	98
Canada	79	88	93	97	98
Flanders (Belgium)	79	90	94	96	98
Germany	79	89	95	98	99
Austria	79	90	95	98	99
Norway	78	86	93	96	98
United States	72	83	93	96	98

Notes: Finland, France and Japan did not participate in the reading components assessment. Countries are sorted in descending order of percentage correct below Level 1.

3. Passage Comprehension

The final part of the reading components booklet contained four paragraphs of text. Respondents were asked to read each passage and when they came to the underlined alternatives, circle the word that made sense. There were 44 word-pair tasks spread across the four passages to complete.

Example:

Yesterday, it was announced that the cost of riding the bus will increase. The price will go up by twenty percent starting next wife/month. As someone who takes the bus every day, I am upset by this foot/increase. I understand that the cost of diesel/student has risen. I also understand that passengers have to pay a fair price/snake for a bus service. I am willing to pay a little more because I rely on the bus to get to object/work. But an increase/uncle of twenty percent is too much.

As with the other reading component elements, the vast majority of people in all participating countries found these items quite easy. For those at Levels 1 to 5 of literacy proficiency the average percentage correct ranges from 88% for Level 1 to 100% for Level 5 (Table 2.5). Indeed, even at the lowest level of literacy ability (below Level 1) 88% of the items were answered correctly on average, or approximately 39 out of the 44 word-pair tasks. Adults in Ireland who were below Level 1 for literacy proficiency answered 91% of these tasks correctly on average.

Table 2.5 Average percent correct of Passage Comprehension tasks by literacy proficiency level

Passage Comprehension (44 tasks)	Literacy Proficiency				
	Below Level 1	Level 1	Level 2	Level 3	Level 4/5
	% correct	% correct	% correct	% correct	% correct
Countries					
Slovak Republic	99	99	99	100	100
Poland	93	97	98	99	100
Netherlands	91	95	98	99	100
Ireland	91	94	98	99	99
Estonia	91	96	98	99	99
Denmark	91	95	97	99	100
Australia	90	96	99	100	100
Northern Ireland	90	96	97	98	100
Spain	89	95	98	99	100
Flanders (Belgium)	89	95	98	99	99
England	88	94	98	99	100
Average	88	94	98	99	100
Czech Republic	87	94	98	99	99
Sweden	86	96	99	99	100
Germany	85	93	97	99	100
Canada	85	94	98	99	99
Korea	84	90	97	99	100
Italy	84	90	95	98	100
Austria	84	92	97	99	100
Cyprus	83	94	97	99	100
United States	82	90	97	100	100
Norway	81	93	98	99	100

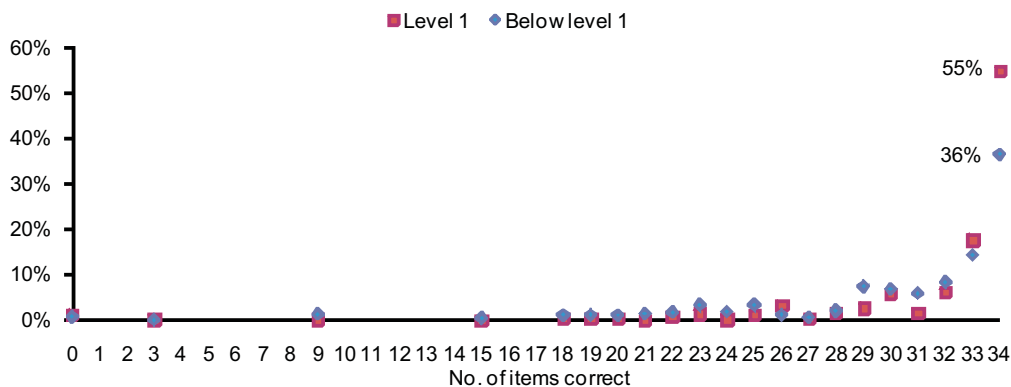
Notes: Finland, France and Japan did not participate in the reading components assessment.
Countries are sorted in descending order of percentage correct below Level 1.

Ireland: Focus on those at or below Level 1 of literacy proficiency

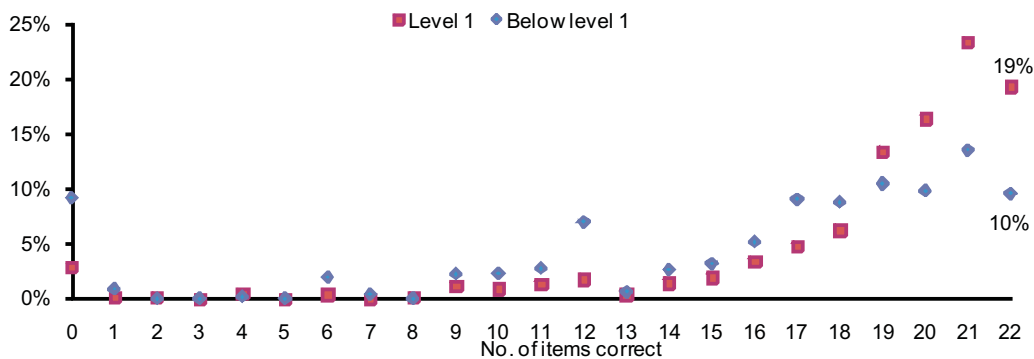
Within the lower levels of literacy proficiency there is considerable uniformity in the percentage of items correctly answered across the reading component tasks, though there are some differences. The graphs below (Figure 2.4) show the total number of items correct for each test and the percentage of those at Level 1 and below Level 1 who received each total score.

Those at Level 1 on the literacy scale are more likely than those below Level 1 to get most or all of the items correct on each component test. For example, 55% of those at Level 1 got all (34) of the Print Vocabulary items correct compared to 36% of those below Level 1. Similarly, 19% of those at Level 1 got all (22) of the Sentence Processing items correct compared to 10% of those below Level 1. The pattern is the same for the Passage Comprehension test, with 27% of those at Level 1 getting all (44) of the items correct compared to 10% of those below Level 1.

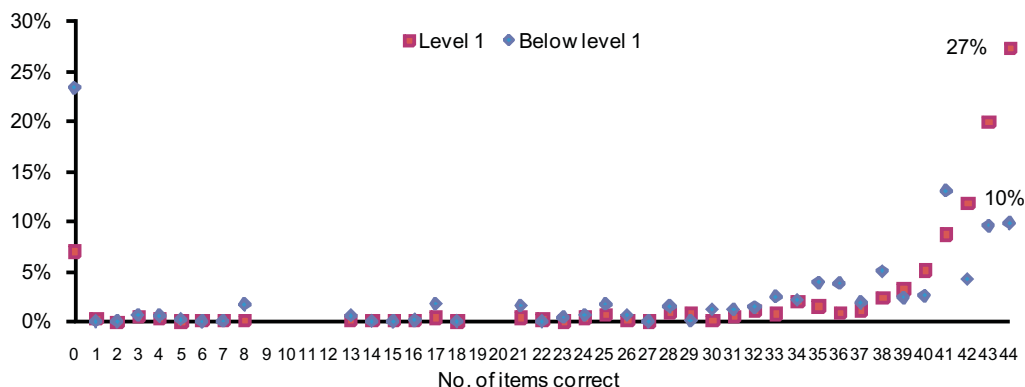
Figure 2.4
Print Vocabulary: Percentage of those at or below Level 1 of literacy proficiency by number of items answered correctly (Ireland)



Sentence Processing: Percentage of those at or below Level 1 of literacy proficiency by number of items answered correctly (Ireland)



Passage Comprehension: Percentage of those at or below Level 1 of literacy proficiency by number of items answered correctly (Ireland)



NUMERACY

Mean scores and levels

The respondent's performance across the numeracy test items is transformed into an overall 'mean scale score' for the domain. This score is then used to place the respondent within one of five 'levels' on the numeracy scale. The scale scores corresponding with each level of the numeracy scale are outlined below:

Numeracy	
Level	Range of scale scores
Below Level 1	0-175
Level 1	176-225
Level 2	226-275
Level 3	276-325
Level 4	326-375
Level 5	376-500

Numeracy mean proficiency score

On the numeracy scale, adults in Ireland aged 16–65 have an adjusted scale score of 255 (256 unadjusted) which is significantly below the PIAAC average score of 266 (269 unadjusted), and places Ireland 19th out of 24 participating countries. The numeracy mean score for Ireland is not significantly different from the mean scores of Northern Ireland (255) and France (253), but is significantly higher than those of Italy, United States and Spain (Table 2.6). Japan and Finland scored the highest with 286 and 282 respectively.

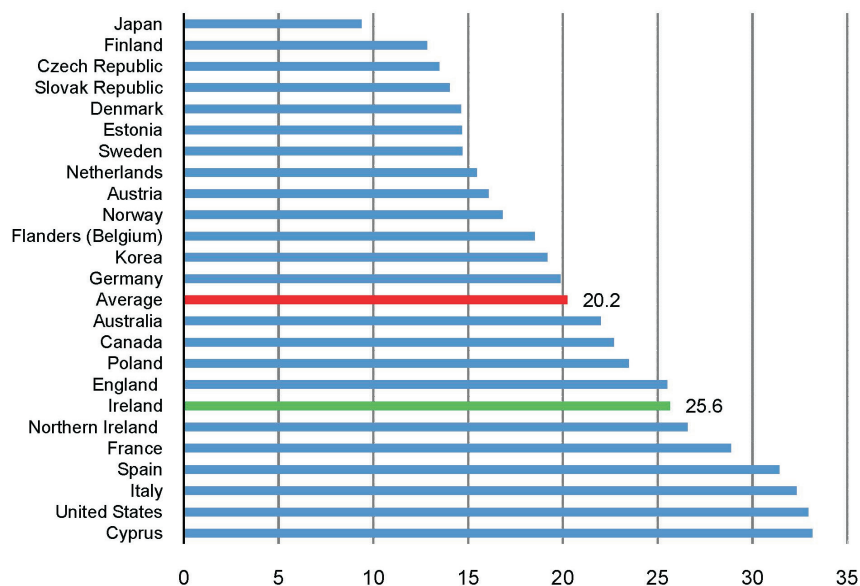
Distribution of adults across the levels of numeracy proficiency

Following the methodology outlined for literacy, those who did not respond to the survey for literacy-related reasons are added to the bottom of the proficiency distribution for numeracy in the same way as they were assigned a score of 85 for calculating the numeracy adjusted mean score.

At or below Level 1

Just over 25% (25.6%) of adults in Ireland score at or below Level 1 for numeracy compared to just over 20% (20.2%) on average across participating countries, when literacy-related non-response is accounted for. This places Ireland 18th out of 24 countries, statistically not different from Poland (23.5%), England (25.5%) and Northern Ireland (26.6%), but with a lower proportion at this level than France, Spain, Italy, and the United States (Figure 2.5). Japan is the only country to have less than 10% of adults at or below Level 1 on the numeracy scale.

Figure 2.5
Percentage of adults (16-65) at or below Level 1 of numeracy proficiency



Numeracy - Levels 3, 4 and 5

At the top end of the numeracy proficiency scale 36.3% of adults in Ireland are at Levels 3, 4 and 5 compared to 46.8% on average across participating countries. From a statistical perspective, the proportion of adults at Levels 3, 4 and 5 in Ireland is the same as that of Northern Ireland (37.5%), France (37.3%) and the United States (34.4%) but larger than Italy (28.9%) and Spain (28.5%) (Figure 2.6).

Figure 2.6
Percentage of adults (16-65) at Levels 3-4-5
of numeracy proficiency

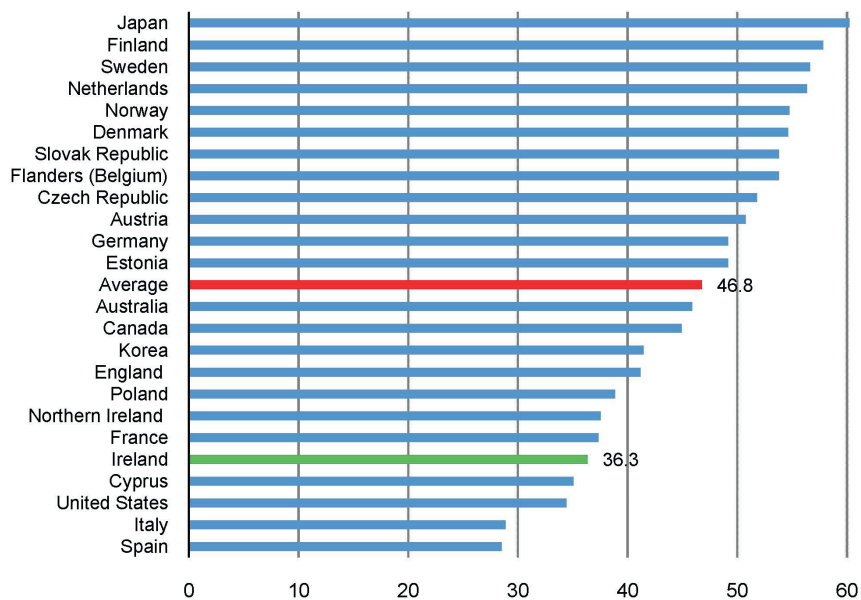


Table 2.6 Comparison of the average numeracy proficiency of adults (adjusted and unadjusted)

Adjusted			Unadjusted				
Country	Mean Score	S.E.	S.D.	Country	Mean Score	S.E.	S.D.
Japan	»	286 (0.7)	(48.9)	Japan	»	288 (0.7)	(43.7)
Finland	»	282 (0.7)	(52.2)	Finland	»	282 (0.7)	(52.2)
Sweden	»	279 (0.8)	(54.9)	Flanders (Belgium)	»	280 (0.8)	(51.4)
Denmark	»	278 (0.7)	(52.4)	Netherlands	»	280 (0.7)	(51.4)
Netherlands	»	276 (0.7)	(58.5)	Sweden	»	279 (0.8)	(54.9)
Slovak Republic	»	275 (0.8)	(48.2)	Norway	»	278 (0.8)	(55.1)
Czech Republic	»	275 (1.0)	(46.2)	Denmark	»	278 (0.7)	(51.2)
Norway	»	274 (0.8)	(61.6)	Slovak Republic	»	276 (0.8)	(47.2)
Estonia	»	272 (0.5)	(46.6)	Czech Republic	»	276 (0.9)	(43.8)
Austria	»	272 (0.9)	(54.9)	Austria	»	275 (0.9)	(49.1)
Flanders (Belgium)	»	270 (0.9)	(66.1)	Estonia	»	273 (0.5)	(45.2)
Germany	»	269 (1.0)	(57.0)	Germany	»	272 (1.0)	(52.7)
Average	»	266 (0.2)	(54.7)	Average	»	269 (0.2)	(51.3)
Australia	»	264 (1.0)	(61.4)	Australia	»	268 (1.0)	(56.7)
Canada	»	264 (0.7)	(58.0)	Canada	»	265 (0.7)	(55.8)
Korea	»	263 (0.7)	(46.1)	Cyprus	»	265 (0.8)	(46.7)
Poland	»	260 (0.8)	(50.9)	Korea	»	263 (0.7)	(45.3)
England	»	259 (1.0)	(58.4)	England	»	262 (1.1)	(54.9)
Northern Ireland	—	255 (1.8)	(56.5)	Poland	»	260 (0.8)	(50.9)
Ireland	—	255 (1.0)	(54.8)	Northern Ireland	»	259 (1.8)	(51.1)
France	—	253 (0.6)	(58.0)	Ireland	—	256 (1.0)	(53.7)
Italy	«	246 (1.2)	(51.7)	France	—	254 (0.6)	(56.2)
United States	«	246 (1.2)	(65.3)	United States	—	253 (1.2)	(57.1)
Spain	«	245 (0.6)	(53.1)	Italy	«	247 (1.1)	(50.2)
Cyprus	«	233 (0.9)	(80.3)	Spain	«	246 (0.6)	(51.4)

Significantly above average

Not significantly different from average

Significantly below average

» Significantly above Ireland

— Not significantly different from Ireland

« Significantly below Ireland

Notes: Statistical significance is at the five percent level. The adjusted mean shows the effect on mean scores if literacy-related non-respondents are included in the calculation and attributed a score of 85. This shows a lower bound for the mean score in each country assuming all literacy-related non-respondents have very low proficiency scores. The unadjusted mean excludes literacy-related non-respondents (missing) from the calculation.

Countries are sorted in descending order of the adjusted mean score and the unadjusted mean score.

Table 2.7 Percentage of 16-65 year-olds scoring at each level on the numeracy scale (including literacy-related non-response)

Countries	Missing (Literacy- related) % S.E.	Proficiency levels						
		Below Level 1		At or below Level 1 (incl. literacy-related non-response)				
		% S.E.	% S.E.	Level 1 % S.E.	Level 2 % S.E.	Level 3 % S.E.	Level 4 % S.E.	Level 5 % S.E.
Japan	1.2 (0.1)	1.2 (0.2)	7.0 (0.5)	» 9.4 (0.6)	28.1 (0.8)	43.7 (0.8)	17.3 (0.7)	1.5 (0.2)
Finland	0.0 (0.0)	3.1 (0.3)	9.7 (0.5)	» 12.8 (0.5)	29.3 (0.7)	38.4 (0.8)	17.2 (0.6)	2.2 (0.3)
Czech Republic	0.6 (0.2)	1.7 (0.3)	11.1 (0.8)	» 13.5 (0.8)	34.7 (1.2)	40.4 (1.3)	10.6 (0.7)	0.9 (0.3)
Slovak Republic	0.3 (0.1)	3.5 (0.3)	10.3 (0.6)	» 14.0 (0.6)	32.2 (0.9)	41.1 (1.0)	11.8 (0.7)	0.8 (0.2)
Denmark	0.4 (0.1)	3.4 (0.3)	10.8 (0.5)	» 14.6 (0.6)	30.7 (0.8)	38.0 (0.7)	14.9 (0.5)	1.7 (0.2)
Estonia	0.4 (0.1)	2.4 (0.2)	11.9 (0.5)	» 14.7 (0.5)	36.2 (0.6)	38.0 (0.6)	10.4 (0.4)	0.8 (0.2)
Sweden	0.0 (0.0)	4.4 (0.4)	10.3 (0.7)	» 14.7 (0.7)	28.7 (1.1)	38.0 (1.1)	16.7 (0.6)	1.9 (0.3)
Netherlands	2.3 (0.2)	3.5 (0.3)	9.7 (0.6)	» 15.5 (0.6)	28.2 (0.8)	39.4 (0.9)	15.6 (0.6)	1.3 (0.2)
Austria	1.8 (0.2)	3.4 (0.3)	10.9 (0.6)	» 16.1 (0.7)	33.1 (0.9)	37.2 (1.0)	12.5 (0.6)	1.1 (0.2)
Norway	2.2 (0.2)	4.3 (0.3)	10.2 (0.5)	» 16.8 (0.6)	28.4 (0.8)	37.4 (0.8)	15.7 (0.7)	1.7 (0.3)
Flanders (Belgium)	5.2 (0.2)	3.0 (0.3)	10.4 (0.5)	» 18.5 (0.6)	27.7 (0.7)	36.8 (0.9)	15.4 (0.7)	1.6 (0.2)
Korea	0.3 (0.1)	4.2 (0.3)	14.7 (0.6)	» 19.2 (0.6)	39.4 (1.0)	34.6 (0.9)	6.6 (0.5)	0.2 (0.1)
Germany	1.5 (0.2)	4.5 (0.4)	13.9 (0.7)	» 19.9 (0.7)	31.0 (0.8)	34.9 (0.9)	13.0 (0.6)	1.2 (0.2)
Average	1.2 (0.0)	5.0 (0.1)	14.0 (0.1)	» 20.2 (0.1)	33.0 (0.2)	34.4 (0.2)	11.4 (0.1)	1.1 (0.0)
Australia	1.9 (0.2)	5.7 (0.4)	14.4 (0.7)	22.0 *	32.1 (0.9)	32.6 (0.9)	11.7 (0.6)	1.5 (0.2)
Canada	0.9 (0.1)	5.9 (0.3)	16.4 (0.4)	22.7 *	31.9 (0.5)	32.4 (0.7)	11.3 (0.4)	1.3 (0.2)
Poland	0.0 (0.0)	5.9 (0.4)	17.6 (0.6)	— 23.5 (0.7)	37.7 (0.9)	30.5 (0.9)	7.7 (0.5)	0.7 (0.1)
England	1.4 (0.2)	6.4 (0.5)	17.8 (0.9)	— 25.5 (0.9)	33.3 (1.0)	29.8 (1.1)	10.4 (0.8)	0.9 (0.2)
Ireland	0.5 (0.1)	7.1 (0.5)	18.1 (0.8)	— 25.6 (0.9)	38.0 (0.9)	28.8 (0.9)	7.0 (0.6)	0.6 (0.1)
Northern Ireland	2.2 (0.3)	5.6 (0.8)	18.7 (1.2)	— 26.6 (1.5)	35.9 (1.1)	29.0 (1.1)	7.8 (0.7)	0.7 (0.2)
France	0.8 (0.1)	9.1 (0.3)	18.9 (0.6)	« 28.9 (0.6)	33.8 (0.7)	29.0 (0.6)	7.8 (0.3)	0.5 (0.1)
Spain	0.8 (0.1)	9.5 (0.5)	21.1 (0.7)	« 31.4 (0.7)	40.1 (0.9)	24.5 (0.7)	4.0 (0.3)	0.1 (0.1)
Italy	0.7 (0.2)	8.0 (0.6)	23.7 (1.0)	« 32.3 (1.1)	38.8 (1.1)	24.4 (1.0)	4.3 (0.4)	0.2 (0.1)
United States	4.2 (0.6)	9.1 (0.6)	19.6 (0.8)	« 32.9 (0.9)	32.6 (1.0)	25.9 (0.8)	7.8 (0.6)	0.7 (0.2)
Cyprus	17.7 (0.4)	3.4 (0.3)	12.1 (0.7)	« 33.2 (0.7)	31.8 (0.9)	28.4 (0.8)	6.3 (0.4)	0.3 (0.1)

Significantly above average

Not significantly different from average

Significantly below average

» Significantly above Ireland
 — Not significantly different from Ireland
 « Significantly below Ireland

Notes: Adults in the missing category did not receive a proficiency score because they were not able to answer more than five questions in the background questionnaire due to language difficulties or learning and mental disabilities (literacy related non-response).

* It was not possible to generate a S.E. for these estimates as the Australian and Canadian public use files were not available.

Countries are sorted in ascending order of the proportion of adults at or below Level 1 (including literacy-related non-response)

PROBLEM SOLVING IN TECHNOLOGY-RICH ENVIRONMENTS

One of the most innovative features of the PIAAC survey was the introduction for the first time of an assessment designed to measure the extent to which adults use and are familiar with Information and Communication Technologies (ICT).

In this assessment respondents had to find a solution to a problem using information and tools presented to them in simulated computer environments. These tasks were based on the use of common computer applications, such as internet, e-mail, word processing and spreadsheet tools³ (see Annex 1 for sample assessment items). The scenarios involved varying levels of cognitive complexity. The solution path could entail a few or many steps, with or without built-in impasses. The problem statement could be more or less explicit; and arriving at a solution could demand greater or lesser levels of self-monitoring, inferential reasoning, and evaluation of the relevance and credibility of information (OECD, 2013a).

As this is the first time that items of this nature have been developed a number of important caveats apply to the interpretation of the results.

- The problem solving domain only used 14 items compared to the literacy and numeracy assessments which both drew from a pool of 58 and 56 items respectively. For this reason the same breadth of measurement as achieved for literacy and numeracy could not be achieved for problem solving. This is also the reason why only three problem solving levels have been established compared to five for the literacy and numeracy scales.
- This assessment was first designed in 2007/2008 at a time when touch screen technology for personal computing was not as widespread as it is currently. The recent proliferation of smart phones and tablet computers which do not rely on a keyboard and mouse interface may have had an effect on the ability of the assessment to measure the underlying proficiency.
- In some countries, including Ireland, sizeable proportions of the target population who indicated some previous computer experience, opted not to take the assessment on computer. As a result the problem solving in technology-rich environments estimates for some countries are not representative of all those with computer experience. This, according to the OECD, militates against the use of mean scores across countries to compare proficiency (OECD, 2013a), as the estimates are not based on comparable cross-country samples. For this reason the OECD has used the percentages at the different levels of proficiency to compare countries rather than the mean scores.

The PIAAC problem solving assessment produces three related pieces of information. In the first instance it provides a simple estimate of the percentage of the adult population who have some computer experience. Secondly, it provides an estimate of the percentage of the adult population who are sufficiently comfortable with ICT to use them to complete the computer-based assessment, and thirdly it provides a measure of the problem solving in technology-rich environments proficiency of those adults who undertook the assessment.

Computer experience

In Ireland 10% of adults indicated no computer experience either at work or at home, just above the average of 8%. Nearly 5% of adults in Ireland failed the basic computer skills assessment⁴, which is the same as the study average (4.9%) (Table 2.8). The proportions of adults (16-65) across the levels of the problem solving scale in Ireland are broadly similar to the average and also quite similar to Northern Ireland and England. However, as mentioned above, the proportion of adults 16-65 opting not to take the computer-based assessment and for whom no problem solving data is available must be taken into account.

³ The look-and-feel of the tools presented to respondents in the problem solving assessment was similar but not identical to commercially available software.

⁴ The basic computer skills assessment was a set of six basic computer tasks used to determine if the respondent had the necessary skills to proceed to take the main skills assessment on a laptop computer. Tasks included using drop-down menus, scroll bars for navigation and using a mouse to highlight text. Respondents who failed this test were routed to a paper-based skills assessment of literacy or numeracy

'Opt-outs'

A difficulty in analysing the problem solving results relates to the proportion of people who opted for a paper-based rather than computer assessment even though they had previously indicated some computer experience, either at work or at home. For this reason the data on the problem solving scale does not reflect the proficiency of all those with computer experience in each country, and this makes cross-country comparisons problematic.

In Ireland 17.4% opted for a paper-based assessment compared to the study average of 9.9% even though they had previously indicated some computer experience. Although the reasons why such a large proportion 'opted-out' of the computer-based assessment are not known, the OECD suggest that across countries this group either did not have the computer skills or the confidence in those skills to attempt the computer-based assessment (OECD, 2013a). Further analysis of this group across countries suggests that in general they have less daily exposure to ICT technology in their everyday lives and at work than those who opted to take the assessment on computer. The literacy and numeracy scores for this group are lower on average than those who took the assessment on computer, but higher than those who failed the basic ICT skills assessment (OECD, 2013a).

In Ireland, the literacy (262) and numeracy (243) scores of those who opted-out of the computer-based assessment are significantly higher than those who failed the ICT and significantly lower on average than the literacy (276) and numeracy (269) mean scores of those who took the computer-based assessment. This suggests that, in Ireland, those who opted-out of the computer-based assessment have lower proficiency levels than those who took the computer-based path. However, it should also be noted that almost 40% (39.5%) of the group who opted out of the computer-based assessment in Ireland scored at levels 3, 4 and 5 on the literacy scale (international average 41.5%).

The known characteristics of those who opted-out of the computer-based assessment internationally, suggest that while this group are generally more proficient than those who failed the basic computer skills test, they are still likely to have relatively low levels of the problem solving in technology-rich environments proficiency, but it is not possible to say with confidence where along the proficiency scale they would have fallen if they had taken the test.

Therefore, the percentages at each level of the problem solving in technology-rich environments scale are presented below for those who took the computer-based assessment, along with the percentages of those with no computer experience, those who failed the basic computer skills test and those who opted out of a computer-based assessment to provide a picture of the skills of the full population in each country.

Table 2.8 ICT experience of adults (16-65) and distribution across levels of the problem solving scale for Ireland and selected countries

	Ireland	Northern Ireland	England	Study Average
	% S.E.	% S.E.	% S.E.	% S.E.
No computer experience	10.1 (0.4)	10.0 (0.6)	4.1 (0.3)	8.0 (0.1)
Opted out of computer based assessment	17.4 (0.7)	2.3 (0.3)	4.6 (0.4)	9.9 (0.1)
Failed basic computer skills test	4.7 (0.4)	5.8 (0.4)	5.8 (0.4)	4.9 (0.1)
Missing	0.6 (0.1)	2.2 (0.3)	1.6 (0.2)	1.5 (0.0)
Below Level 1	12.6 (0.7)	16.4 (1.5)	15.1 (0.8)	12.3 (0.1)
Level 1	29.5 (0.9)	34.5 (1.2)	33.8 (1.1)	29.4 (0.2)
Level 2	22.1 (0.8)	25.0 (1.2)	29.3 (0.9)	28.2 (0.2)
Level 3	3.1 (0.3)	3.7 (0.6)	5.7 (0.5)	5.8 (0.1)
	100	100	100	100

Mean scores and levels

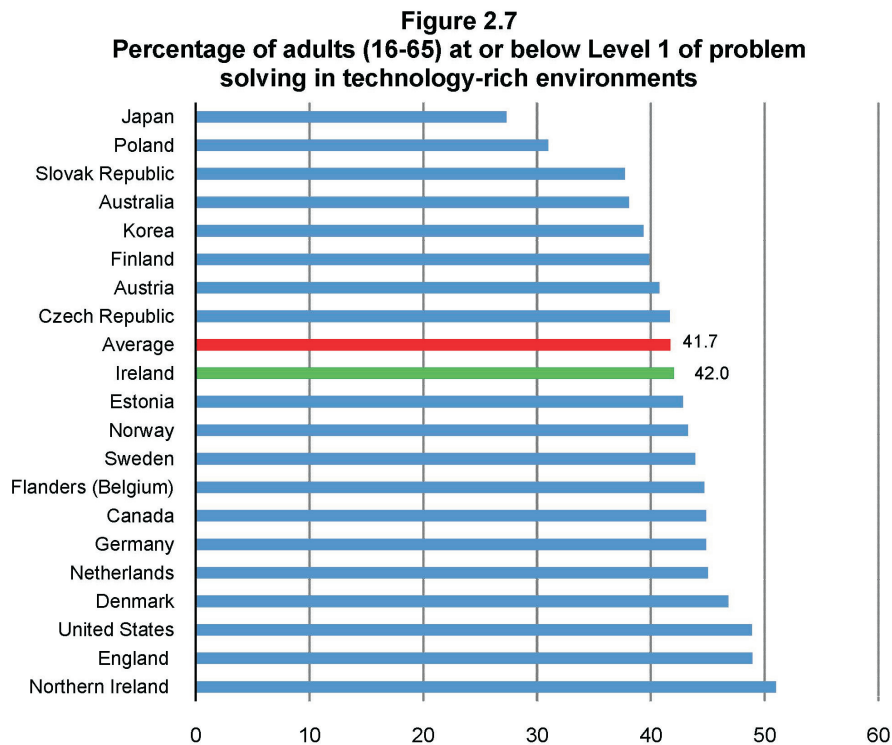
The respondent's performance across the problem solving in technology-rich environments test items is transformed in to an overall 'mean scale score' for the domain. This score is then used to place the respondent within one of three 'levels' on the problem solving scale. The scale scores corresponding with each level of the problem solving scale are outlined below.

Note that only three levels were created for problem solving and that the mean scores and levels are not comparable with the mean scores and levels of the literacy and numeracy scales.

Problem solving in technology-rich environments	
Level	Range of scale scores
Below Level 1	0-240
Level 1	241-290
Level 2	291-340
Level 3	341-500

At or below Level 1 in problem solving in technology-rich environments

More than two-fifths (42%) of adults in Ireland score at or below Level 1 (29.5% at Level 1, 12.6% below Level 1) on the problem solving scale, the same as the study average (41.7%) (Figure 2.7). Ireland is in a large group of six other countries with a similar proportion at this level, including Finland (39.9%), Estonia (42.8%) and Sweden (43.9%). Of the 20⁵ countries who implemented the problem solving assessment, 14 have between 40% and 50% at or below Level 1 on this scale. The country rated highest on problem solving, Japan, still has 27.3% of adults at or below Level 1 on the problem solving scale (Table 2.9).



⁵ France, Spain, Italy and Cyprus did not administer the problem solving assessment.

At Levels 2 and 3 of problem solving in technology-rich environments

At the top end of problem solving proficiency 25.3% of adults are at levels 2 and 3 in Ireland compared to 34.0% on average internationally. This is significantly more than Poland (19.2%) but not statistically different from Northern Ireland (28.7%), Estonia (27.6%) or the Slovak Republic (25.6%) (Figure 2.8).

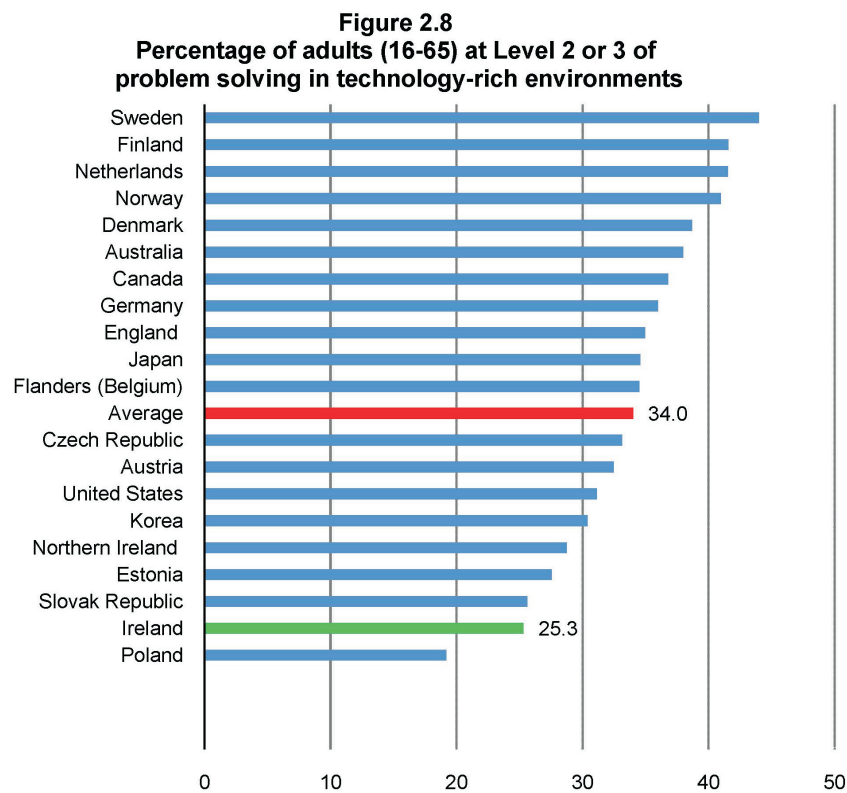


Table 2.9 Percentage of 16-65 year-olds scoring at each level of the problem solving scale (including non-response related to ICT proficiency)

Countries	Proficiency levels									
	Missing	No computer experience	Opted out of computer based assessment	Failed basic computer skills test	Below Level 1		At or Below Level 1			Level 3
					1	Level 1	Level 1	Level 2	Level 3	
% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	
Japan	1.3 (0.1)	10.2 (0.5)	15.9 (0.9)	10.7 (0.7)	7.6 (0.6)	19.7 (0.8)	» 27.3 (0.9)	26.3 (0.8)	8.3 (0.5)	
Poland	0.0 (0.0)	19.5 (0.5)	23.8 (0.7)	6.5 (0.4)	12.0 (0.6)	19.0 (0.7)	» 31.0 (0.8)	15.4 (0.7)	3.8 (0.3)	
Slovak Republic	0.3 (0.1)	22.0 (0.7)	12.2 (0.4)	2.2 (0.2)	8.9 (0.5)	28.8 (0.9)	» 37.7 (0.9)	22.8 (0.7)	2.9 (0.3)	
Australia	2.7 (0.3)	4.0 (0.3)	13.7 (0.6)	3.5 (0.3)	9.2 (0.6)	28.9 (0.8)	38.1 *	31.8 (1.0)	6.2 (0.5)	
Korea	0.3 (0.1)	15.5 (0.4)	5.4 (0.3)	9.1 (0.4)	9.8 (0.5)	29.6 (0.9)	» 39.4 (0.9)	26.8 (0.8)	3.6 (0.3)	
Finland	0.1 (0.1)	3.5 (0.3)	9.7 (0.4)	5.2 (0.3)	11.0 (0.5)	28.9 (0.8)	— 39.9 (0.8)	33.2 (0.7)	8.4 (0.6)	
Austria	1.8 (0.2)	9.6 (0.4)	11.3 (0.5)	4.0 (0.3)	9.9 (0.5)	30.9 (0.9)	— 40.8 (0.9)	28.1 (0.8)	4.3 (0.4)	
Czech Republic	0.6 (0.2)	10.3 (0.5)	12.1 (0.8)	2.2 (0.3)	12.9 (0.9)	28.8 (1.3)	— 41.7 (1.2)	26.5 (1.1)	6.6 (0.6)	
Average	1.5 (0.0)	8.0 (0.1)	9.9 (0.1)	4.9 (0.1)	12.3 (0.1)	29.4 (0.2)	— 41.7 (0.2)	28.2 (0.2)	5.8 (0.1)	
Ireland	0.6 (0.1)	10.1 (0.4)	17.4 (0.7)	4.7 (0.4)	12.6 (0.7)	29.5 (0.9)	— 42.0 (1.0)	22.1 (0.8)	3.1 (0.3)	
Estonia	0.5 (0.1)	9.9 (0.3)	15.8 (0.4)	3.4 (0.2)	13.8 (0.5)	29.0 (0.7)	— 42.8 (0.8)	23.2 (0.6)	4.3 (0.4)	
Norway	2.2 (0.2)	1.6 (0.2)	6.7 (0.4)	5.2 (0.3)	11.4 (0.6)	31.8 (0.8)	— 43.2 (0.8)	34.9 (0.9)	6.1 (0.4)	
Sweden	0.1 (0.0)	1.6 (0.2)	5.7 (0.3)	4.8 (0.3)	13.1 (0.5)	30.8 (0.8)	— 43.9 (0.8)	35.2 (0.9)	8.8 (0.6)	
Flanders (Belgium)	5.2 (0.2)	7.4 (0.3)	4.7 (0.3)	3.5 (0.3)	14.8 (0.6)	29.8 (0.8)	« 44.7 (0.8)	28.7 (0.8)	5.8 (0.4)	
Canada	1.9 (0.1)	4.5 (0.2)	6.3 (0.3)	5.9 (0.2)	14.8 (0.4)	30.0 (0.7)	44.8 *	29.4 (0.5)	7.1 (0.4)	
Germany	1.5 (0.2)	7.9 (0.5)	6.1 (0.5)	3.7 (0.4)	14.4 (0.8)	30.5 (0.8)	« 44.8 (1.0)	29.2 (0.8)	6.8 (0.6)	
Netherlands	2.3 (0.2)	3.0 (0.2)	4.5 (0.3)	3.7 (0.3)	12.5 (0.6)	32.6 (0.7)	« 45.0 (0.8)	34.3 (0.8)	7.3 (0.4)	
Denmark	0.4 (0.1)	2.4 (0.2)	6.4 (0.3)	5.3 (0.2)	13.9 (0.6)	32.9 (0.8)	« 46.8 (0.8)	32.3 (0.7)	6.3 (0.4)	
United States	4.3 (0.6)	5.2 (0.4)	6.3 (0.6)	4.1 (0.4)	15.8 (0.9)	33.1 (0.9)	« 48.9 (1.1)	26.0 (0.9)	5.1 (0.4)	
England	1.6 (0.2)	4.1 (0.3)	4.6 (0.4)	5.8 (0.4)	15.1 (0.8)	33.8 (1.1)	« 48.9 (1.0)	29.3 (0.9)	5.7 (0.5)	
Northern Ireland	2.2 (0.3)	10.0 (0.6)	2.3 (0.3)	5.8 (0.4)	16.4 (1.5)	34.5 (1.2)	« 51.0 (1.3)	25.0 (1.2)	3.7 (0.6)	
Spain	m ¹ m ¹	17.0 (0.5)	10.7 (0.5)	6.2 (0.3)						
France	m ¹ m ¹	10.5 (0.3)	11.6 (0.4)	6.0 (0.3)						
Italy	m ¹ m ¹	24.4 (0.8)	14.6 (0.9)	2.5 (0.3)						
Cyprus	m ¹ m ¹	18.4 (0.4)	18.0 (0.5)	1.9 (0.2)						

Significantly above average

Not significantly different from average

Significantly below average

» Significantly above Ireland

— Not significantly different from Ireland

« Significantly below Ireland

Notes: Adults in the missing category did not receive a proficiency score because they were not able to answer more than five questions in the background questionnaire due to language difficulties or learning and mental disabilities (literacy related non-response).

The ICT basic computer skills test was a series of relatively simple computer tasks such as using menus, dragging and dropping and highlighting text, designed to measure a basic level of computer proficiency in order to filter respondents towards either the computer or paper-based assessments. .

* It was not possible to calculate standard errors for these combined estimates because the Australian and Canadian public use files were not available.

¹ Data unavailable.

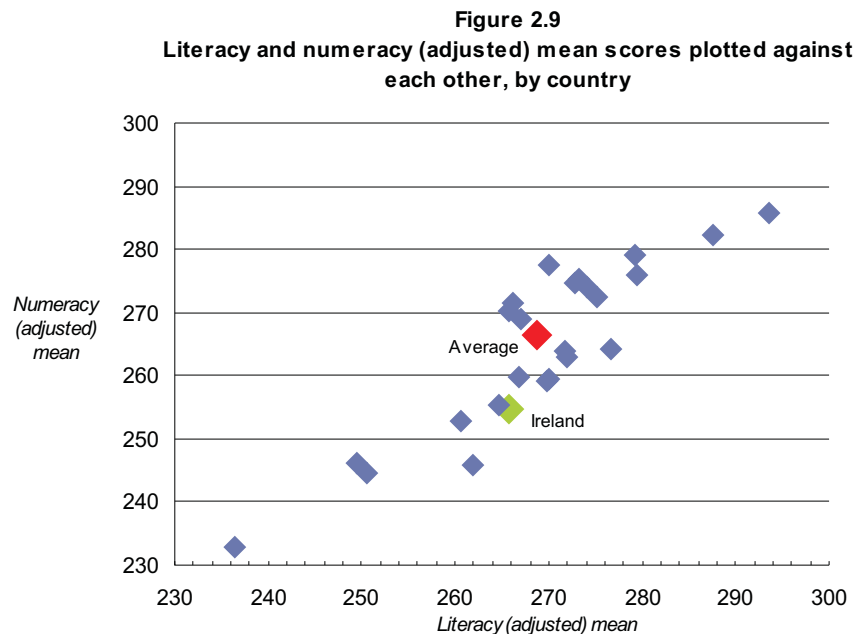
Cyprus, Italy, France and Spain did not field the the problem solving in technology-rich environments assessment.

Countries are sorted in ascending order of the proportion of adults at or below Level 1 .

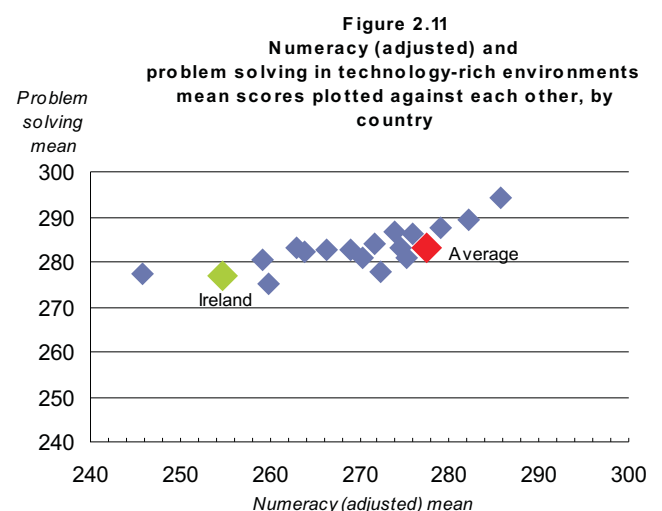
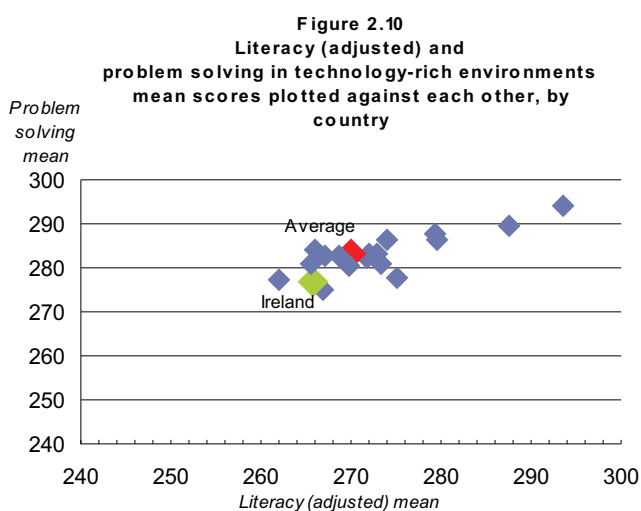
RELATIONSHIP BETWEEN DOMAINS

This section describes the relationships between the scales and the extent to which performance in one domain translates into performance in another.

While literacy and numeracy constitute distinct skills, each defined by their respective frameworks, the correlations between the literacy and numeracy scales are quite strong, with an average Pearson correlation coefficient of 0.87⁶. This ranges from 0.90 for Norway to 0.80 for the Czech Republic and Cyprus, while the correlation for Ireland is 0.87. In general, as proficiency in literacy increases so too does proficiency in numeracy (Figure 2.9).



On the other hand the correlations between both literacy and numeracy and the problem solving scale are much lower with an average correlation of 0.53 for literacy and problem solving and 0.55 for numeracy and problem solving. The correlation for Ireland is below the average in both cases at 0.42 and 0.47 respectively. Figures 2.10 and 2.11 further illustrate this point, and it can be seen that although there is a positive relationship between both literacy and numeracy proficiency and problem solving in technology-rich environments, this relationship is much weaker than between literacy and numeracy.



⁶ The values of a correlation coefficient range from 0 to 1, where 0 suggests no relationship between two variables and 1 suggests a perfect relationship

There is little difference for most countries between the correlation of literacy and problem solving and the correlation of numeracy and problem solving. Out of 21 countries, only three have a difference greater than 0.05 between the two values, with England the widest (0.57 versus 0.63) (Table 2.10).

Table 2.10 Correlations between proficiency scores of all three scales

Countries	Literacy-Numeracy	Literacy-Problem solving	Numeracy-Problem solving
	Correlation coefficient	Correlation coefficient	Correlation coefficient
Norway	0.90	0.58	0.61
United States	0.89	0.65	0.64
Sweden	0.89	0.68	0.67
Australia	0.89	*	*
Netherlands	0.89	0.67	0.64
Korea	0.88	0.54	0.58
Denmark	0.88	0.68	0.65
Northern Ireland	0.88	0.65	0.69
Germany	0.88	0.60	0.62
Ireland	0.87	0.42	0.47
England	0.87	0.57	0.63
Flanders (Belgium)	0.87	0.63	0.63
Canada	0.87	*	*
Average	0.87	0.53	0.55
Finland	0.86	0.57	0.58
Austria	0.86	0.50	0.54
Poland	0.86	0.35	0.37
Slovak Republic	0.86	0.34	0.39
Japan	0.85	0.39	0.40
Estonia	0.83	0.36	0.46
Czech Republic	0.80	0.41	0.47
Spain	0.89	**	**
France	0.87	**	**
Italy	0.82	**	**
Cyprus	0.80	**	**

Notes :

* It was not possible to generate these estimates for Australia or Canada as their public use files were not available before the report was finalised.

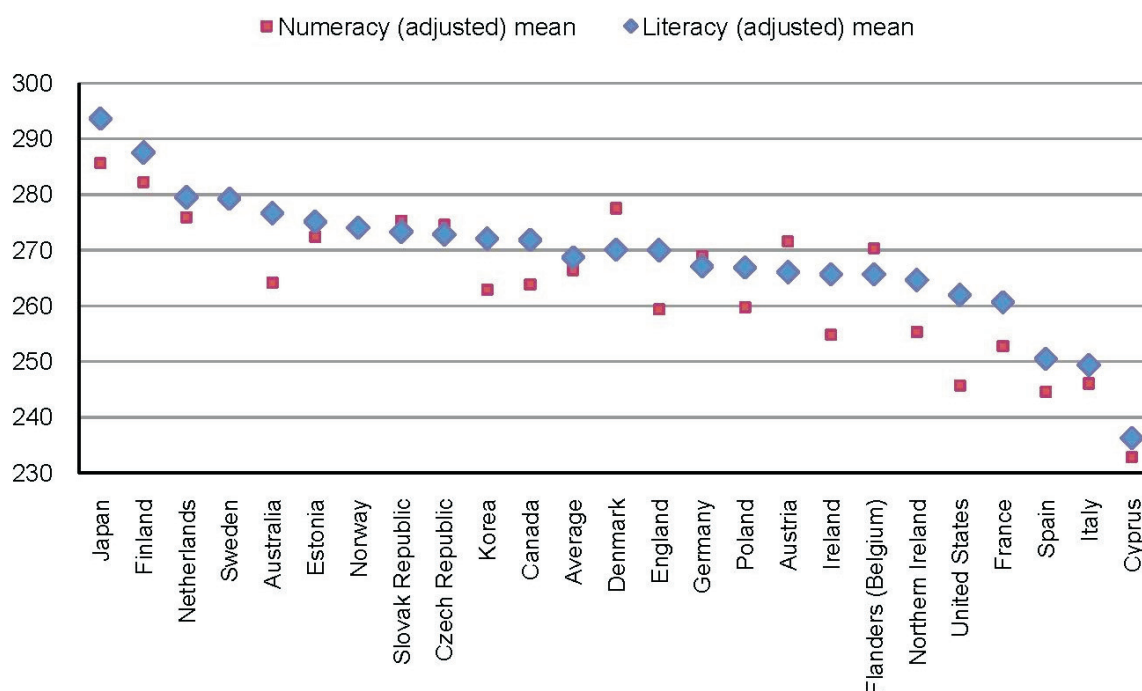
** Spain, France, Italy and Cyprus did not administer the problem solving in technology-rich environments assessment.

Countries are sorted in descending order of the literacy-numeracy correlation coefficient.

Mean scores are higher for literacy than numeracy in 16 countries, including Ireland, Northern Ireland and England, while six countries have a higher numeracy than literacy score with just two countries (Sweden and Norway) having more or less the same scores for both domains (Figure 2.12).

The mean score difference between literacy and numeracy for participating countries is moderate, with an average difference of 4 points between literacy and numeracy for all countries. Sweden and Norway have a difference of 0 while the United States and Australia displayed the largest differences between literacy and numeracy mean scores within their populations, having a 16-point and 13-point difference respectively. The Irish difference is 11, the same as England (11) and very similar to Northern Ireland (10).

Figure 2.12
Literacy and numeracy mean scores (adjusted)



Seven countries (France, Ireland, Italy, Poland, Spain, the United States and Cyprus) score significantly below the average in both literacy and numeracy while seven more score significantly above the average (Estonia, Finland, Japan, the Netherlands, Norway and Sweden) on both scales.

Looking at the percentage of 16 to 65 year-olds scoring at Level 2 or 3 on the problem solving in technology-rich environments scale, seven countries score significantly higher than average and seven significantly below, including Ireland who at 25.3% have the second lowest percentage at these levels (Table 2.11).

Table 2.11 Summary of proficiency in key information-processing skills

Mean proficiency scores (adjusted) of 16-65 year-olds on the literacy and numeracy scales, and the percentage of 16-65 year-olds scoring at Level 2 or 3 on the problem solving in technology-rich environments scale			
Countries	Literacy (adjusted mean score)	Numeracy (adjusted mean score)	Problem solving in technology-rich environments (%)
Average	270	266	34
Australia	277	264	38
Austria	266	272	32
Canada	272	264	37
Cyprus	236	233	*
Czech Republic	273	275	33
Denmark	270	278	39
England	270	259	35
Estonia	275	272	28
Finland	288	282	42
Flanders (Belgium)	266	270	35
France	261	253	*
Germany	267	269	36
Ireland	266	255	25
Italy	249	246	*
Japan	294	286	35
Korea	272	263	30
Netherlands	280	276	42
Northern Ireland	265	255	29
Norway	274	274	41
Poland	267	260	19
Slovak Republic	273	275	26
Spain	251	245	*
Sweden	279	279	44
United States	262	246	31

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

Notes: *Cyprus, France, Italy and Spain did not field the problem solving in technology-rich environments assessment.

Countries are sorted in alphabetical order.

Chapter 3

PIAAC
Results for Ireland

NATIONAL TRENDS

This chapter focuses on the Irish data from the PIAAC survey with respect to socio-demographic variables, such as gender, age, education, language and labour market status. International comparisons are also made where relevant.

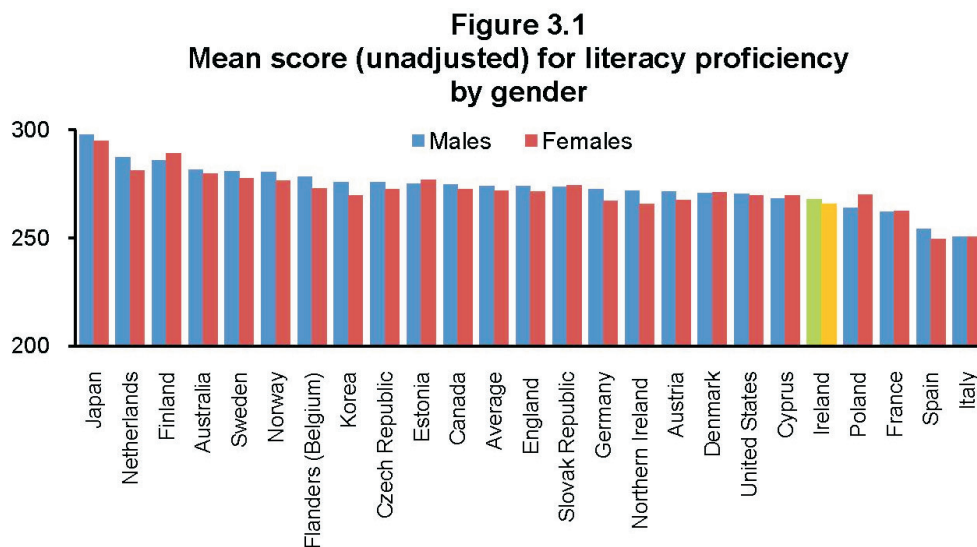
In these tables the unadjusted mean is used because the adjusted mean is not available at this level of detail¹. In any case the difference between the unadjusted and adjusted mean score for Ireland on both the literacy and numeracy scales is small. Similarly, the proportion of adults in Ireland within each level of the proficiency scales is only marginally affected by literacy-related non-response.

Each assessment domain is presented in turn, but the interactions between the proficiencies are not explored in detail in this report. In all cases where a relationship is identified between proficiency and a particular socio-demographic variable it should be noted that this does not necessarily indicate a simple causal relationship in one direction or another. The drivers of proficiency and the consequences of high or low levels of proficiency in any domain are multifaceted and complex. The international report attempts to disentangle the complex relationships underlying proficiency in each domain and the interactions between domains using a series of multivariate analyses that are beyond the scope of this report (OECD, 2013a).

LITERACY

Gender

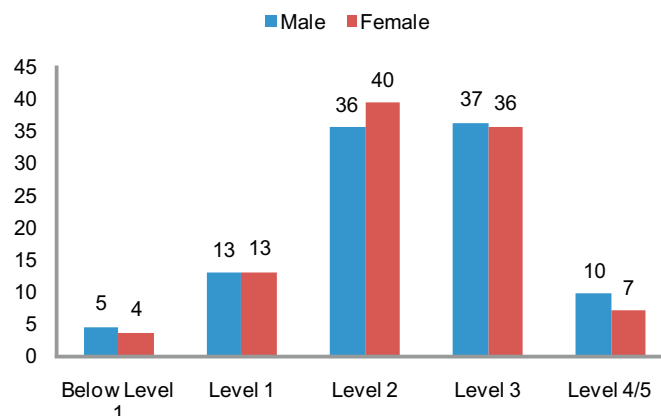
There is no statistical difference between the mean score of males (268) and females (265) in Ireland on the literacy scale, and this trend is the same across most countries (Figure 3.1).



¹ The adjusted mean score was created by assigning a score of 85 to those who failed to complete the background questionnaire and the assessment stages of the survey for literacy-related reasons (e.g. literacy, language difficulties and disability). There is no demographic information (e.g. age, gender, education, employment) available for this group to allow the adjusted mean score to be used in more detailed analyses.

Similarly there are few substantial differences between the percentages of males and females across the levels of the literacy scale in Ireland (Figure 3.2). The percentage of females performing at Level 2 is slightly higher than males, 40% compared with 36%, while the percentage of males at Level 4/5 is slightly higher than females, 10% compared with 7%.

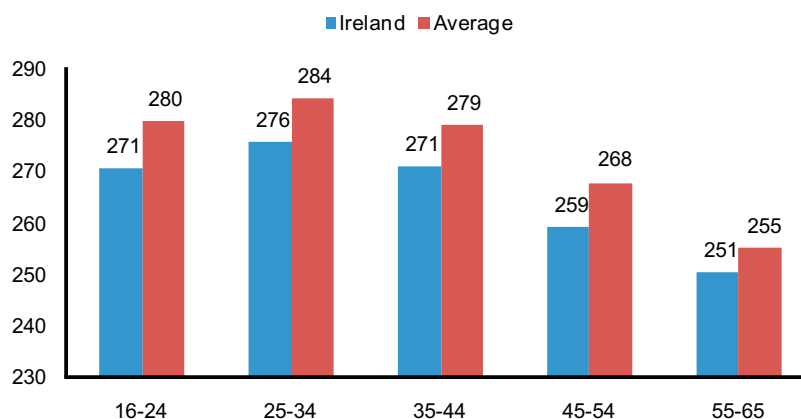
Figure 3.2
Percentage of males and females in Ireland at each level of literacy proficiency



Age Group

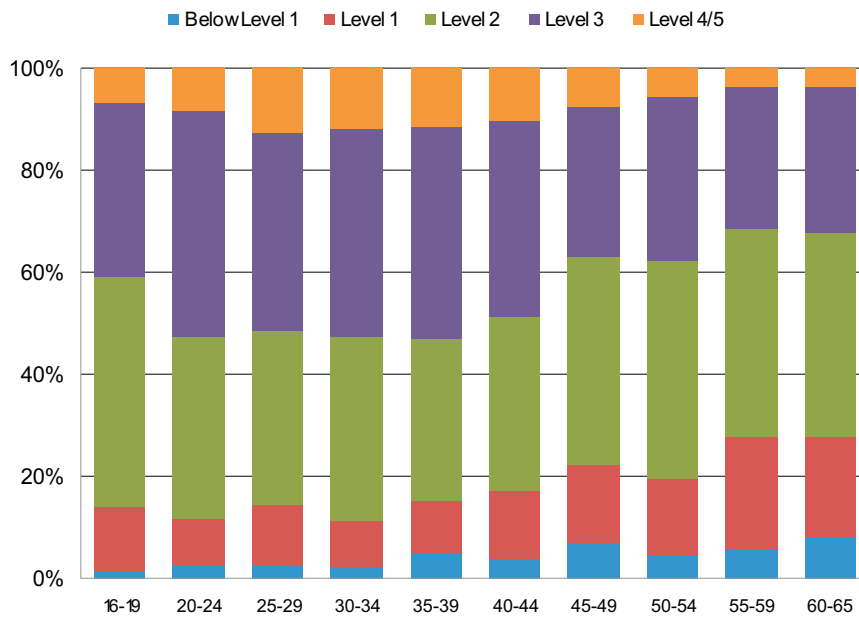
In Ireland, adults aged 25-34 have the highest literacy mean score (276), while adults aged 55-65 have the lowest literacy mean score (251). This mirrors the pattern across participating countries which shows a decline in literacy proficiency for older age groups. Internationally, there is a 29 point scale score difference between those aged 25-34 (284) and those aged 55-65 (255) (Figure 3.3).

Figure 3.3
Mean score (unadjusted) for literacy proficiency by age group



Greater percentages of adults in older age groups are found at the lower levels of literacy in Ireland. For example, 27.8% of adults aged 55-65 are at or below Level 1 compared to 12.9% of those aged 16-24 (Figure 3.4). This compares to 24.5% of adults aged 55-65 who are at or below Level 1 internationally and 10.9% of those aged 16-24.

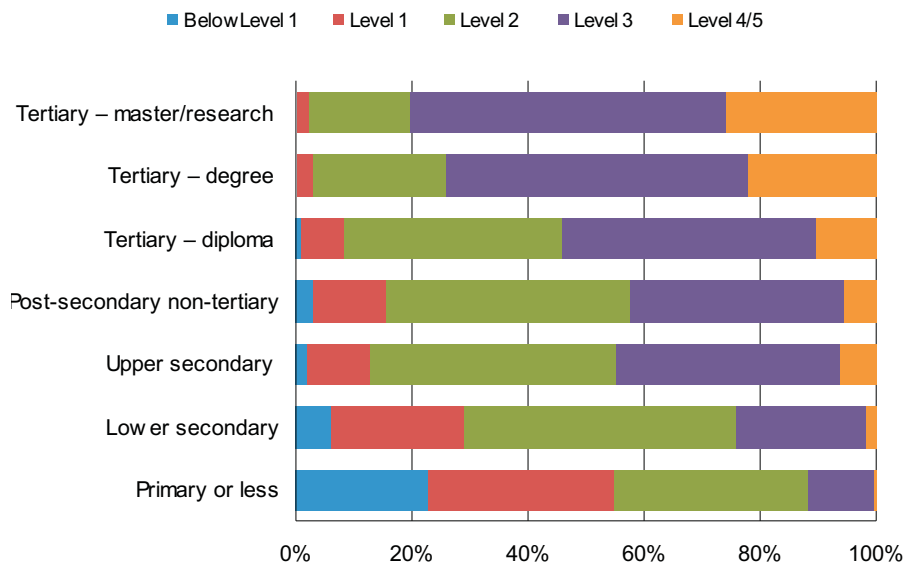
Figure 3.4
Percentage of adults at levels of literacy proficiency by 5-year age group



Highest level of education achieved

There is a clear correlation between educational achievement and literacy proficiency and generally adults in Ireland with higher levels of education have higher mean scores on the literacy scale. For example, adults with a master’s degree or higher receive a mean score of 304 compared to a mean score of 246 for those whose highest level of education is lower secondary (i.e. Junior Certificate or equivalent) (Table 3.1). This pattern is further illustrated by the percentage of persons at the lowest levels of literacy: 54.7% of those whose highest level of education is at primary level or less score at or below Level 1 on the literacy scale, compared to only 12.8% of those whose highest level of education is upper secondary (Leaving Certificate or equivalent) (Figure 3.5).

Figure 3.5
Percentage of adults at levels of literacy proficiency by highest level of education achieved

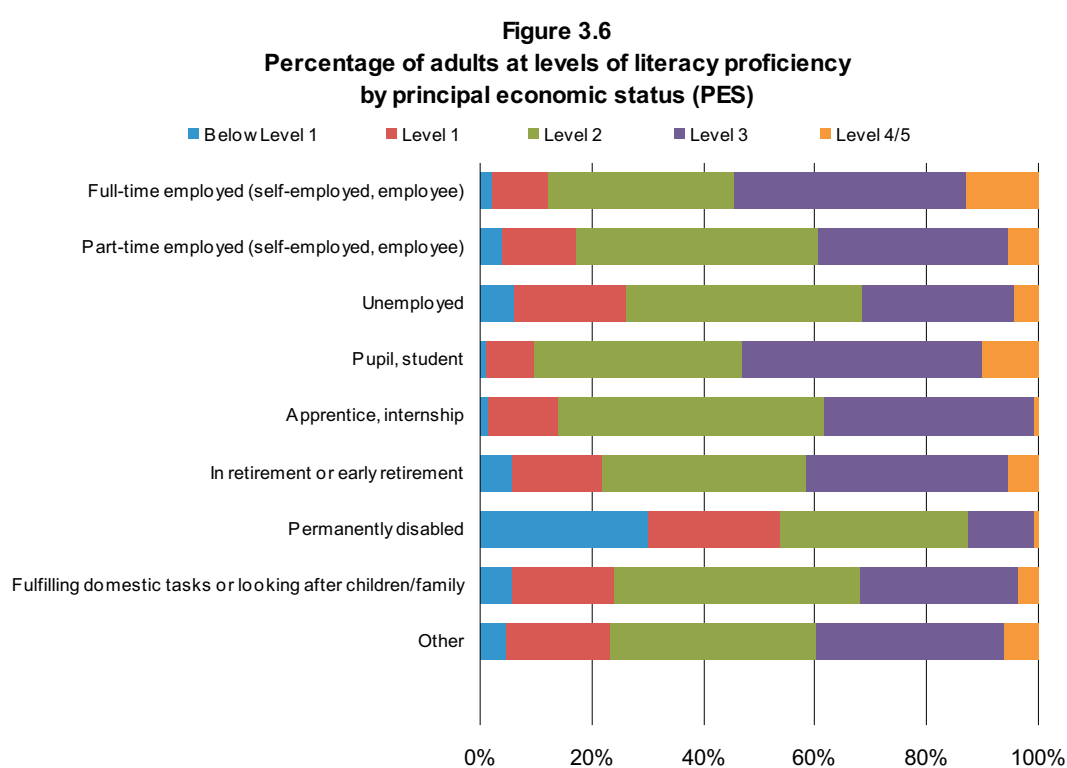


Principal Economic Status²

Looking at the relationship between literacy levels and principal economic status in Ireland, adults in full time employment have the highest mean score for literacy (278), marginally higher than students (277) but considerably higher than those in part-time employment (262 or a difference of 16 points). The literacy mean score for retired adults (260) is seven points higher than those fulfilling domestic tasks or looking after children and family (253) (Table 3.1). Internationally, the differences in literacy proficiency are smaller than in Ireland with the mean literacy score of employed individuals being about 13 points (approximately 5%) higher than the mean score of unemployed adults (OECD, 2013a).

Similarly, the percentage of adults at or below Level 1 varies by economic status. Figure 3.6 shows that 9.6% of students, 12.1% of those in full-time employment, 17.2% of those in part-time employment, 22.0% of those who have retired and 26.3% of the unemployed have literacy mean scores at or below Level 1.

At the top end of the literacy scale, there are also substantial differences in the proportions of those at literacy levels 3 and 4/5 by economic status. For example, 54.4% of those who are in full-time employment score at levels 3 and 4/5 compared to 39.4% of those in part-time employment and 31.7% of those who are unemployed (Figure 3.6).



Principal Economic Status: Permanently Disabled

Across all three domains the overall performance of those who are *permanently disabled* is lower than the other economic groups. However, this finding should be interpreted with caution, as the standard errors and standard deviations associated with estimates for this group are comparatively large. This suggests that there is considerable variation in proficiency within this group and also that the estimates themselves may not be that precise. This is not surprising given that the absolute number of those identifying themselves as permanently disabled within the sample is small.

² Principal Economic Status is based on the respondent's own judgement as to his/her usual economic status

Summary findings for literacy proficiency in Ireland by other socio-demographic characteristics

Native language/Born in Ireland

Adults in the Irish population who were not born in Ireland (*foreign-born*) and whose native language is not English (*foreign-language*) have a significantly lower literacy mean score (249) than those born in Ireland (*native-born*) whose native language is English (*native-language*) (267). It is also noticeable that foreign-born native-English speakers score higher on average (274) than native-born English speakers (267) (Table 3.1).

International comparisons display a similar trend across participating countries between these two groups, with mean score differences ranging from 59 points in Sweden to 6 and 2 points respectively in the Czech and Slovak republics. Ireland has the third smallest gap (18 points) between the literacy proficiency of those who were born in the country and speak the language of the assessment (i.e. English) and those not born in the country who are not native speakers of the assessment language.

Almost 30% (28.1%) of foreign-born non-native English speakers (*foreign-born and foreign-language*) in Ireland score at or below Level 1 on the literacy scale compared to 17.1% of native-born and native-English speakers and 12.3% foreign-born native-English speakers (Table 3.1). Internationally, on average, 41.6% of those born outside the country who are not native speakers of the test language score (*foreign-born and foreign-language*) at or below Level 1.

Immigration status

A comparison of the literacy proficiency scale scores of immigrant and non-immigrant adults in Ireland reveals a slight advantage for non-immigrants (267 as against 262). However, across the proficiency levels there are few substantial differences apart from the percentage scoring below Level 1, with 6.7% of immigrants and 3.7% of non-immigrants at this level. It is important to bear in mind that approximately half of the immigrants in the Irish population are native English speakers.

Parents' highest level of education (Adults aged 16-24³)

Parents' educational attainment is often used as a proxy for socio-economic background and parents' education is considered a useful predictor of income, wealth and occupation (OECD, 2013a). The average literacy mean score for adults aged 16-24 with at least one parent attaining tertiary education (283) is significantly higher than both those with at least one parent attaining secondary or post-secondary, non-tertiary education (269) and those where neither parent attained upper secondary education (256) (Table 3.1).

Health status

In Ireland, adults who report an excellent state of health have a considerably higher literacy mean score (276) than those who report a fair (249) or poor (232) state of health. Across the levels of the literacy scale this pattern is also apparent, with proportionally fewer of those with excellent (11.7%) or very good (14.6%) health at Level 1 or below compared to those with fair (31.0%) or poor (40.3%) health. Findings are similar at Level 4/5 with the percentages at this level ranging from 2.2% for those with poor health to 10.9% for those reporting excellent health (Table 3.1). This mirrors the international trend where in all countries individuals who score at lower levels of literacy proficiency are more likely than those with higher levels of proficiency to report poor health (OECD, 2013a).

³ This analysis focuses on the education of the parent(s) of those aged 16-24 as it is likely to have had a more pronounced effect for this age group than the education of the parent(s) of older adults.

Hourly income deciles⁴

There is also a clear relationship between literacy proficiency and the hourly salary of those currently in employment (Figure 3.7). The literacy mean score of those in the highest hourly salary decile (296) is 39 points higher than those in the lowest hourly salary decile (257). In the same vein, 74.0% of those with the highest hourly salary are at or above Level 3 on the literacy scale compared to only 35.9% of those with the lowest hourly salary (Table 3.1).

Occupation

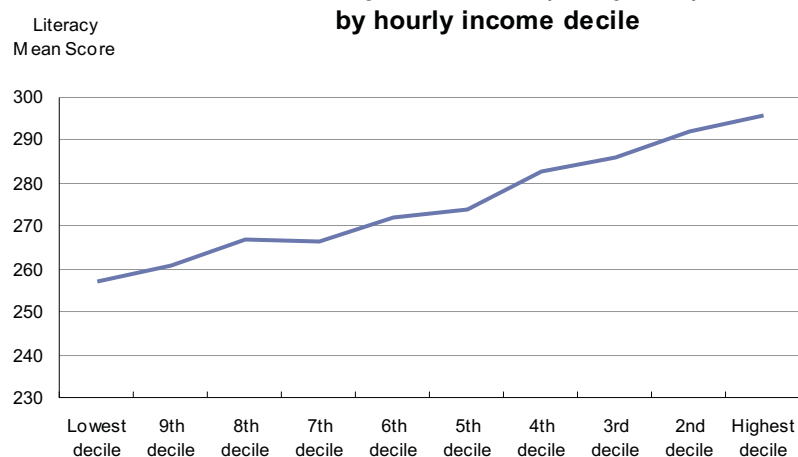
PIAAC found substantial differences in literacy proficiency across occupational categories. Literacy mean scores range from 295 for *Professionals* to 251 for those in *Elementary occupations*. Looking across the levels of the literacy scale, *Professionals* (20.3%), *Technicians and associate professionals* (14.8%) and *Legislators, Senior Officials and Managers* (13.5%) have the highest percentages at Level 4/5 (Table 3.1). At the other end of the literacy proficiency scale, those in *Elementary occupations* (6.7%), *Plant and machinery operatives* (6.0%) and *Craft and related trades workers* (5.2%) have the highest proportions below Level 1. There is a large variation between the literacy mean scores of those in *Elementary occupations* and *Professionals* across participating countries. In Ireland the gap is 44 points, compared to a 30-point difference in Japan and a 56-point difference in Norway (OECD, 2013a).

Industrial sector

A comparison of literacy proficiency across industrial sectors shows an overall mean difference of 44 points between the highest and lowest scoring sectors. Those working in *Information and communication* (303), *Financial, insurance and real estate activities* (295) and *Professional, scientific and technical activities* (294) have the highest average literacy mean scores, while those working in *Agriculture, forestry and fishing* (259) and *Other activities⁶* (264) have the lowest.

The highest proportion of those scoring at or below Level 1 are found in the *Agriculture, forestry and fishing* sector (20.1%) while the highest proportion scoring at Level 4/5 is found in the *Information and communication* sector (26.8%).

Figure 3.7
Literacy mean score (unadjusted)
by hourly income decile



⁴ Hourly income deciles were calculated by listing the hourly income rate for each person in the sample and then grouping the highest earning 10% of respondents together, then the next highest earning 10% and so on.

⁵ Technically those in the Armed forces are amongst those with the highest percentages at Level 4/5 but the relatively small sample size associated with this estimate and the large standard error make this estimate somewhat unreliable

⁶ *Other activities* includes those working in the arts, as employees of private households and in service industries.

Table 3.1 Mean scores and percentages of adults in Ireland at levels of literacy proficiency

Variable	Level	No of adults 16-65		Literacy mean score		Below Level 1	Level 1	Level 2	Level 3	Level 4/5				
		000s	S.E. 000s	Mean	S.E.						%	S.E.	%	S.E.
Population 16-65		2,980.3	(3.4)	267	(0.9)	(47.2)	13.2	(0.8)	37.7	(0.9)	36.2	(0.9)	8.5	(0.5)
Gender	Male	1,458.0	(4.8)	268	(1.2)	(49.2)	13.1	(1.0)	35.8	(1.3)	36.5	(1.2)	9.9	(0.8)
	Female	1,522.3	(4.1)	265	(1.1)	(45.2)	13.3	(1.0)	39.6	(1.2)	35.9	(1.4)	7.3	(0.7)
Age (5 year)	16-19	258.4	(9.1)	267	(2.8)	(39.4)	12.7	(2.9)	45.0	(3.4)	34.0	(3.1)	6.7	(2.0)
	20-24	261.6	(8.7)	274	(2.8)	(42.3)	9.0	(1.9)	35.9	(3.0)	44.4	(3.2)	8.2	(1.5)
	25-29	308.5	(13.1)	275	(2.5)	(47.0)	11.5	(1.8)	34.2	(2.8)	38.9	(3.1)	12.5	(2.0)
	30-34	418.0	(10.6)	276	(1.8)	(44.5)	8.8	(1.2)	36.3	(2.0)	40.8	(2.2)	11.7	(1.6)
	35-39	350.4	(12.2)	273	(2.6)	(50.1)	10.4	(1.7)	31.7	(2.1)	41.5	(2.1)	11.4	(1.4)
	40-44	341.5	(9.7)	270	(2.2)	(48.0)	13.1	(1.9)	34.3	(2.6)	38.2	(2.5)	10.3	(1.6)
	45-49	277.4	(9.9)	258	(2.9)	(50.8)	15.2	(2.2)	40.8	(3.0)	29.5	(2.3)	7.5	(1.3)
	50-54	277.4	(9.5)	261	(2.5)	(44.9)	14.7	(2.5)	42.9	(3.1)	32.0	(3.1)	5.7	(1.4)
	55-59	239.6	(9.8)	251	(2.7)	(46.1)	21.6	(3.0)	40.9	(3.2)	28.0	(2.5)	3.4	(1.2)
	60-65	247.6	(9.0)	250	(2.4)	(47.6)	19.8	(2.1)	40.0	(2.5)	28.7	(2.4)	3.4	(1.2)
Education	Primary or less (ISCED 1 or less)	240.7	(11.3)	216	(3.5)	(51.0)	32.0	(3.7)	33.6	(3.5)	11.4	(2.5)	0.2	(0.4)
	Lower secondary (ISCED 2, ISCED 3C short)	607.5	(11.6)	246	(1.9)	(42.7)	22.7	(2.3)	47.0	(2.4)	22.4	(1.8)	1.7	(0.7)
	Upper secondary (ISCED 3A-B, C long)	665.2	(13.6)	269	(1.8)	(39.6)	10.8	(1.4)	42.3	(2.3)	38.8	(2.2)	6.1	(1.0)
	Post-secondary, non-tertiary (ISCED 4A-B-C)	521.6	(16.4)	265	(2.0)	(41.5)	12.6	(1.5)	42.0	(1.8)	36.8	(2.2)	5.6	(1.2)
	Tertiary – diploma (ISCED 5B)	372.6	(10.2)	278	(1.8)	(39.1)	7.2	(1.3)	37.4	(2.7)	43.8	(2.7)	10.4	(1.6)
	Tertiary – bachelor degree (ISCED 5A)	350.4	(9.0)	298	(1.8)	(37.1)	2.9	(0.9)	22.8	(2.1)	51.8	(2.2)	22.2	(1.9)
	Tertiary – master's/research degree (ISCED 5A/6)	220.6	(9.0)	304	(2.1)	(36.6)	1.9	(0.7)	17.2	(2.1)	54.6	(3.1)	25.9	(2.7)

Table 3.1 (cont.) Mean scores and percentages of adults in Ireland at levels of literacy proficiency

Variable	Level	No of adults 16-65		Literacy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5	
		000s	S.E. 000s	Mean	S.E. S.D.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Principal Economic Status	Full-time employed (self-employed, employee)	1,243.3	(22.1)	278	(1.3) (44.6)	2.3	(0.5)	9.8	(0.9)	33.5	(1.3)	41.6	(1.4)	12.8	(1.1)
	Part-time employed (self-employed, employee)	448.6	(16.2)	262	(2.1) (43.6)	3.8	(1.0)	13.4	(2.2)	43.4	(2.5)	33.9	(2.0)	5.5	(1.1)
	Unemployed	360.4	(14.7)	253	(2.4) (47.2)	6.0	(1.2)	20.3	(2.0)	42.0	(2.4)	27.5	(2.2)	4.2	(1.0)
	Pupil, student	360.3	(13.9)	277	(2.2) (39.2)	1.1	(0.7)	8.6	(1.9)	37.4	(2.5)	43.0	(2.7)	9.9	(1.7)
	Apprentice, internship	11.3	(3.4)	261	(10.5) (32.2)	1.5	(1.6)	12.3	(14.5)	47.7	(18.9)	37.8	(17.2)	0.7	(1.5)
	In retirement or early retirement	89.0	(6.1)	260	(3.2) (46.5)	5.7	(2.1)	16.2	(3.1)	36.5	(4.5)	36.1	(4.8)	5.4	(2.3)
	Permanently disabled	106.8	(9.1)	212	(5.7) (57.5)	30.3	(4.8)	23.4	(4.1)	33.7	(5.3)	12.0	(3.1)	0.6	(0.5)
	Fulfilling domestic tasks or looking after children/family	302.2	(13.3)	253	(2.4) (45.4)	5.6	(1.3)	18.6	(2.5)	43.8	(3.0)	28.3	(2.3)	3.7	(1.0)
	Other	57.2	(7.0)	261	(5.3) (45.7)	4.5	(2.7)	18.7	(4.7)	36.8	(6.4)	33.7	(6.5)	6.2	(3.2)
Native Speaker (English)/Born in Ireland	Native-born and native-language	2,330.2	(22.3)	267	(0.9) (46.2)	3.7	(0.4)	13.3	(1.0)	37.7	(1.0)	36.6	(1.1)	8.6	(0.6)
	Native-born and foreign-language	26.0	(6.8)	273	(8.3) (43.6)	1.6	(2.0)	14.2	(5.8)	37.3	(9.6)	36.6	(10.3)	10.3	(5.2)
	Foreign-born and native-language	345.4	(13.8)	274	(2.5) (45.0)	3.0	(0.9)	9.3	(1.8)	36.9	(2.8)	40.0	(2.9)	10.8	(1.5)
	Foreign-born and foreign-language	278.1	(17.9)	249	(3.0) (54.2)	11.2	(2.0)	16.9	(2.5)	38.8	(3.2)	28.2	(2.9)	4.9	(1.1)
Parents' highest level of education Age group 16-24	Neither parent has attained upper secondary	114.2	(7.8)	256	(3.7) (41.9)	4.2	(2.1)	16.7	(4.0)	47.6	(5.5)	29.4	(4.7)	2.1	(1.4)
	At least one parent has attained secondary or post-secondary, non-tertiary	192.2	(10.6)	269	(3.0) (38.7)	1.2	(0.9)	11.8	(2.9)	43.9	(4.1)	36.2	(4.0)	6.8	(2.0)
	At least one parent has attained tertiary	194.1	(11.4)	283	(2.6) (37.1)	1.2	(0.8)	5.1	(1.9)	33.2	(3.3)	49.5	(3.8)	11.1	(2.3)

Table 3.1 (cont.) Mean scores and percentages of adults in Ireland at levels of literacy proficiency

Variable	Level	No of adults 16-65		Literacy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E. 000s	Mean	S.E.	S.D.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Immigration status	Immigrant (1st or 2nd generation)	543.7	(22.3)	262	(1.9)	(51.0)	6.7	(1.2)	13.0	(1.5)	37.1	(2.4)	35.5	(1.9)	7.7	(1.0)
	Non-immigrant	2,427.5	(23.1)	267	(0.8)	(46.4)	3.7	(0.4)	13.3	(1.0)	37.9	(0.9)	36.4	(1.1)	8.7	(0.6)
Health Status	Excellent	768.9	(21.2)	276	(1.5)	(42.9)	2.2	(0.6)	9.5	(1.3)	34.9	(1.8)	42.5	(1.7)	10.9	(1.1)
	Very good	1,100.8	(23.4)	271	(1.6)	(45.5)	3.2	(0.6)	11.4	(1.1)	37.8	(1.4)	37.8	(1.4)	9.7	(0.9)
	Good	772.4	(20.8)	260	(1.5)	(46.4)	4.8	(0.8)	15.7	(1.5)	40.9	(1.9)	32.5	(1.9)	6.0	(0.7)
	Fair	256.8	(10.8)	249	(3.5)	(53.0)	9.4	(2.0)	21.6	(2.7)	36.3	(3.4)	26.7	(2.8)	6.0	(1.4)
	Poor	80.7	(5.7)	232	(4.7)	(56.6)	17.8	(3.6)	22.5	(4.4)	37.3	(5.3)	20.3	(3.8)	2.2	(1.4)
Hours earnings excluding bonuses for current wage and salary earners in deciles	Lowest decile	169.3	(11.5)	257	(3.7)	(48.8)	6.9	(2.3)	15.8	(3.5)	41.4	(3.8)	29.1	(3.4)	6.8	(2.0)
	9th decile	164.0	(10.3)	261	(3.0)	(43.6)	4.0	(1.7)	14.7	(3.0)	43.7	(4.6)	32.2	(4.3)	5.5	(1.8)
	8th decile	148.9	(9.7)	267	(3.5)	(45.8)	2.6	(1.3)	14.4	(2.7)	41.3	(3.8)	31.8	(4.1)	9.9	(3.4)
	7th decile	145.1	(8.8)	266	(3.2)	(44.8)	3.7	(1.6)	14.3	(3.2)	36.8	(3.8)	37.8	(4.3)	7.5	(2.3)
	6th decile	144.4	(9.6)	272	(3.5)	(39.5)	0.6	(0.6)	12.7	(2.9)	39.4	(4.4)	38.8	(4.7)	8.5	(2.5)
	5th decile	139.8	(8.6)	274	(2.8)	(40.4)	1.5	(0.9)	8.8	(2.9)	42.3	(4.7)	38.5	(3.7)	9.0	(2.1)
	4th decile	131.1	(8.1)	283	(3.0)	(42.1)	2.2	(1.5)	6.2	(2.2)	32.1	(3.9)	45.6	(3.8)	13.8	(2.8)
	3rd decile	125.7	(9.0)	286	(3.3)	(41.0)	1.8	(1.3)	5.5	(2.0)	28.5	(3.8)	49.0	(4.5)	15.2	(2.9)
	2nd decile	127.7	(7.9)	292	(2.5)	(39.0)	0.4	(0.5)	4.5	(1.9)	28.3	(3.2)	47.7	(4.5)	19.1	(3.5)
Highest decile	126.6	(8.5)	296	(3.2)	(41.9)	1.5	(1.1)	3.6	(2.0)	20.8	(3.4)	52.1	(4.3)	21.9	(3.9)	

Table 3.1 (cont.) Mean scores and percentages of adults in Ireland at levels of literacy proficiency

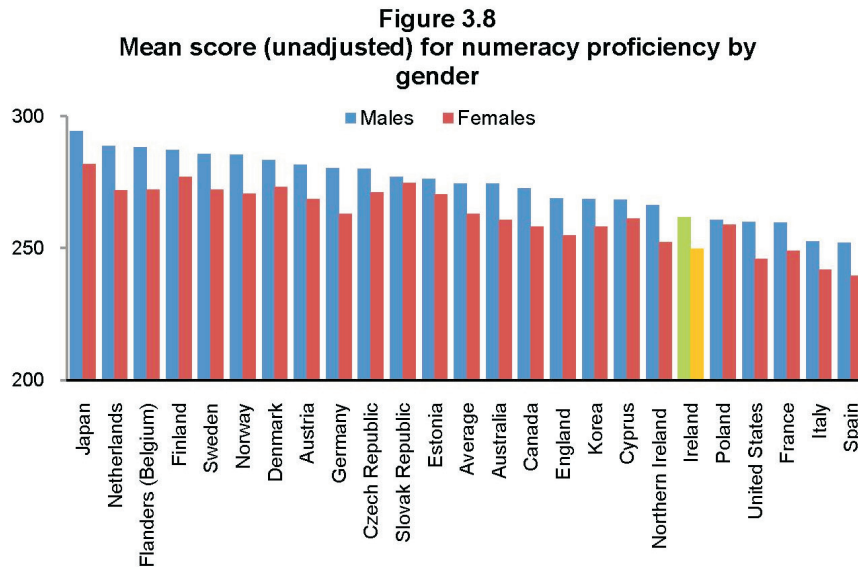
Variable	Level	No of adults 16-65		Literacy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E. 000s	Mean	S.E.	S.D.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Occupation (current job)	Armed forces	8.6	(2.8)	293	(14.3)	(36.8)	0.0	(0.0)	2.5	(5.1)	36.4	(21.6)	40.8	(19.6)	20.3	(14.7)
	Legislators, senior officials and managers	129.6	(7.7)	281	(3.1)	(42.9)	1.7	(1.1)	8.8	(2.4)	30.2	(3.4)	45.7	(4.0)	13.5	(2.8)
	Professionals	385.2	(12.4)	295	(1.7)	(37.8)	0.2	(0.2)	4.1	(1.1)	24.8	(2.2)	50.6	(2.3)	20.3	(2.0)
	Technicians and associate professionals	187.5	(10.6)	285	(2.7)	(41.5)	1.3	(0.9)	6.4	(1.5)	29.9	(2.9)	47.6	(3.7)	14.8	(3.1)
	Clerks	199.6	(9.9)	279	(2.7)	(41.2)	1.4	(0.9)	7.8	(2.2)	36.0	(3.3)	43.4	(3.6)	11.3	(2.2)
	Service workers and shop and market sales workers	378.5	(15.5)	263	(2.0)	(41.7)	3.2	(1.0)	13.3	(2.1)	44.4	(2.8)	33.3	(2.7)	5.8	(1.3)
	Skilled agricultural and fishery workers	80.8	(8.8)	259	(4.5)	(43.4)	4.3	(2.1)	14.7	(4.2)	43.8	(6.0)	33.1	(5.7)	4.1	(2.0)
	Craft and related trades workers	184.8	(11.3)	263	(3.5)	(46.3)	5.2	(1.8)	13.4	(2.5)	40.3	(3.6)	34.5	(3.6)	6.6	(1.8)
	Plant and machine operators and assemblers	107.1	(8.5)	254	(4.6)	(47.8)	6.0	(2.1)	18.6	(4.4)	43.1	(5.0)	28.0	(4.7)	4.4	(1.8)
	Elementary occupations	143.1	(9.2)	251	(3.7)	(46.4)	6.7	(2.2)	19.5	(3.4)	43.0	(4.0)	26.9	(3.5)	3.9	(1.7)
Industrial classification (current job)	Agriculture, forestry and fishing	87.4	(9.2)	259	(4.4)	(44.3)	4.2	(2.0)	15.9	(4.2)	43.1	(6.5)	31.6	(5.9)	5.1	(2.2)
	Industry	235.8	(11.3)	269	(2.9)	(50.3)	5.2	(1.5)	11.7	(2.1)	35.0	(2.8)	37.6	(3.3)	10.5	(1.5)
	Construction	105.6	(9.2)	266	(3.9)	(44.4)	3.5	(1.7)	14.1	(4.2)	38.2	(4.7)	38.1	(4.4)	6.1	(2.6)
	Wholesale and retail trade; repair of motor vehicles and motorcycles	246.2	(13.1)	265	(2.7)	(42.4)	2.9	(1.4)	13.9	(2.1)	42.2	(3.5)	34.4	(3.4)	6.6	(1.4)
	Transportation and storage	82.1	(6.7)	269	(4.7)	(45.5)	3.4	(1.8)	12.0	(4.1)	37.2	(5.8)	39.2	(5.2)	8.2	(3.2)
	Accommodation and food service activities	129.4	(9.9)	266	(3.8)	(44.5)	4.2	(1.9)	9.7	(3.0)	44.6	(4.5)	33.9	(3.9)	7.5	(2.7)
	Information and communication	62.1	(5.4)	303	(4.0)	(35.3)	0.2	(0.3)	2.5	(1.8)	17.4	(4.8)	53.1	(7.0)	26.8	(5.7)
	Financial, insurance and real estate activities	107.8	(8.5)	295	(3.6)	(38.0)	0.0	(0.0)	2.9	(1.6)	29.0	(4.4)	46.1	(4.3)	22.0	(4.0)
	Professional, scientific and technical activities	78.1	(7.1)	294	(3.4)	(37.7)	0.7	(0.8)	3.9	(1.8)	24.4	(4.2)	51.5	(4.5)	19.5	(3.9)
	Administrative and support service activities	69.8	(7.1)	266	(5.5)	(44.6)	3.1	(2.2)	15.3	(4.6)	35.9	(6.0)	37.8	(7.5)	7.9	(3.9)
Public administration and defence; compulsory social security	102.9	(7.5)	289	(3.2)	(37.2)	0.4	(0.5)	4.9	(1.9)	29.1	(4.4)	51.7	(5.0)	13.9	(3.3)	
Education	152.4	(8.7)	291	(2.7)	(40.7)	0.8	(0.7)	6.3	(1.9)	25.9	(3.1)	48.5	(4.1)	18.5	(3.1)	
Human health and social work activities	243.4	(11.2)	267	(2.2)	(41.7)	2.4	(1.1)	12.8	(2.2)	41.8	(3.0)	36.3	(2.9)	6.7	(1.2)	
Other activities	102.8	(8.4)	264	(4.3)	(44.1)	4.0	(2.1)	12.2	(3.9)	40.9	(5.7)	36.0	(5.0)	7.0	(2.3)	

NUMERACY

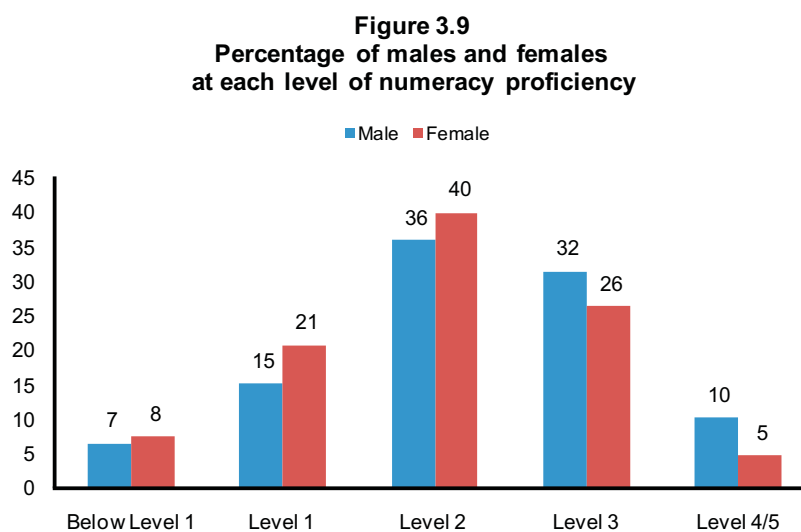
Not surprisingly most of the trends observed for literacy are also found for numeracy in Ireland. However, the overall level of numeracy proficiency is lower than literacy and in general there are greater percentages of people at lower levels of numeracy than literacy across the demographic variables.

Gender

Unlike literacy there is a statistically significant 12-point difference in the mean scores for males (262) and females (250) on the numeracy scale. This difference between males and females on numeracy is consistent with the trend in all participating countries (Figure 3.8) where males score higher than females.



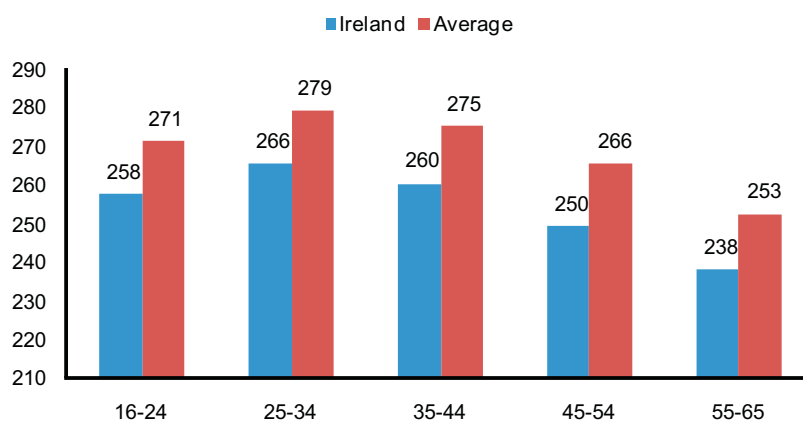
Across the proficiency levels this pattern is further supported by a significant difference in the proportions at the lower and higher ends of the numeracy scale. A fifth (21.9%) of males are at Level 1 or below compared with 28.5% of females, while 10.4% of males and 4.8% of females are at Level 4/5 (Figure 3.9).



Age Group

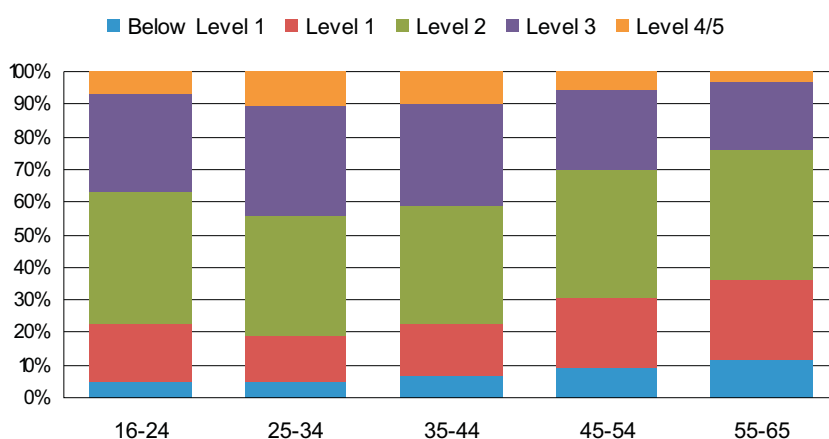
The relationship between age and numeracy in Ireland is very similar to that of literacy. Adults aged 25-34 have the highest mean score for numeracy (266), while adults aged 55-65 have the lowest numeracy mean score (238). This also mirrors the average trend across participating countries which shows a decline in numeracy proficiency for older age groups (Figure 3.10). Internationally, there is a 26 point average mean score difference between those aged 25-34 (279) and those aged 55-65 (253) on the numeracy scale, which compares with a 29 point difference found between the mean score of the same age groups for literacy.

Figure 3.10
Mean score for numeracy proficiency by age group
comparing Ireland with the study average



Looking at the age breakdown of adults in Ireland who score at or below Level 1 on the numeracy proficiency scale, 22.9% of those aged 16-24 are at this level compared to 18.8% of those aged 25-34 and 36.4% of those aged 55-65 (Figure 3.11). This compares to 16.1% of those aged 16-24, 14.2% of those aged 25-34 and 27.6% of those aged 55-65 who are at or below Level 1 internationally (OECD, 2013a).

Figure 3.11
Percentage of adults at levels of numeracy proficiency
by 10-year age group

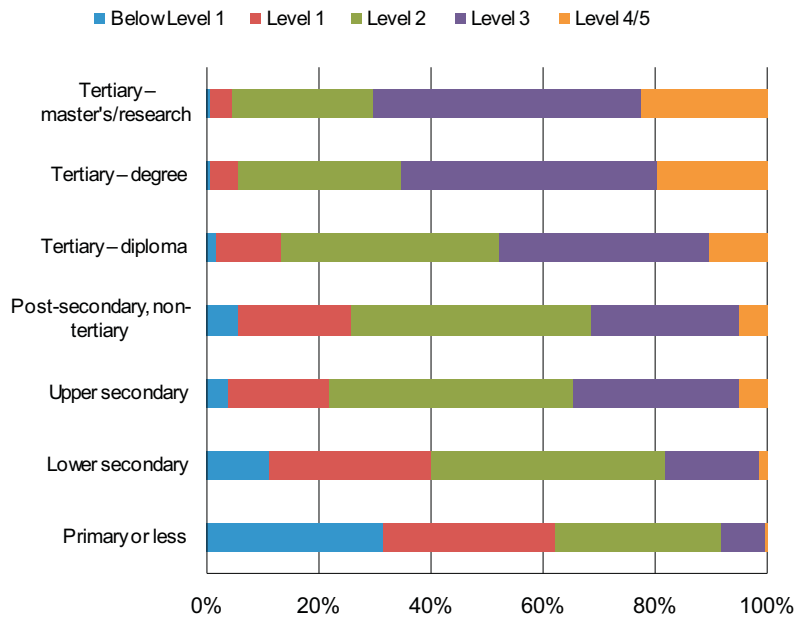


Highest level of education achieved

There is a strong relationship between educational achievement and numeracy proficiency and not surprisingly higher numeracy mean scores are associated with higher levels of education. Those with a master’s degree or higher have a numeracy mean score of 295 compared to a mean score of 234 for those whose level of education is lower secondary (Junior Certificate).

The distribution of adults across the numeracy proficiency levels further illustrates the relationship between educational achievement and numeracy proficiency. Almost two thirds (62.1%) of those whose highest level of education is at primary level or less scoring at or below Level 1 on the numeracy scale, compared to 21.8% of those whose highest level of education is upper secondary (Leaving Certificate) (Figure 3.12).

Figure 3.12
Percentage of adults at levels of numeracy proficiency by highest level of education achieved

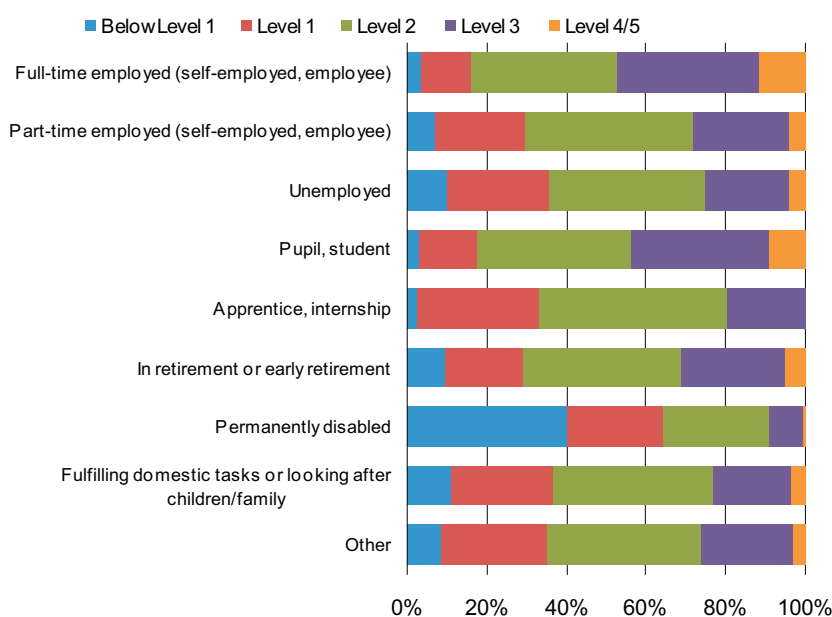


Principal Economic Status

Adults in Ireland in full-time employment have the highest mean score for numeracy (271), only marginally higher than students (267) but differing significantly from those in part-time employment (247) and those who were unemployed (241). The numeracy mean score for retired adults (248) is ten points higher than those fulfilling domestic tasks or looking after children and family (238).

These differences are also borne out by the percentages of these economic groups at or below Level 1, with 15.9% of those who are employed on a full-time basis at or below Level 1 compared to 35.8% of those who are unemployed (Table 3.1) and 36.7% of those fulfilling domestic tasks or looking after children and family (Figure 3.13).

Figure 3.13
Percentage of adults at levels of numeracy proficiency
by principal economic status (PES)



Summary numeracy findings for other socio-demographic characteristics

Native language/Born in Ireland

Adults whose native language is not English (*foreign-language*) and who were not born in Ireland (*foreign-born*) have a significantly lower numeracy mean score (246) than those whose native language is English (*native-language*) and who were born in Ireland (*native-born*) (255) (Table 3.2). Interestingly, foreign-born native-English speakers (*foreign-born and native-language*) score higher on numeracy (265) than Irish born native-English speakers (255).

In Ireland 29.4% of those who are *foreign-born* and who are not native-English speakers (*foreign-language*) score at or below Level 1 compared to 25.8% of those who are native-born English speakers. International comparisons display a similar trend across participating countries (OECD, 2013a), with those whose native language is different to that of the assessment displaying lower levels of numeracy proficiency.

Immigration status

There is no significant difference between the average numeracy proficiency of immigrant (257) and non-immigrant (255) adults. Similarly across the levels of the numeracy proficiency scale there are only slight differences between immigrants and non-immigrants. For example, 23.0% of immigrants are at or below Level 1 compared to 25.7% of non-immigrants (Table 3.2). It is important to note that approximately half of the immigrants to Ireland are native-English speakers.

Parents' highest level of education (Adults aged 16-24)

Parents' highest level of educational achievement is also strongly related to numeracy proficiency. The average mean score for adults aged 16-24 with at least one parent attaining tertiary education (273) is significantly higher than for those with at least one parent attaining secondary or post-secondary, non-tertiary (255) and those where neither parent attained upper secondary education (241) (Table 3.2). The mean score for those aged 16-24 (241) if neither parent achieved upper secondary level education is substantially below the mean score for the overall population (256).

Health Status

As is the case for literacy there are statistically significant differences between the numeracy mean scores of those reporting poor health (213), good health (252) and excellent health (265). More than half of those with poor health (53.8%) are at or below Level 1 compared with 18.5% of those in excellent health.

Hourly income deciles⁷

The relationship between hourly salary deciles and numeracy follow the trend for the literacy domain with a 50 point numeracy mean score difference between adults earning in the highest hourly income decile (293) and those in the lowest income decile (243). Looking across the levels of the numeracy scale there is a general trend for larger proportions of those in the higher income deciles to have higher levels of numeracy proficiency (Table 3.2). For example, 22.0% of those who earn in the highest hourly decile score at Level 4/5 for numeracy compared to just 5.6% of those in the lowest hourly decile.

Occupation

Average numeracy scores are higher for those in certain occupational categories as is also the case for literacy. *Professionals* (289) and *Legislators, senior officials and managers* (279) have the highest mean scores⁸, while *Plant and machinery operators and assembly workers* (247) and those in *Elementary occupations* (240) have the lowest. At the top end of the numeracy proficiency scale, *Professionals* were the most prominent group with 18.6% of them scoring at Level 4/5 compared to 3.7% of those in *Elementary occupations*.

Industrial sector

Those working in *Information and Communication* (302), *Financial, insurance and real estate activities* (288), *Professional, scientific and technical activities* (286) and *Education* (281) have the highest numeracy proficiency scores across the industrial sectors. More than three quarters (76.5%) of those working in the *Information and Communication* sector score at Level 3 or higher on the numeracy scale. Adults working in *Accommodation and food services activities* (26.5%) and *Human health and social work activities* (25.6%) have the highest percentages at or below Level 1 on the numeracy proficiency scale (Table 3.2).

⁷ Hourly income deciles were calculated by listing the hourly income rate for each person in the sample and then grouping the highest earning 10% of respondents together, then the next highest earning 10% and so on.

⁸ Technically those in the Armed forces have a higher mean score but the relatively small sample size associated with this estimate and the large standard error make this estimate somewhat unreliable.

Table 3.2 Mean scores and percentages of adults in Ireland at levels of numeracy proficiency

Variable	Level	No of adults 16-65		Numeracy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E. 000s	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	
Population 16-65		2,980.3	(3.4)	256	(1.0)	(53.7)	7.1	(0.5)	18.2	(0.8)	38.2	(0.9)	29.0	(0.9)	7.6	(0.6)
Gender	Male	1,458.0	(4.8)	262	(1.3)	(55.5)	6.6	(0.6)	15.3	(0.8)	36.2	(1.3)	31.5	(1.3)	10.4	(0.8)
	Female	1,522.3	(4.1)	250	(1.3)	(51.2)	7.6	(0.7)	21.0	(1.2)	40.1	(1.4)	26.5	(1.1)	4.8	(0.7)
Age (5 year)	16-19	258.4	(9.1)	253	(2.8)	(45.5)	4.6	(1.4)	22.7	(3.0)	41.1	(3.8)	26.2	(3.3)	5.4	(1.7)
	20-24	261.6	(8.7)	263	(3.2)	(48.6)	4.5	(1.5)	14.2	(2.3)	40.0	(3.6)	34.2	(3.5)	7.1	(1.8)
	25-29	308.5	(13.1)	263	(2.9)	(52.9)	5.2	(1.3)	15.9	(1.8)	38.4	(2.8)	30.6	(2.6)	9.9	(1.8)
	30-34	418.0	(10.6)	268	(2.0)	(49.0)	4.3	(0.9)	13.2	(1.3)	36.4	(2.1)	36.3	(2.4)	9.9	(1.7)
	35-39	350.4	(12.2)	261	(2.8)	(57.2)	7.3	(1.3)	14.0	(1.8)	36.2	(2.5)	31.7	(2.3)	10.8	(1.6)
	40-44	341.5	(9.7)	259	(2.4)	(55.4)	6.9	(1.2)	17.0	(2.1)	35.3	(2.4)	31.7	(2.2)	9.1	(1.4)
	45-49	277.4	(9.9)	251	(3.1)	(57.2)	8.9	(1.7)	19.7	(2.3)	38.6	(3.1)	24.9	(2.5)	7.9	(1.4)
	50-54	277.4	(9.5)	248	(2.7)	(51.6)	7.6	(1.4)	22.4	(2.8)	40.0	(3.2)	24.9	(2.4)	5.0	(1.3)
	55-59	239.6	(9.8)	240	(3.4)	(54.2)	11.3	(2.3)	24.5	(2.8)	37.8	(3.4)	23.1	(2.8)	3.3	(1.1)
	60-65	247.6	(9.0)	236	(2.8)	(54.5)	13.2	(1.9)	24.0	(2.5)	40.5	(3.0)	18.8	(2.2)	3.4	(0.9)
Education	Primary or less (ISCED 1 or less)	240.7	(11.3)	199	(4.6)	(61.5)	31.5	(3.4)	30.6	(3.3)	29.5	(3.1)	8.2	(2.1)	0.2	(0.4)
	Lower secondary (ISCED 2, ISCED 3C short)	607.5	(11.6)	234	(1.8)	(48.0)	10.9	(1.3)	29.1	(1.9)	41.8	(2.3)	16.8	(1.7)	1.4	(0.5)
	Upper secondary (ISCED 3A-B, C long)	665.2	(13.6)	257	(1.9)	(44.6)	4.1	(0.8)	17.7	(1.9)	43.7	(2.1)	29.5	(2.0)	5.1	(1.0)
	Post-secondary, non-tertiary (ISCED 4A-B-C)	521.6	(16.4)	252	(2.1)	(47.9)	5.8	(1.0)	20.0	(1.7)	42.6	(2.1)	26.7	(1.9)	4.9	(1.0)
	Tertiary – diploma (ISCED 5B)	372.6	(10.2)	273	(2.1)	(44.1)	1.9	(0.7)	11.3	(1.5)	38.8	(2.4)	37.4	(2.7)	10.5	(1.6)
	Tertiary – bachelor degree (ISCED 5A)	350.4	(9.0)	291	(2.5)	(41.4)	0.6	(0.4)	5.3	(1.4)	28.6	(2.5)	46.0	(2.6)	19.6	(2.7)
	Tertiary – master's/research degree (ISCED 5A/6)	220.6	(9.0)	295	(2.5)	(42.7)	0.7	(0.5)	3.9	(1.1)	25.2	(2.8)	47.6	(3.5)	22.6	(2.7)

Table 3.2 (cont.) Mean scores and percentages of adults in Ireland at levels of numeracy proficiency

Variable	Level	No of adults 16-65		Numeracy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E. 000s	Mean	S.E.	S.D.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Principal Economic Status	Full-time employed (self-employed, employee)	1,243.3	(22.1)	271	(1.4)	(48.8)	3.4	(0.5)	12.5	(0.9)	36.7	(1.4)	35.8	(1.4)	11.6	(1.1)
	Part-time employed (self-employed, employee)	448.6	(16.2)	247	(2.4)	(48.7)	7.2	(1.3)	22.7	(2.7)	42.1	(2.4)	24.2	(2.1)	3.8	(1.0)
	Unemployed	360.4	(14.7)	241	(2.5)	(53.2)	10.3	(1.8)	25.5	(3.0)	38.9	(2.4)	21.3	(2.5)	3.9	(1.0)
	Pupil, student	360.3	(13.9)	267	(2.5)	(45.2)	2.8	(1.0)	15.0	(2.0)	38.4	(3.0)	34.6	(2.8)	9.1	(1.6)
	Apprentice, internship	11.3	(3.4)	245	(11.5)	(39.5)	2.3	(3.1)	30.9	(17.7)	47.1	(21.2)	19.6	(13.5)	0.1	(0.3)
	In retirement or early retirement	89.0	(6.1)	248	(4.3)	(52.5)	9.5	(2.4)	19.6	(3.4)	39.5	(4.4)	26.3	(4.5)	5.0	(1.7)
	Permanently disabled	106.8	(9.1)	188	(7.8)	(71.1)	40.3	(4.8)	23.8	(4.5)	26.8	(4.5)	8.4	(2.4)	0.7	(0.8)
	Fulfilling domestic tasks or looking after children/family	302.2	(13.3)	238	(2.7)	(51.8)	11.2	(1.9)	25.5	(2.6)	40.4	(2.9)	19.6	(2.0)	3.3	(0.9)
	Other	57.2	(7.0)	242	(6.0)	(51.7)	8.4	(3.3)	26.9	(6.2)	38.6	(7.2)	23.3	(6.0)	2.8	(2.3)
Native Speaker (English)/Born in Ireland	Native-born and native-language	2,330.2	(22.3)	255	(1.1)	(52.6)	6.7	(0.5)	19.1	(1.0)	38.4	(1.1)	28.5	(1.0)	7.3	(0.7)
	Native-born and foreign-language	26.0	(6.8)	259	(10.5)	(53.9)	8.6	(5.0)	18.8	(8.6)	33.7	(10.5)	28.4	(10.5)	10.6	(5.8)
	Foreign-born and native-language	345.4	(13.8)	265	(2.7)	(51.4)	4.5	(1.1)	13.9	(2.2)	38.4	(2.6)	33.6	(2.6)	9.6	(1.6)
	Foreign-born and foreign-language	278.1	(17.9)	246	(3.5)	(62.3)	13.6	(2.0)	15.7	(2.3)	36.9	(3.0)	27.1	(2.7)	6.7	(1.7)
Parents' highest level of education Age group 16-24	Neither parent has attained upper secondary	114.2	(7.8)	241	(4.4)	(49.6)	8.0	(2.8)	27.6	(4.4)	40.3	(4.8)	21.8	(4.6)	2.3	(1.6)
	At least one parent has attained secondary or post-secondary, non-tertiary	192.2	(10.6)	255	(3.4)	(42.4)	3.6	(1.6)	20.5	(3.1)	44.0	(4.5)	27.4	(3.7)	4.5	(1.8)
	At least one parent has attained tertiary	194.1	(11.4)	273	(3.3)	(44.3)	2.1	(1.2)	10.5	(2.5)	37.8	(3.9)	39.1	(3.9)	10.5	(2.3)

Table 3.2 (cont.) Mean scores and percentages of adults in Ireland at levels of numeracy proficiency

Variable	Level	No of adults 16-65		Numeracy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E. 000s	Mean	S.E.	S.D.	S.D.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	
																score
Immigration status	Immigrant (1st or 2nd generation)	543.7	(22.3)	257	(2.3)	(56.8)	8.5	(1.3)	14.5	(1.5)	37.1	(2.2)	31.5	(1.8)	8.4	(1.3)
	Non-immigrant	2,427.5	(23.1)	255	(1.1)	(52.6)	6.7	(0.5)	19.0	(1.0)	38.5	(1.1)	28.4	(0.9)	7.4	(0.6)
Health Status	Excellent	768.9	(21.2)	265	(1.8)	(47.4)	3.7	(0.8)	14.8	(1.3)	39.8	(1.7)	32.6	(1.7)	9.1	(1.0)
	Very good	1,100.8	(23.4)	261	(1.7)	(51.6)	5.3	(0.7)	17.0	(1.1)	37.9	(1.4)	30.9	(1.4)	8.9	(1.0)
	Good	772.4	(20.8)	252	(1.7)	(53.6)	7.9	(0.8)	19.1	(1.7)	39.0	(1.7)	28.2	(1.7)	5.8	(0.8)
	Fair	256.8	(10.8)	230	(3.9)	(59.9)	17.3	(2.7)	27.0	(3.8)	34.4	(3.3)	17.0	(2.4)	4.3	(1.2)
	Poor	80.7	(5.7)	213	(6.2)	(64.6)	24.4	(4.1)	29.4	(5.0)	31.1	(4.9)	12.5	(3.3)	2.7	(1.6)
Hours earnings excluding bonuses for current wage and salary earners in deciles	Lowest decile	169.3	(11.5)	243	(4.4)	(57.1)	11.4	(2.5)	22.7	(3.6)	36.6	(4.8)	23.7	(4.6)	5.6	(1.9)
	9th decile	164.0	(10.3)	247	(3.1)	(45.9)	6.7	(2.1)	21.8	(3.2)	45.9	(3.9)	22.3	(3.3)	3.4	(1.5)
	8th decile	148.9	(9.7)	251	(3.9)	(47.0)	4.9	(1.5)	24.1	(4.0)	41.8	(4.2)	24.0	(3.7)	5.2	(2.1)
	7th decile	145.1	(8.8)	255	(3.5)	(48.7)	7.1	(1.9)	17.6	(3.0)	41.2	(3.9)	27.8	(3.9)	6.2	(1.8)
	6th decile	144.4	(9.6)	265	(3.5)	(43.2)	2.2	(1.1)	16.4	(3.6)	39.9	(4.0)	33.8	(4.4)	7.7	(2.6)
	5th decile	139.8	(8.6)	266	(2.8)	(44.4)	2.4	(1.3)	14.7	(3.3)	42.9	(4.3)	31.2	(3.4)	8.7	(2.3)
	4th decile	131.1	(8.1)	275	(3.5)	(46.2)	2.0	(1.4)	11.0	(3.0)	36.9	(4.9)	38.2	(3.5)	11.9	(2.6)
	3rd decile	125.7	(9.0)	279	(3.4)	(45.1)	1.9	(1.3)	9.0	(2.1)	32.0	(3.9)	44.2	(3.8)	12.9	(2.9)
	2nd decile	127.7	(7.9)	288	(3.1)	(43.1)	0.6	(0.5)	6.8	(2.2)	30.6	(3.6)	42.4	(5.4)	19.6	(3.8)
	Highest decile	126.6	(8.5)	293	(3.5)	(47.0)	2.1	(1.3)	5.0	(1.7)	23.6	(3.9)	47.3	(4.2)	22.0	(3.2)

Table 3.2 (cont.) Mean scores and percentages of adults in Ireland at levels of numeracy proficiency

Variable	Level	No of adults 16-65		Numeracy mean score		Below Level 1		Level 1		Level 2		Level 3		Level 4/5		
		000s	S.E.	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	
																000s
Occupation (current job)	Armed forces	8.6	(2.8)	292	(12.4)	(35.6)	0.0	(0.0)	5.6	(5.6)	20.9	(18.0)	60.2	(20.8)	13.3	(12.7)
	Legislators, senior officials and managers	199.6	(9.9)	279	(3.4)	(46.3)	2.1	(1.2)	11.0	(2.6)	32.3	(3.7)	40.3	(3.9)	14.2	(2.6)
	Professionals	184.8	(11.3)	289	(1.9)	(41.7)	0.6	(0.3)	6.3	(1.0)	28.6	(2.4)	46.0	(2.3)	18.6	(1.9)
	Technicians and associate professionals	143.1	(9.2)	275	(3.2)	(46.2)	2.6	(1.1)	10.8	(1.9)	35.6	(3.2)	38.0	(3.5)	12.9	(3.2)
	Clerks	129.6	(7.7)	266	(3.0)	(44.5)	2.8	(1.2)	12.7	(3.0)	44.0	(3.1)	33.0	(3.1)	7.5	(1.9)
	Service workers and shop and market sales workers	107.1	(8.5)	250	(2.1)	(46.3)	6.1	(1.1)	22.3	(2.4)	43.1	(3.0)	24.5	(2.0)	4.0	(1.1)
	Skilled agricultural and fishery workers	385.2	(12.4)	253	(5.0)	(50.8)	6.4	(2.7)	15.8	(4.5)	48.1	(5.5)	23.5	(5.2)	6.3	(2.4)
	Craft and related trades workers	378.5	(15.5)	256	(4.0)	(54.0)	6.6	(1.7)	16.5	(3.3)	40.4	(4.1)	29.8	(3.3)	6.7	(1.7)
	Plant and machine operators and assemblers	80.8	(8.8)	247	(4.6)	(52.9)	8.1	(2.9)	22.9	(4.7)	39.7	(4.3)	24.8	(4.2)	4.4	(2.2)
	Elementary occupations	187.5	(10.6)	240	(3.7)	(52.5)	10.5	(2.4)	24.2	(3.9)	42.0	(4.5)	19.6	(3.1)	3.7	(1.8)
Industrial classification (current job)	Agriculture, forestry and fishing	87.4	(9.2)	253	(4.8)	(50.1)	6.7	(2.7)	16.3	(4.7)	48.0	(5.6)	22.7	(5.1)	6.3	(2.5)
	Industry	235.8	(11.3)	263	(3.3)	(56.0)	6.1	(1.6)	14.0	(2.7)	36.5	(3.4)	32.4	(3.4)	10.9	(1.9)
	Construction	105.6	(9.2)	261	(4.4)	(45.7)	4.0	(1.7)	15.7	(4.4)	42.2	(5.9)	32.0	(4.8)	6.0	(2.6)
	Wholesale and retail trade; repair of motor vehicles and motorcycles	246.2	(13.1)	256	(3.0)	(46.5)	5.3	(1.5)	18.0	(2.9)	42.6	(3.7)	28.7	(3.0)	5.4	(1.8)
	Transportation and storage	82.1	(6.7)	262	(5.0)	(50.3)	5.4	(2.9)	16.9	(4.3)	36.8	(5.4)	32.5	(4.8)	8.3	(3.2)
	Accommodation and food service activities	129.4	(9.9)	252	(3.8)	(50.7)	6.7	(2.1)	19.8	(3.2)	42.2	(4.4)	25.6	(3.6)	5.7	(1.9)
	Information and communication	62.1	(5.4)	302	(4.3)	(40.9)	0.6	(0.7)	3.7	(2.2)	19.2	(4.8)	48.4	(6.5)	28.0	(5.4)
	Financial, insurance and real estate activities	107.8	(8.5)	288	(4.0)	(43.8)	0.4	(0.8)	6.3	(2.4)	34.7	(4.7)	38.9	(5.2)	19.7	(3.5)
	Professional, scientific and technical activities	78.1	(7.1)	286	(4.2)	(44.4)	1.7	(1.2)	5.6	(2.1)	31.5	(4.6)	43.0	(5.2)	18.2	(3.8)
	Administrative and support service activities	69.8	(7.1)	258	(6.9)	(53.8)	7.1	(3.3)	17.7	(4.6)	35.4	(6.6)	31.3	(6.7)	8.4	(4.3)
	Public administration and defence; compulsory social security	102.9	(7.5)	277	(3.1)	(39.9)	0.9	(0.8)	9.9	(3.1)	36.3	(4.5)	43.3	(4.3)	9.6	(2.8)
	Education	152.4	(8.7)	281	(2.9)	(45.9)	1.6	(1.1)	11.0	(2.3)	30.2	(3.4)	42.3	(4.2)	14.9	(3.2)
	Human health and social work activities	243.4	(11.2)	253	(2.7)	(46.2)	5.1	(1.4)	20.5	(2.7)	42.3	(3.7)	27.6	(2.8)	4.5	(1.3)
	Other activities	102.8	(8.4)	253	(4.9)	(50.2)	6.0	(2.4)	21.0	(4.4)	39.2	(4.9)	28.5	(3.8)	5.3	(2.6)

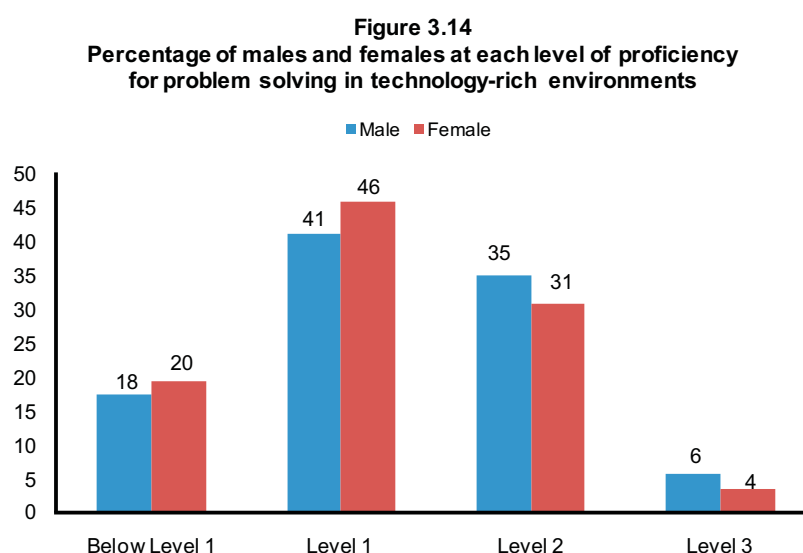
PROBLEM SOLVING IN TECHNOLOGY-RICH ENVIRONMENTS

This section presents the problem solving in technology-rich environments results for Irish adults who took the computer-based assessment. It does not include any information about those with no computer experience, those who failed the basic computer skills test or those who opted-out of the computer-based assessment in spite of having some level of computer experience (see Chapter 2 for this detail and a discussion of this issue). The percentages in this section only describe the performance of those who opted for a computer-based assessment and for whom a problem solving scale score was calculated.

Although the OECD has cautioned against the use of problem solving mean scores for inter-country comparisons they have advised that mean scores are still useful to assess the proficiency of subgroups within national populations relative to each other, and therefore mean scores are presented along with the percentages at each level in this section (Table 3.3). However, the mean scores and percentages at the different levels for problem solving presented here for Ireland cannot be compared directly with those of other countries.

Gender

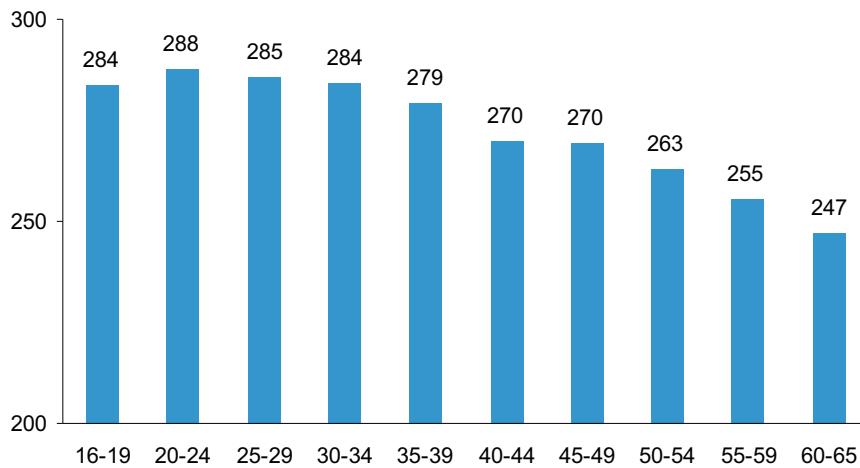
There is a statistically significant six-point gap between the mean scores of males (280) and females (274) on the problem solving scale. There is also a significant difference in the proportions of males (41.0%) proficient at Level 2 and Level 3 on the problem solving in technology-rich environments scale in comparison to females (34.4%) (Figure 3.14). The international data contains a similar trend for problem solving with 36% of males compared to 32% of women at Level 2 and Level 3 (OECD, 2013a).



Age Group

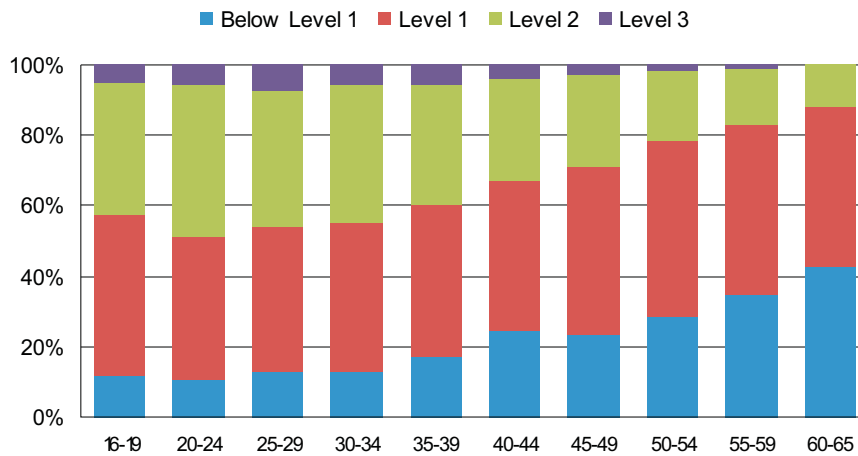
In Ireland the highest problem solving mean score is achieved by those in the 20-24 age group (288) while the lowest is achieved by those aged 60-65 (247). Mean scores for those aged between 16 and 34 are quite similar but gradually decrease for older age groups (Figure 3.15).

Figure 3.15
Problem solving in technology-rich environments
mean score by 5-year age groups



In general those aged under 34 in Ireland have the highest proportions at Level 2 and Level 3 on the proficiency scale for problem solving in technology-rich environments (Figure 3.16). For example, almost 50% of those aged 20-24 are at Level 2 or 3. This mirrors the average trend across participating countries where 50.7% of people aged 16-24 score at Level 2 or 3 but just 24.0% aged 55-65 score at the same level (OECD, 2013a). At the other end of the scale those aged 55-59 (82.9%) and aged 60-65 (88.3%) have the highest percentages at Level 1 and below.

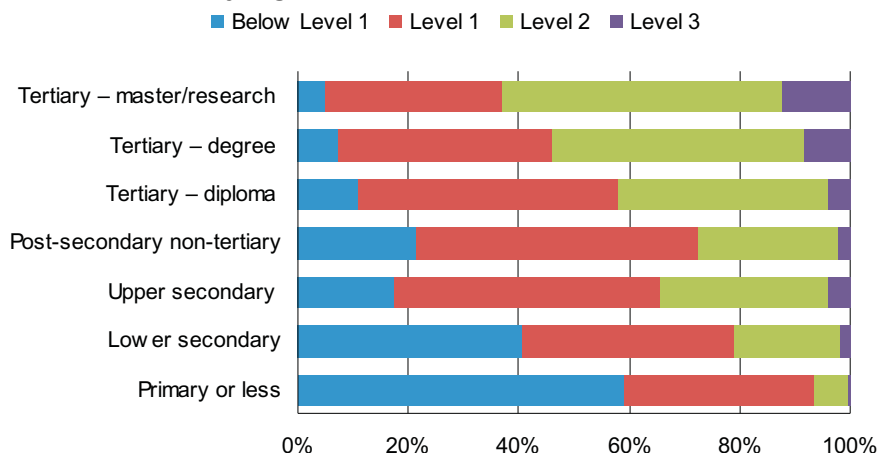
Figure 3.16
Percentage of adults at levels of problem solving in
technology-rich environments by 5-year age group



Highest level of education achieved

As is also the case for the literacy and numeracy domains, there is a positive correlation between educational achievement and problem solving proficiency. Adults with higher levels of education have higher mean scores on the problem solving scale and feature more prominently at Levels 2 and 3. There is a sizeable gap between the mean scores of those whose highest level of education is a master's degree or higher (301) and those whose highest level of education is lower secondary (254). Across the levels of the problem solving scale about half (50.8%) of those with a master's degree or higher score at Level 2 compared to around one fifth (19.1%) of those whose highest level of education is lower secondary (i.e. Junior Certificate) at the same level. Although only a small portion of the overall population are at Level 3 on the problem solving scale, this ranges from 1.9% for those whose highest level of education is lower secondary to 12.2% of those with a master's degree or higher (Figure 3.17).

Figure 3.17
Percentage of adults at levels of problem solving in
technology-rich environments
by highest level of education achieved



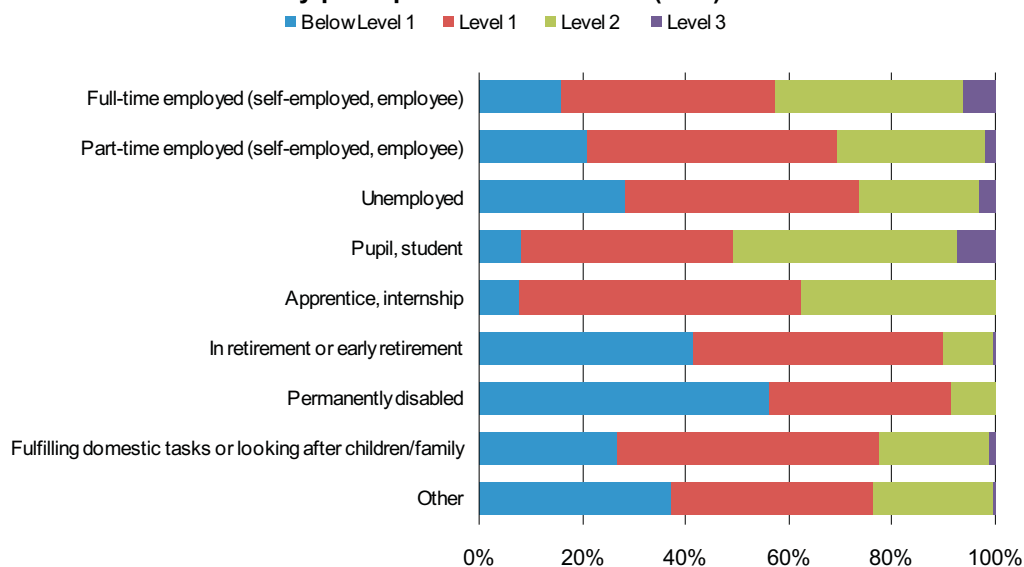
Principal Economic Status

In contrast to the literacy and numeracy domains, where employed people and students have a similar level of performance, students are the strongest performers on the problem solving in technology-rich environments scale. Students have the highest mean score (291) followed by those in full-time employment (282), while retired people (246) have the lowest mean score. Interestingly, and again in contrast to the trends seen for literacy and numeracy, those working in the home (264) perform better than retired people in this domain.

Students have the largest representation at Levels 2 and 3 of the problem solving proficiency scale with 50.8% at these levels, followed by 42.5% of those in full time employment and 37.7% of apprentices. Three quarters of those who are unemployed (73.5%) and those fulfilling domestic tasks or looking after children (77.6%) are at or below Level 1 on this scale. In addition, 89.9% of the retired population are also at these lower levels for problem solving. There is only a 4.3% difference between the percentage of those who are unemployed (73.5%) and in part-time employment (69.2%) at or below Level 1 on the problem solving scale (Figure 3.18).

Across all PIAAC participating countries, a majority of employed individuals either do not display proficiency or score at or below Level 1 on the problem solving in technology-rich environments scale, with only about 6% of workers on average scoring at Level 3. Caution is advised when interpreting these results, however, as not all employed individuals completed the problem solving assessment module (OECD, 2013a).

Figure 3.18
Percentage of adults at each level of proficiency for problem
solving in technology-rich environments
by principal economic status (PES)



Summary findings for problem solving in technology-rich environments for other socio-demographic characteristics

Native language/Born in Ireland

Unlike literacy and numeracy, there is no significant difference between the mean score for Irish-born native-English (*native-born and native language*) speakers (276) and those not born in Ireland who are non-native English (*foreign-born and foreign language*) speakers (275) on the problem solving proficiency scale. Similarly, across Levels 2 and 3 of the problem solving scale, there is no substantial difference between the percentage of Irish-born native-English (*native-born and native language*) speakers (37.0%) at these levels, and those not born in Ireland who are not native-English (*foreign-born and foreign language*) speakers (34.8%) (Table 3.3).

However, those who were not born in Ireland and are native English speakers (*foreign-born native language*) have a higher mean score (282) and a higher percentage at Levels 2 and 3 (42.3%) than all other groups in this category⁹.

Immigration status

An analysis of immigrant and non-immigrant adults across the problem solving proficiency levels shows no substantial difference between the groups. International comparisons show mixed results due to the variation in both the size and composition of immigrant populations (OECD, 2013a).

Parents' highest level of education (Adults aged 16-24)

Using parents' educational attainment as an analysis variable for those aged 16 to 24, comparisons on the problem solving scale are similar to the findings for literacy and numeracy. Problem solving mean scores increase with the highest educational level of the parent. Also 60.6% of adults aged 16-24 with at least one parent with tertiary education score at Levels 2 and 3 compared to 39.3% of those with at least one parent who attained upper secondary education and 29.4% of those with neither parent achieving upper secondary education (Table 3.3).

Hourly income deciles¹⁰

Those in the highest hourly income decile have the highest problem solving mean score (293). More than two fifths (44.5%) of those in the top income decile score at Level 1 or below on the problem solving scale, compared to almost two-thirds (63.2%) of those at the lowest income decile. At the upper end of the proficiency scale (Level 3), the highest proportions of adults are in the highest income decile (8.6%) (Table 3.3).

Occupation

Approximately three quarters of adults with occupations in *Elementary occupations, Plant and machine operators and assemblers* and *Skilled agricultural and fishery workers* are at or below Level 1 on the problem solving in technology-rich environments scale, while around half of those with occupations as *Professionals, Legislators, senior officials and managers* and *Technicians and associate professionals* are at or above Level 2 (Table 3.3).

International findings are similar to Ireland, with a cross-country average showing a higher number of adults in skilled occupations (51%) scoring at Level 2 or 3 than those in elementary occupations (20%) (OECD, 2013a).

⁹ The percentages for *native-born and foreign language* group are marginally higher but have large standard errors.

¹⁰ Hourly income deciles were calculated by listing the hourly income rate for each person in the sample and then grouping the highest earning 10% of respondents together, then the next highest earning 10% and so on.

Industrial sector

Adults working in the *Information and communication* sector score on average nearly 13 points higher than those in every other industrial sector on the problem solving proficiency scale (Figure 3.19). Almost 70% (68.6%) of those in this sector score at Level 2 and 3, followed by just over half (55.1%) of those in the *Professional, scientific and technical activities* sector. *Agriculture, forestry and fishing* has the lowest percentage of workers at Level 2 and 3 (22.4%) (Table 3.3).

Figure 3.19
Problem solving in technology-rich environments
mean scores by industrial sector

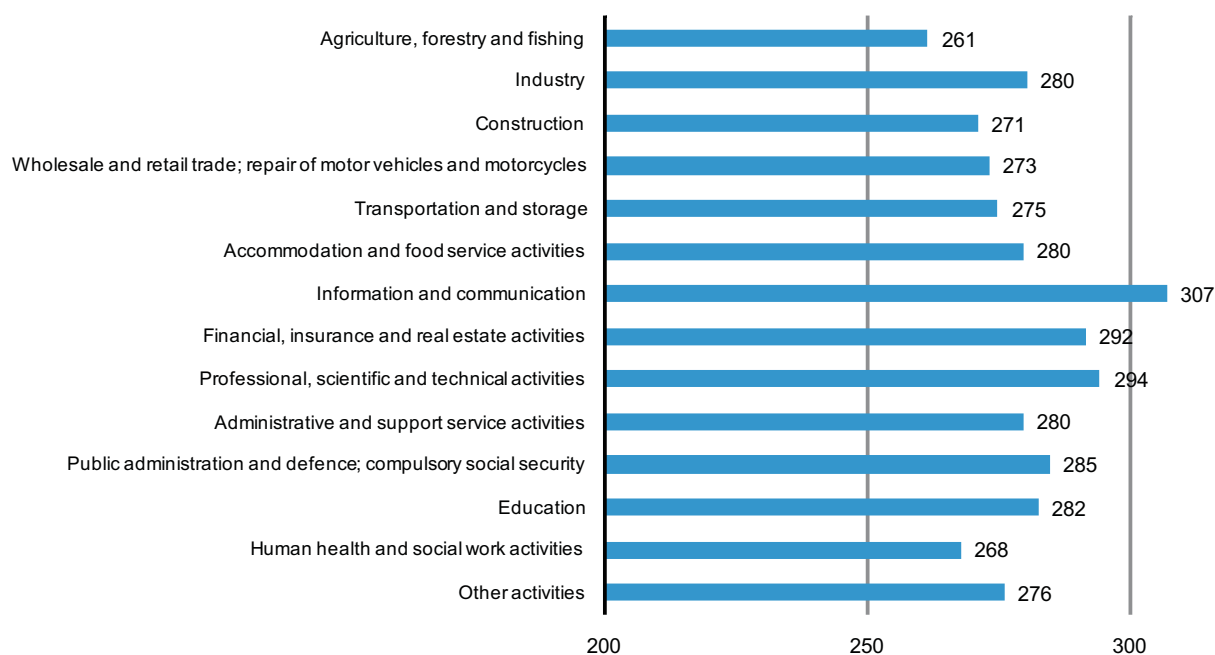


Table 3.3 Mean scores and percentages of adults in Ireland at levels of problem solving in a technology-rich environment proficiency

Variable	No of adults 16-65		PS-TRE mean score		Below Level 1		Level 1		Level 2		Level 3			
	000s	S.E. 000s	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.		
Population 16-65	2,015.3	(22.2)	277	(1.0)	40.2	(40.2)	18.7	(1.0)	43.8	(1.2)	32.9	(1.2)	4.7	(0.5)
Gender														
Male	961.3	(15.4)	280	(1.4)	(41.1)		17.6	(1.4)	41.3	(1.5)	35.1	(1.6)	5.9	(0.7)
Female	1,054.0	(16.0)	274	(1.2)	(39.1)		19.6	(1.1)	46.0	(1.9)	30.9	(1.7)	3.5	(0.6)
Age (5 year)														
16-19	230.1	(10.3)	284	(2.7)	(35.7)		11.9	(2.8)	45.6	(4.6)	37.3	(4.5)	5.2	(2.1)
20-24	228.4	(9.5)	288	(2.3)	(35.6)		10.7	(2.2)	40.3	(3.2)	43.4	(3.6)	5.6	(1.7)
25-29	250.7	(11.4)	285	(2.4)	(39.1)		12.8	(2.2)	40.9	(3.2)	39.2	(3.2)	7.1	(1.5)
30-34	328.0	(11.4)	284	(2.3)	(38.1)		13.2	(1.9)	42.2	(3.1)	39.0	(3.0)	5.7	(1.6)
35-39	256.3	(10.2)	279	(2.3)	(41.0)		17.3	(2.4)	42.8	(3.1)	34.1	(2.6)	5.8	(1.2)
40-44	245.8	(8.1)	270	(2.1)	(42.4)		24.5	(2.5)	42.8	(2.7)	28.8	(2.6)	3.9	(1.0)
45-49	160.5	(8.1)	270	(2.6)	(38.7)		23.2	(3.1)	48.0	(3.5)	25.9	(2.8)	2.9	(1.1)
50-54	139.7	(8.3)	263	(3.3)	(37.9)		28.6	(4.0)	49.7	(4.0)	19.9	(3.2)	1.8	(1.0)
55-59	97.6	(7.8)	255	(2.9)	(37.8)		34.4	(4.1)	48.5	(4.7)	16.1	(3.6)	1.0	(1.1)
60-65	78.3	(5.7)	247	(3.8)	(37.9)		42.8	(5.0)	45.5	(5.2)	11.5	(3.3)	0.2	(0.5)
Education														
Primary or less (ISCED 1 or less)	40.1	(5.3)	232	(5.4)	(37.1)		59.2	(8.3)	34.4	(9.0)	6.2	(4.5)	0.2	(0.5)
Lower secondary (ISCED 2, ISCED 3C short)	308.0	(10.8)	254	(2.9)	(44.1)		40.5	(3.3)	38.5	(3.1)	19.1	(2.6)	1.9	(1.3)
Upper secondary (ISCED 3A-B, C long)	481.4	(13.8)	276	(1.8)	(36.5)		17.5	(2.1)	48.1	(2.7)	30.6	(2.8)	3.8	(0.9)
Post-secondary, non-tertiary (ISCED 4A-B-C)	359.5	(14.9)	269	(1.7)	(36.7)		21.5	(1.8)	51.1	(2.3)	25.3	(2.1)	2.1	(0.7)
Tertiary – diploma (ISCED 5B)	311.9	(10.9)	283	(1.9)	(33.3)		10.8	(2.0)	47.4	(3.0)	38.0	(2.4)	3.8	(1.2)
Tertiary – bachelor degree (ISCED 5A)	313.3	(9.9)	293	(1.6)	(35.2)		7.1	(1.4)	39.0	(2.4)	45.6	(2.5)	8.3	(1.5)
Tertiary – master's/research degree (ISCED 5A/6)	200.9	(9.1)	301	(2.1)	(35.4)		4.9	(1.2)	32.1	(2.7)	50.8	(3.1)	12.2	(2.2)

Note: Percentages describe those who opted for a computer-based assessment and exclude those with no computer experience, those who failed the basic computer skills test and those who opted-out of the computer-based assessment in spite of having some level of computer experience.

Table 3.3 (cont.) Mean scores and percentages of adults in Ireland at levels of problem solving in a technology-rich environment proficiency

Variable	Level	No of adults 16-65		PS-TRE mean score		Below Level 1		Level 1		Level 2		Level 3			
		000s	S.E.	Mean	S.E.	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.		
Principal Economic Status	Full-time employed (self-employed, employee)	920.7	(19.8)	282	(1.3)	(40.1)	15.7	(1.2)	41.8	(1.7)	36.5	(1.7)	6.0	(0.9)	
	Part-time employed (self-employed, employee)	282.1	(14.2)	271	(2.0)	(37.2)	20.8	(2.2)	48.4	(3.3)	28.7	(2.7)	2.1	(0.9)	
	Unemployed	221.6	(12.0)	265	(2.8)	(40.3)	28.2	(3.0)	45.3	(3.0)	23.4	(2.7)	3.1	(1.5)	
	Pupil, student	331.3	(14.0)	291	(2.1)	(34.6)	8.1	(2.0)	41.1	(3.5)	43.6	(3.4)	7.2	(1.6)	
	Apprentice, internship	10.8	(3.2)	280	(9.3)	(25.5)	7.7	(11.1)	54.7	(19.5)	37.5	(18.2)	0.2	(0.8)	
	In retirement or early retirement	43.2	(4.2)	246	(4.7)	(38.4)	41.3	(6.5)	48.6	(6.6)	9.9	(3.2)	0.3	(0.6)	
	Permanently disabled	20.4	(3.9)	236	(7.8)	(38.1)	56.4	(11.6)	34.9	(11.1)	8.7	(5.5)	0.0	(0.0)	
	Fulfilling domestic tasks or looking after children/family	151.7	(8.8)	264	(2.9)	(37.8)	26.6	(3.2)	51.0	(3.4)	21.0	(3.3)	1.3	(0.8)	
	Other	33.6	(4.8)	256	(6.1)	(42.2)	37.4	(8.1)	38.8	(8.5)	23.3	(6.9)	0.6	(0.8)	
	Native Speaker (English)/Born in Ireland	Native-born and native-language	1,575.6	(25.9)	276	(1.1)	(40.3)	19.0	(1.1)	44.0	(1.5)	32.4	(1.3)	4.6	(0.5)
		Native-born and foreign-language	8.9	(2.9)	276	(20.5)	(46.3)	26.6	(20.7)	30.4	(14.5)	37.1	(16.3)	5.9	(8.9)
		Foreign-born and native-language	268.1	(11.6)	282	(2.2)	(38.6)	16.0	(2.2)	41.8	(3.2)	37.3	(3.4)	4.9	(1.3)
		Foreign-born and foreign-language	162.7	(10.6)	275	(2.7)	(40.0)	19.1	(3.3)	46.1	(4.4)	30.4	(3.5)	4.4	(1.5)
	Parents' highest level of education Age group 16-24	Neither parent has attained upper secondary	88.6	(7.8)	272	(3.8)	(36.9)	20.4	(4.3)	50.1	(6.4)	26.2	(5.5)	3.2	(2.0)
At least one parent has attained secondary or post-secondary, non-tertiary		175.5	(10.1)	280	(3.0)	(33.8)	12.9	(2.7)	47.7	(4.7)	36.0	(5.2)	3.4	(1.9)	
At least one parent has attained tertiary		181.6	(11.0)	299	(2.3)	(31.8)	4.2	(2.0)	35.3	(3.8)	52.0	(4.2)	8.6	(2.7)	

Note: Percentages describe those who opted for a computer-based assessment and exclude those with no computer experience, those who failed the basic computer skills test and those who opted-out of the computer-based assessment in spite of having some level of computer experience.

Table 3.3 (cont.) Mean scores and percentages of adults in Ireland at levels of problem solving in a technology-rich environment proficiency

Variable	Level	No of adults 16-65		PS-TRE mean score		Below Level 1		Level 1		Level 2		Level 3			
		000s	S.E. 000s	Mean	S.E.	Mean	S.D.	%	S.E.	%	S.E.	%	S.E.		
Immigration status	Immigrant (1st or 2nd generation)	378.1	(14.8)	280	(1.8)	(39.7)		16.7	(1.8)	43.0	(2.7)	35.2	(2.6)	5.1	(1.1)
	Non-immigrant	1,633.9	(27.1)	276	(1.1)	(40.2)		19.1	(1.1)	44.0	(1.4)	32.4	(1.3)	4.6	(0.5)
Health Status	Excellent	600.2	(20.1)	281	(1.6)	(38.9)		15.3	(1.5)	43.7	(2.0)	36.0	(1.9)	5.0	(0.8)
	Very good	803.9	(20.7)	278	(1.4)	(40.5)		18.2	(1.5)	43.3	(2.0)	33.5	(1.7)	5.0	(0.9)
	Good	459.4	(17.9)	275	(1.8)	(39.0)		19.4	(1.8)	45.3	(2.7)	31.4	(2.7)	3.9	(1.0)
	Fair	126.4	(8.8)	263	(3.5)	(43.8)		31.9	(4.4)	41.2	(5.0)	22.5	(3.6)	4.4	(1.9)
	Poor	25.3	(3.5)	258	(6.0)	(39.8)		33.6	(9.9)	46.3	(11.9)	18.8	(6.9)	1.4	(2.1)
Hours earnings excluding bonuses for current wage and salary earners in deciles	Lowest decile	110.2	(9.2)	275	(3.7)	(39.2)		20.4	(4.0)	42.8	(4.6)	34.0	(4.6)	2.8	(1.7)
	9th decile	112.1	(9.3)	269	(3.7)	(41.7)		24.2	(4.0)	46.4	(6.2)	26.5	(5.6)	3.0	(2.3)
	8th decile	104.2	(8.4)	273	(3.5)	(41.6)		23.0	(3.6)	40.9	(4.4)	31.5	(4.9)	4.6	(2.6)
	7th decile	103.8	(8.4)	277	(3.1)	(39.8)		17.7	(3.5)	43.8	(4.3)	35.1	(4.2)	3.5	(1.8)
	6th decile	103.1	(7.8)	278	(3.3)	(37.1)		16.1	(4.4)	45.0	(6.6)	35.4	(5.7)	3.6	(1.9)
	5th decile	107.2	(7.4)	282	(3.1)	(36.9)		12.6	(2.9)	47.5	(4.9)	33.7	(4.2)	6.2	(2.3)
	4th decile	108.1	(7.9)	283	(2.9)	(37.8)		13.7	(3.0)	43.6	(5.3)	37.5	(4.8)	5.1	(2.1)
	3rd decile	103.8	(8.2)	287	(3.0)	(37.8)		10.4	(2.8)	44.6	(4.8)	37.6	(4.2)	7.4	(2.2)
	2nd decile	105.9	(7.1)	288	(2.6)	(35.0)		8.8	(3.0)	44.8	(5.3)	40.2	(4.2)	6.2	(2.2)
	Highest decile	112.4	(8.0)	293	(3.0)	(36.7)		8.8	(2.7)	35.6	(4.4)	46.9	(4.4)	8.6	(2.4)

Note: Percentages describe those who opted for a computer-based assessment and exclude those with no computer experience, those who failed the basic computer skills test and those who opted-out of the computer-based assessment in spite of having some level of computer experience.

Table 3.3 (cont.) Mean scores and percentages of adults in Ireland at levels of problem solving in a technology-rich environment proficiency

Variable	Level	No of adults 16-65		PS-TRE mean score		Below Level 1		Level 1		Level 2		Level 3		
		000s	S.E. 000s	Mean	S.E.	S.D.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Occupation (current job)	Armed forces	5.3	(1.9)	282	(11.6)	(28.7)	9.8	(9.5)	46.3	(33.9)	44.0	(32.0)	0.0	(0.0)
	Legislators, senior officials and managers	100.4	(6.5)	286	(3.1)	(39.8)	12.9	(3.2)	40.0	(4.4)	39.7	(4.4)	7.4	(2.7)
	Professionals	341.7	(11.9)	291	(1.9)	(37.0)	9.5	(1.8)	39.2	(2.5)	42.8	(2.4)	8.4	(1.5)
	Technicians and associate professionals	155.8	(9.2)	287	(2.3)	(35.1)	10.2	(2.1)	43.3	(3.5)	41.1	(3.7)	5.4	(1.8)
	Clerks	171.0	(8.8)	281	(2.9)	(37.0)	14.2	(2.5)	45.4	(4.6)	36.1	(4.6)	4.2	(1.5)
	Service workers and shop and market sales workers	254.8	(12.8)	272	(2.2)	(40.0)	21.7	(2.6)	45.8	(3.3)	29.2	(2.8)	3.3	(1.3)
	Skilled agricultural and fishery workers	33.3	(4.7)	261	(6.6)	(40.2)	30.8	(7.5)	45.7	(9.2)	20.9	(7.8)	2.7	(3.2)
	Craft and related trades workers	99.9	(9.0)	271	(4.2)	(41.4)	23.3	(4.2)	44.0	(5.4)	28.9	(4.4)	3.8	(1.7)
	Plant and machine operators and assemblers	62.3	(6.5)	265	(4.3)	(36.3)	25.0	(4.6)	52.3	(6.0)	20.9	(5.0)	1.8	(1.6)
	Elementary occupations	81.6	(7.5)	261	(4.3)	(40.0)	31.8	(6.3)	44.6	(6.4)	21.7	(4.4)	1.9	(1.7)
Industrial classification (current job)	Agriculture, forestry and fishing	38.7	(5.6)	261	(6.7)	(37.9)	32.1	(8.5)	45.5	(8.5)	20.1	(6.5)	2.4	(3.1)
	Industry	170.0	(9.6)	280	(2.6)	(40.4)	16.7	(3.1)	41.4	(3.4)	36.5	(3.0)	5.4	(1.5)
	Construction	60.1	(7.8)	271	(5.0)	(37.6)	20.7	(5.1)	48.8	(5.9)	27.5	(5.6)	3.0	(3.2)
	Wholesale and retail trade; repair of motor vehicles and motorcycles	177.3	(11.1)	273	(2.7)	(40.1)	21.0	(2.8)	44.1	(3.9)	32.0	(3.4)	2.9	(1.3)
	Transportation and storage	49.1	(5.4)	275	(5.1)	(38.3)	19.7	(5.7)	44.2	(7.2)	33.3	(6.1)	2.8	(2.7)
	Accommodation and food service activities	88.7	(8.1)	280	(3.5)	(37.4)	16.8	(3.4)	42.6	(5.8)	36.6	(5.4)	4.0	(2.0)
	Information and communication	59.5	(5.5)	307	(3.3)	(32.8)	2.3	(1.6)	29.1	(5.2)	53.8	(5.4)	14.8	(3.5)
	Financial, insurance and real estate activities	101.0	(8.2)	292	(3.6)	(38.7)	9.4	(2.9)	39.4	(4.7)	40.8	(4.7)	10.4	(3.1)
	Professional, scientific and technical activities	68.2	(6.3)	294	(3.8)	(34.5)	6.4	(2.1)	38.6	(5.0)	47.2	(5.2)	7.9	(3.0)
	Administrative and support service activities	49.9	(6.8)	280	(5.7)	(43.1)	17.4	(5.1)	41.3	(6.2)	34.1	(7.5)	7.1	(4.2)
	Public administration and defence; compulsory social security	81.1	(6.5)	285	(3.5)	(31.6)	8.2	(3.5)	49.2	(7.8)	39.1	(5.9)	3.6	(2.1)
	Education	127.3	(7.5)	282	(2.9)	(36.0)	13.0	(3.0)	45.1	(4.3)	36.8	(4.0)	5.1	(2.0)
	Human health and social work activities	167.0	(9.8)	268	(2.4)	(38.9)	24.0	(2.6)	49.1	(3.7)	24.0	(3.1)	2.9	(1.2)
	Other activities	68.4	(7.1)	276	(4.4)	(41.4)	20.8	(4.9)	41.4	(6.2)	33.0	(5.7)	4.7	(2.5)

Note: Percentages describe those who opted for a computer-based assessment and exclude those with no computer experience, those who failed the basic computer skills test and those who opted-out of the computer-based assessment in spite of having some level of computer experience.

Chapter 4

Trends in Adult Literacy

IALS – TRENDS IN LITERACY PROFICIENCY

In 1994 the International Adult Literacy Survey (IALS) was conducted in Ireland by the Educational Research Centre, St. Patrick's College, Drumcondra (Morgan et al., 1997). The use of common or so-called linking items in the IALS and PIAAC surveys and IRT methodology allows the results of both surveys to be compared in a general but meaningful way.

Although the target populations for both surveys were identical (i.e. non-institutionalised persons aged 16-65) and both measure 'literacy', it is not possible to directly compare the IALS data published in 1997 with the new PIAAC data and a number of technical adjustments of the IALS data were required.

Firstly, the IALS survey collected data for three individual literacy dimensions; prose, document and quantitative literacy, while PIAAC only used a single literacy framework. For comparability purposes the IALS data for the prose and document scales have been combined by the OECD into a single IALS literacy scale. The IALS quantitative literacy data was not used.

Secondly, because there now exists a lot more information about the items that were initially used in IALS and subsequently used in ALL and PIAAC, it was possible for ETS and the OECD to refine the item parameters used in IALS and produce more accurate literacy estimates for IALS. Importantly, this 'rescaling' process has slightly changed the IALS results for all participating countries. Previously IALS estimated that 25% of Irish adults were at or below Level 1 in 1994 while the newly scaled data now puts this figure at 22%.

There are a number of things to bear in mind when comparing the IALS and PIAAC literacy data.

- IALS had a much smaller sample size (2,439 respondents) than PIAAC (5,983), and had a lower overall response rate (60%) than PIAAC (72%).
- In IALS the assessment was exclusively carried out on paper booklets, whereas PIAAC used a combination of paper and computer-based assessments.
- Through the inclusion of an assessment of 'reading components' PIAAC provides considerably more information about the skills of weaker readers than has been previously available.
- There was considerable variation in the survey execution of IALS across countries to such an extent that it has been argued that international comparisons based on IALS data should be interpreted with caution (OECD, 2013a). On the other hand, PIAAC has been described by the OECD as one of the most closely monitored and controlled surveys of its type, notwithstanding the large variations in response rates across countries.

INTERNATIONAL TRENDS: IALS vs PIAAC

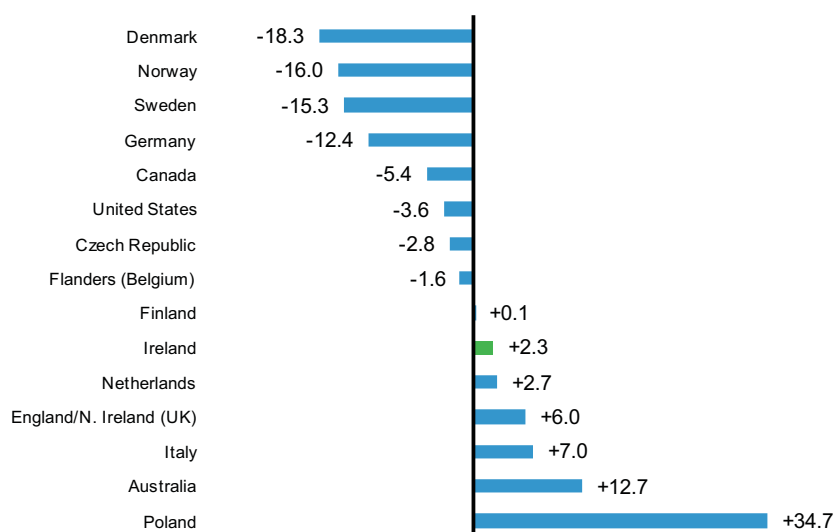
This section looks at the international trends (IALS) in adult literacy proficiency over time by looking at the performance of countries who participated in both the IALS and PIAAC surveys. In total, 15 countries participated in both IALS and PIAAC. Data collection for IALS took place at different times across countries between the years 1994 and 1998.

The data presented in this section is based on the unadjusted PIAAC mean score in order to maintain comparability with the international report. Consequently, the PIAAC mean score and proportions of adults at lower levels of literacy may be underestimated as some countries have relatively high levels of literacy-related non-response. In Ireland the PIAAC unadjusted literacy mean score is 267 (266 adjusted) and the proportion of respondents at or below Level 1 is 17.5% (17.9% adjusted).

Literacy mean scores

Table 4.1 contains the IALS (1994-1998) and PIAAC (2012) mean literacy scale scores for countries who participated in both surveys. The table shows that in three countries, Ireland, Finland and Flanders (Belgium) there has been no statistically significant change in the average literacy proficiency of the adult population since 1994. In five countries there has been a significant increase in mean scores (Australia, England/Northern Ireland (UK), Italy, the Netherlands and Poland), while in seven there has been a significant decrease in scores. The most substantial gains in mean score points between the two surveys were in Poland (+35) and Australia (+13), while the largest falls were in Denmark (-18), Norway (-16) and Sweden (-15) (Figure 4.1).

Figure 4.1
Literacy mean score change
(IALS 1994 vs PIAAC 2012)



This table (Table 4.1) also contains the literacy mean score of countries who participated in ALL (Adult Literacy and Life skills survey) between 2003 and 2007, and allows for a more detailed trend analysis for six countries.

Table 4.1 International comparison of literacy mean scores between IALS, ALL and PIAAC

Surveys	IALS		ALL		PIAAC		Change between IALS and PIAAC		
	1994-1998		2003-2007		2012 ¹		Change between 1994-1998 and 2012		
Years	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	p value
Australia	268	(1.0)	273	(0.6)	280	(0.9)	13	(1.3)	0.000 *
Austria					269	(0.7)			
Canada	279	(2.6)	280	(0.7)	273	(0.6)	-5	(2.7)	0.043 *
Cyprus					269	(0.8)			
Czech Republic	277	(1.0)			274	(1.0)	-3	(1.4)	0.047 *
Denmark	289	(0.8)			271	(0.6)	-18	(1.0)	0.000 *
England ²					273	(1.1)			
England/N. Ireland (UK)	266	(1.7)			272	(1.0)	6	(2.0)	0.002 *
Estonia					276	(0.7)			
Finland	287	(0.9)			288	(0.7)	0	(1.1)	0.961
Flanders (Belgium)	277	(3.4)			275	(0.8)	-2	(3.5)	0.645
France					262	(0.6)			
Germany	282	(1.0)			270	(0.9)	-12	(1.4)	0.000 *
Ireland	264	(3.2)			267	(0.9)	2	(3.3)	0.483
Italy	243	(1.8)	226	(1.7)	250	(1.1)	7	(2.1)	0.001 *
Japan					296	(0.7)			
Korea					273	(0.6)			
Netherlands	281	(0.8)	281	(0.9)	284	(0.7)	3	(1.0)	0.008 *
Northern Ireland ²					269	(1.9)			
Norway	294	(1.1)	295	(0.8)	278	(0.6)	-16	(1.3)	0.000 *
Poland	232	(1.1)			267	(0.6)	35	(1.2)	0.000 *
Slovak Republic					274	(0.6)			
Spain					252	(0.7)			
Sweden	295	(1.1)			279	(0.7)	-15	(1.3)	0.000 *
United States	273	(1.4)	268	(1.3)	270	(1.0)	-4	(1.7)	0.040 *

Notes:

Only some of the PIAAC participating countries also participated in IALS and ALL but all are shown above.

¹The mean score for PIAAC is the unadjusted mean score which ignores literacy related non-response.

² Rescaled (2012) IALS literacy data is not available separately for England and Northern Ireland.

Source: Survey of Adult Skills (PIAAC) (2012) and OECD, IALS database and ALL database

* p<.05 (Statistically significant difference)

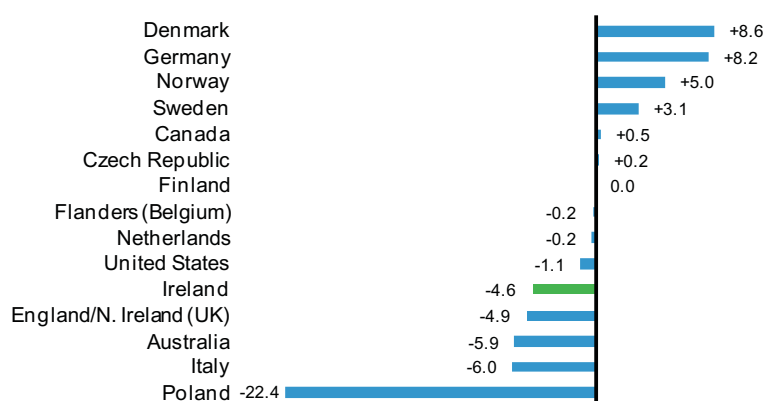
Countries are sorted alphabetically

Levels of literacy scale

The distribution of adults across the levels of the literacy scale for IALS and PIAAC help to explain the changes in the mean scores (Table 4.2). In four of the countries that participated in both IALS and PIAAC there has been an increase in the percentage of their adult populations who scored at the lowest levels (at or below Level 1) of the literacy scale: Denmark (+8.6%), Germany (+8.2%), Norway (+5.0%) and Sweden (+3.1%).

On the other hand, in eight countries the percentage of adults 16-65 at or below Level 1 has fallen, including Ireland (-4.6%). Poland had the most significant reduction in the percentage of adults at the lowest levels of literacy, a drop of 22.4% from 41.1% in IALS to 18.8% in PIAAC (Figure 4.2). In three countries there has been little or no change in the percentage of adults at or below Level 1 (Finland, Czech Republic and Canada).

Figure 4.2
Change in percentage of adults at or below Level 1
on the literacy proficiency scale between IALS and
PIAAC



At the top of the literacy scale, 11 of the 15 countries who participated in both surveys had a drop in the percentage of adults at Levels 3, 4 and 5 (Table 4.2). Denmark (-16.1%), Norway (-15.1%) and Sweden (-10.6%) had the largest reductions, while Ireland had a very small reduction of just under 1%. Only two countries added significantly to their proportion of adults at the top end of the literacy scale, Poland (+20.7%) and Australia (+6.7%) (Figure 4.3).

The percentages at the different levels of literacy proficiency for PIAAC are based on all those who received a literacy mean score. These percentages do not factor in those who did not respond to PIAAC for literacy-related reasons. This approach is taken in order to compare IALS and PIAAC on the same basis, as IALS did not isolate the percentage of those who failed to respond to the survey for literacy-related reasons (Murray et al, 1998).

Figure 4.3
Change in percentage of adults at Levels 3, 4 or 5
on the literacy proficiency scale between IALS and
PIAAC

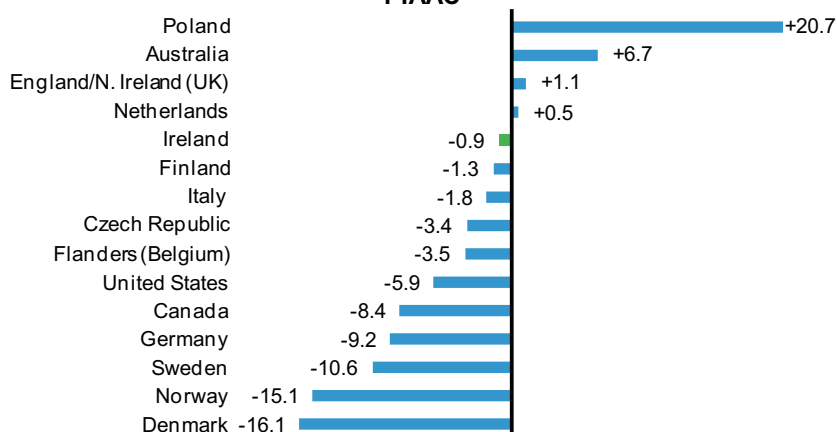


Table 4.2 Percentage of adults (16-65) at each level of the literacy proficiency scale for IALS (1994-98) and PIAAC (2012)

Countries	PIAAC 2012										Difference in percentage of adults at top and bottom of proficiency scale							
	IALS 1994-1998					PIAAC 2012					At or below Level 1	Differ ence	At Levels 3-4-5	Differ ence				
	Level 1	Level 2	Level 3	Level 4	Level 5	Below Level 1	Level 1	Level 2	Level 3	Level 4					Level 5			
% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.		
Australia	7.9 (0.5)	10.8 (0.5)	30.5 (0.7)	38.3 (0.7)	11.8 (0.5)	0.7 (0.1)	3.2 (0.3)	9.6 (0.6)	29.7 (0.7)	40.1 (0.9)	16.0 (0.8)	1.3 (0.2)	18.7	12.8	-5.9	50.8	57.5	6.7
Austria							2.5 (0.3)	13.1 (0.7)	37.9 (0.9)	38.0 (0.9)	8.3 (0.5)	0.3 (0.1)						
Canada	7.3 (1.1)	8.9 (1.3)	24.1 (2.3)	39.7 (2.2)	18.1 (2.2)	2.1 (0.9)	3.9 (0.2)	12.7 (0.5)	32.1 (0.7)	37.6 (0.7)	12.8 (0.5)	0.9 (0.1)	16.1	16.6	0.5	59.8	51.3	-8.4
Cyprus							1.9 (0.3)	12.5 (0.6)	40.1 (1.1)	39.0 (1.1)	6.3 (0.5)	0.2 (0.1)						
Czech Republic	2.1 (0.4)	9.6 (0.8)	34.6 (1.4)	42.5 (1.4)	10.7 (0.9)	0.5 (0.2)	1.5 (0.3)	10.3 (0.7)	37.7 (1.6)	41.7 (1.4)	8.3 (0.8)	0.4 (0.2)	11.6	11.9	0.2	53.8	50.4	-3.4
Denmark	1.2 (0.2)	6.0 (0.6)	26.6 (1.1)	48.5 (1.1)	17.0 (0.9)	0.7 (0.2)	3.8 (0.3)	11.9 (0.6)	34.1 (0.9)	40.1 (0.8)	9.7 (0.5)	0.4 (0.1)	7.2	15.8	8.6	66.2	50.1	-16.1
England																		
England/N. Ireland (UK)	7.5 (0.8)	14.0 (0.8)	29.9 (1.2)	34.2 (1.1)	13.3 (0.9)	1.0 (0.2)	3.3 (0.4)	13.3 (0.7)	33.7 (1.0)	36.4 (1.0)	12.5 (0.7)	0.8 (0.2)	21.6	16.6	-4.9	48.5	49.7	1.1
Estonia							2.0 (0.2)	11.0 (0.5)	34.4 (0.7)	40.8 (0.9)	11.0 (0.5)	0.8 (0.2)						
Finland	2.5 (0.4)	8.1 (0.6)	25.2 (0.9)	43.3 (1.0)	19.5 (0.7)	1.4 (0.3)	2.7 (0.2)	8.0 (0.5)	26.5 (0.9)	40.7 (0.8)	20.0 (0.6)	2.2 (0.3)	10.6	10.6	0.0	64.2	62.9	-1.3
Flanders (Belgium)	4.7 (1.1)	10.2 (1.3)	27.6 (3.3)	42.9 (3.2)	13.7 (1.8)	0.8 (0.4)	2.9 (0.3)	11.9 (0.6)	31.2 (0.8)	40.9 (1.0)	12.6 (0.6)	0.5 (0.2)	15.0	14.8	-0.2	57.5	54.0	-3.5
France							5.4 (0.3)	16.4 (0.5)	36.2 (0.8)	34.3 (0.7)	7.5 (0.4)	0.3 (0.1)						
Germany	1.3 (0.3)	8.3 (0.8)	33.4 (1.3)	41.5 (1.5)	14.6 (1.0)	0.9 (0.3)	3.3 (0.4)	14.5 (0.7)	34.4 (1.0)	37.0 (1.0)	10.3 (0.6)	0.5 (0.2)	9.6	17.8	8.2	57.0	47.8	-9.2
Ireland	7.1 (1.0)	15.0 (1.6)	32.2 (1.8)	34.5 (1.6)	10.3 (1.4)	0.8 (0.3)	4.3 (0.4)	13.2 (0.8)	37.7 (0.9)	36.2 (0.9)	8.1 (0.5)	0.4 (0.1)	22.1	17.5	-4.6	45.7	44.7	-0.9
Italy	13.8 (1.2)	20.0 (1.2)	34.5 (1.4)	27.1 (1.4)	4.5 (0.5)	0.1 (0.1)	5.6 (0.6)	22.3 (1.0)	42.3 (1.0)	26.5 (1.0)	3.3 (0.4)	0.1 (0.0)	33.8	27.9	-6.0	31.7	29.9	-1.8
Japan							0.6 (0.2)	4.4 (0.4)	23.1 (0.8)	49.2 (1.0)	21.6 (0.7)	1.2 (0.2)						
Korea							2.2 (0.2)	10.7 (0.5)	37.1 (0.9)	41.8 (0.9)	7.9 (0.5)	0.2 (0.1)						
Netherlands	3.1 (0.4)	9.1 (0.7)	27.3 (0.9)	45.6 (1.2)	14.2 (0.9)	0.7 (0.2)	2.6 (0.3)	9.3 (0.5)	27.0 (0.7)	42.4 (0.8)	17.2 (0.6)	1.3 (0.2)	12.2	11.9	-0.2	60.5	61.0	0.5
Northern Ireland																		
Norway	1.9 (0.3)	5.6 (0.6)	20.9 (1.4)	48.0 (1.5)	22.3 (1.0)	1.4 (0.2)	3.1 (0.3)	9.5 (0.6)	30.9 (0.8)	42.6 (0.9)	13.4 (0.6)	0.6 (0.1)	7.5	12.5	5.0	71.7	56.6	-15.1
Poland	18.3 (0.9)	22.8 (1.1)	34.9 (1.0)	20.6 (0.9)	3.3 (0.5)	0.1 (0.1)	3.9 (0.3)	14.8 (0.6)	36.5 (0.9)	35.0 (0.9)	9.0 (0.5)	0.7 (0.1)	41.1	18.8	-22.4	24.0	44.7	20.7
Slovak Republic							1.9 (0.2)	9.8 (0.5)	36.3 (1.0)	44.5 (0.9)	7.3 (0.5)	0.2 (0.1)						
Spain							7.3 (0.5)	20.4 (0.9)	39.4 (0.7)	28.0 (0.7)	4.7 (0.4)	0.1 (0.1)						
Sweden	3.2 (0.6)	7.0 (0.6)	21.6 (0.8)	39.5 (1.0)	24.5 (0.9)	4.3 (0.5)	3.7 (0.3)	9.6 (0.6)	29.1 (1.0)	41.6 (0.9)	14.9 (0.6)	1.2 (0.2)	10.1	13.3	3.1	68.2	57.7	-10.6
United States	7.8 (0.5)	11.6 (0.9)	27.1 (1.3)	35.8 (1.5)	16.0 (1.1)	1.8 (0.4)	4.1 (0.5)	14.2 (0.7)	34.0 (1.2)	35.7 (1.0)	11.4 (0.7)	0.7 (0.2)	19.3	18.3	-1.1	53.6	47.8	-5.9

Notes: * The proportion of adults at or below level 1 for PIAAC is calculated on the basis of all those who received a score on the literacy assessment and does not include the proportion of respondents who did not receive a literacy proficiency score because they were unable to complete more than five questions in the background questionnaire, due to language difficulties or learning and mental disabilities (literacy related non-response). This means that for some proficiency the percentage of the population at or below level 1 may be slightly underestimated, while the percentage at levels 3, 4 and 5 may be slightly overestimated. The exclusion of literacy-related non-response from these percentages makes little or no difference to the Irish percentages on the literacy proficiency scale

Source: IALS (1997), Survey of Adult Skills (PIAAC) (2012)

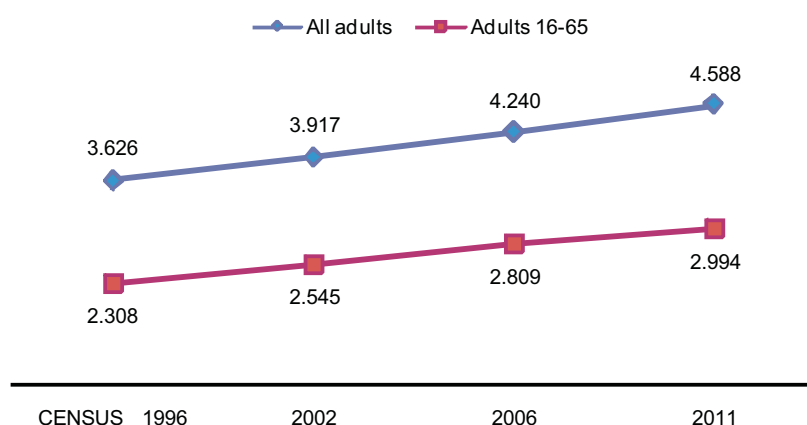
NATIONAL TRENDS

Demographic changes between Census 1991 and Census 2011

In considering the changes in literacy proficiency of the Irish population between IALS and PIAAC it is important to note the considerable demographic changes that have occurred in Ireland between the two surveys.

Firstly, the population of the country grew dramatically between the censuses of 1996¹ and 2011. According to the census there were 4.588m people living in Ireland in April 2011 compared to 3.626m in 1996, an increase of 1.062m or almost 30% in 15 years. The target population for PIAAC (aged 16-65) increased by 0.687m from 2.308m to 2.994m (approximately 40%) in the same timeframe (Figure 4.4).

Figure 4.4
Population change in Ireland 1996 - 2011
(millions)



The age profile of the Irish population has also changed considerably since 1996, with a marked decrease in the percentage of 16-24 year olds and an increase in all older age groups in the 2011 population (Figure 4.5 and 4.6). In 1996 27% of the IALS target population was aged 16-24 compared to 19% of the PIAAC target population.

Figure 4.5
Number within each age group
Census 1996 vs Census 2011

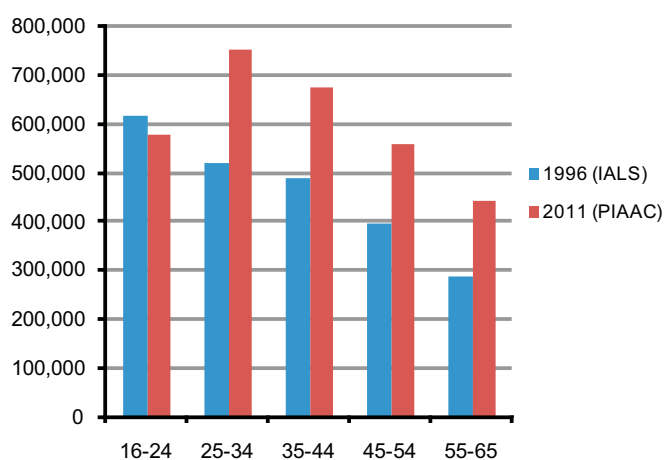
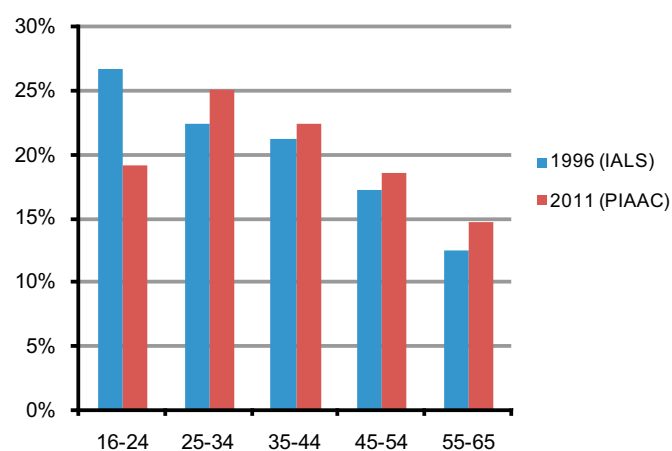


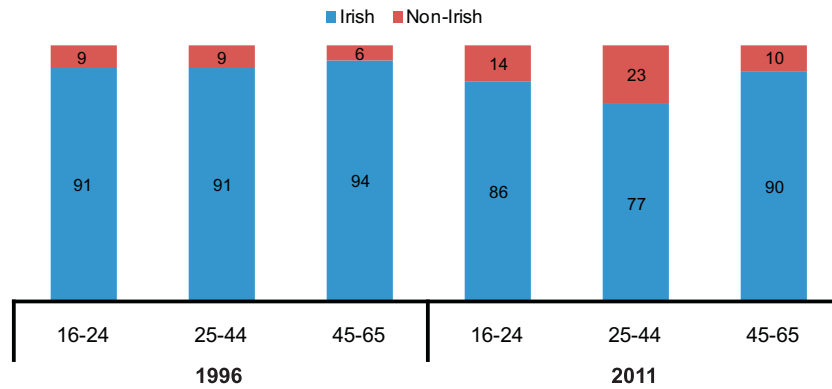
Figure 4.6
Percentage within each age group
Census 1996 vs Census 2011



¹ The IALS data collection took place in Ireland during 1994 though the national report was not published until 1997. The 1991 Census of Population was used to create population estimates for the IALS data.

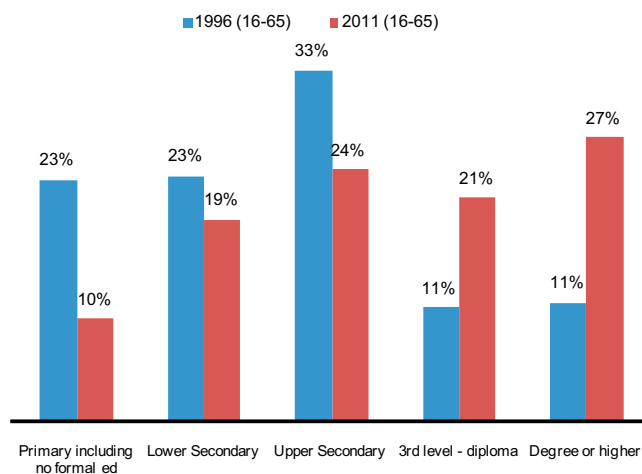
In the same period, there has also been a substantial change in the ratio of Irish/non-Irish within the population. The 2011 Census results show increases in the number of non-Irish adults living in Ireland across all age groups (Figure 4.7). In particular the non-Irish percentage of the population aged 25-44 increased from 9% in 1996 to 23% in 2011.

Figure 4.7
Percentage of Irish and non-Irish population by age group and census year



The educational attainment of the population has improved considerably since 1996, with a general reduction in the percentage of the population educated to primary or secondary level only and a significant increase in the percentage with higher levels of education completed. For example, in 1996 23% of the population aged 16-65 had primary education or lower compared to 10% in 2011. The percentage of adults with a third level qualification has risen from 22% in 1996 to 48% in 2011 (Figure 4.8). With the increasing levels of education among the Irish population, the age at which people ceased full time education also rose steadily between 1996 and 2011 (CSO, 2012).

Figure 4.8
Highest level of education by census year



OVERALL MEAN SCORE COMPARISON AND DISTRIBUTION ACROSS LEVELS

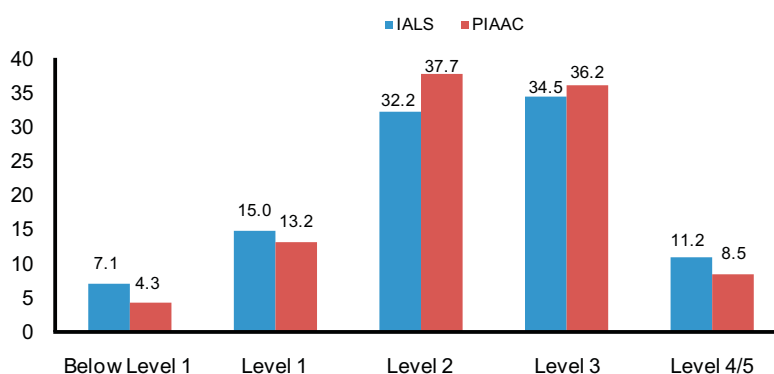
While the difference between the overall literacy mean score of PIAAC (267) and IALS (264) is not statistically significant, the percentage of Irish adults at or below Level 1 has fallen by 4%, from 22% (22.1%) in 1994 to 18% (17.5% unadjusted) now. There are also no statistical differences between the scores of males (264 versus 268) and females (265 versus 265) across the two surveys.

Literacy Levels

In 1994 (IALS) 22%² of Irish adults were at or below Level 1 for literacy proficiency, whereas in 2012 (PIAAC) this figure had dropped to 18% (17.5% unadjusted). IALS estimated that 32.2% of the population were at Level 2 and 34.5% at Level 3, while PIAAC estimates 37.7% at Level 2 and 36.2% at Level 3. At the upper levels of the literacy scale (4/5) the percentage of adults has fallen slightly from 11.2% in IALS to 8.5% in PIAAC (Figure 4.9).

The distribution across the literacy domain suggests that there has been a general increase in the literacy proficiency of the adult population in Ireland, with proportionally fewer at the lower levels of proficiency and a greater percentage at levels 2 and 3.

Figure 4.9
Percentage of adults (16-65) across levels
of literacy proficiency
(IALS 1994 vs PIAAC 2012)



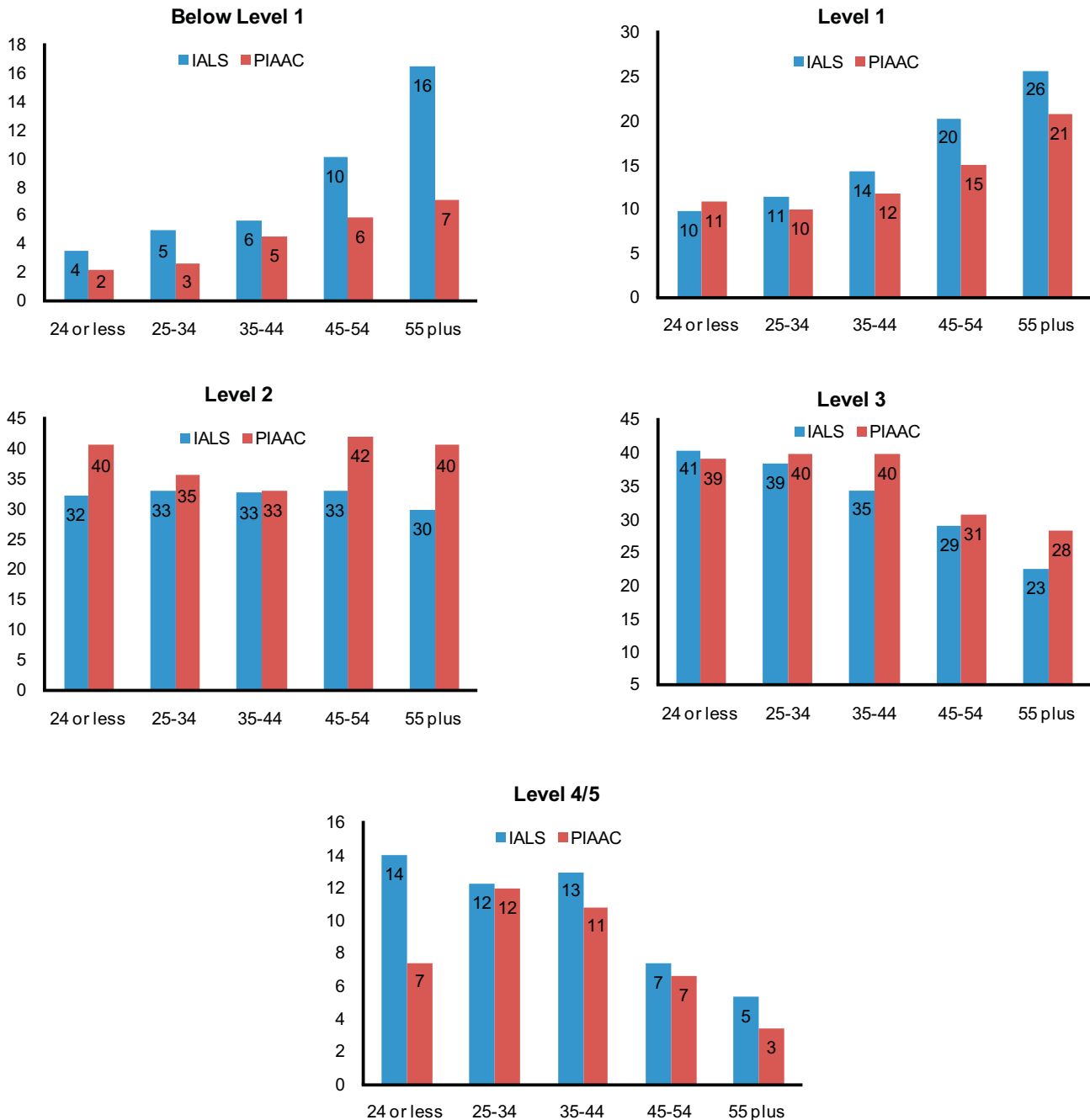
² This is based on the rescaled IALS data produced by ETS (OECD) for PIAAC. The original IALS report (Morgan et al., 1997) estimated that about 25% of the Irish adult population were at the lowest level of literacy proficiency (Level 1) based on the percentages at this level across three separate literacy scales (i.e. Prose 25.3%, Document 22.6% and Quantitative 25.0%).

Age group

Looking at the PIAAC and IALS literacy mean scores by age group shows that there are few significant differences between the scores of adults on both surveys (Table 4.3). However, the PIAAC mean scores of those aged 50-54 (261) and 60-65 (250) are significantly higher than the mean scores of the same groups in IALS (50-54: 246 and 60-65: 233).

Across all age groups there have been reductions in the percentages at or below Level 1 on the literacy scale in PIAAC compared to IALS (Figure 4.10), particularly for older age groups³. There are also increases in the percentage of adults at Level 2, particularly for those aged over 40. However, the trends for Levels 3 and 4/5 are somewhat mixed, with a noticeable reduction at these upper levels for those aged 16 to 19 from 54.1% in IALS to 40.7% in PIAAC, compared with a strong increase for those aged 60-65, from 23.5% in IALS to 32.1% in PIAAC (Table 4.5).

Figure 4.10 Percentage of adults at each level of literacy proficiency in IALS and PIAAC, by 10-year age group

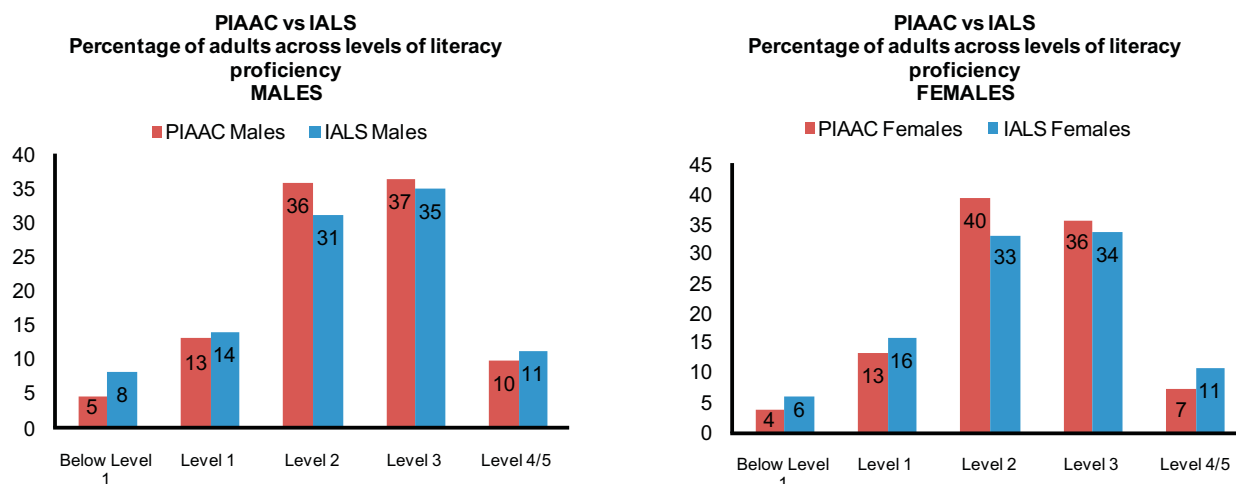


³ 10 year age groups are used in these graphs but more detailed 5-year age groups are provided in Table 4.3

Gender

There is no gender difference when comparing PIAAC and IALS on the basis of overall mean score. Looking at the distribution of males and females across the literacy levels on both surveys however, indicates a general increase in proficiency levels with lower percentages of both males and females at or below Level 1 in PIAAC and greater percentages at Levels 2 and 3 than were found for IALS. At Level 4/5 of proficiency there has been a slight reduction in the percentage of males and females reaching this level in PIAAC.

Figure 4.11 Percentage of adults at each level of literacy proficiency in IALS and PIAAC, by gender



Education

Comparing the literacy mean scores for both surveys by the highest level of education completed shows no difference between those whose highest level of education is primary level or below (Table 4.3). Those whose highest level of education was lower secondary (Junior Certificate), upper secondary (Leaving Certificate) or third-level in IALS scored significantly higher than those at the same level in PIAAC (Table 4.3), and had higher percentages at the upper levels of literacy (Table 4.5).

For example, those whose highest level of education was upper secondary had a literacy mean score of 286 on IALS compared with a score of 269 on PIAAC, and 14.0% of this group were at Level 4/5 on IALS compared with 6.1% on PIAAC (Table 4.3).

However, caution should be exercised when interpreting this data as there are a number of important differences between the IALS and PIAAC surveys in the area of educational qualifications.

- Firstly, the standard errors around the mean scores and percentages at the different levels of literacy proficiency are much larger for IALS than PIAAC, reflecting the smaller sample size of the IALS survey and the comparatively small number of respondents with these qualifications in the IALS sample. These suggest that the actual population scores and percentages for IALS could be much lower or higher than the estimates.
- Secondly, the volume of available courses and qualifications has increased considerably since the IALS survey was conducted in 1994 and this makes it difficult to precisely match the detailed educational qualifications collected by PIAAC with those listed on the original IALS questionnaire. This makes the comparisons at third level between the two surveys tentative at best.
- Finally, as mentioned previously, there have been substantial changes in the educational profile of the population in the period between IALS and PIAAC. For example, in IALS 367,000 or almost 18% of the adult population had a third-level qualification of some sort compared to 1,465,000 or almost 50% of adults in PIAAC. This means that while both groups have broadly equivalent educational qualifications, their socio-demographic compositions may be very different.

Principal Economic Status (current work situation)

Those currently in employment (including self-employed, full-time and part-time employment) have approximately the same literacy mean score on PIAAC (274) as they did in IALS (275). Students including those on apprenticeship programs have a lower mean score in PIAAC (277) than they did in IALS (293) but those unemployed, retired or doing unpaid household work have a significantly higher mean score in 2012 than in 1994 (Table 4.3).

Income

A comparison of annual income quintiles shows that those at the lower end of the income distribution have higher literacy mean scores in PIAAC than in IALS, while at the upper end of the income distribution the trend is reversed though the gap is smaller. At the lowest income quintile, PIAAC's mean score (260) is eight points higher than IALS (251), while those at the highest income quintile score 297 in PIAAC compared to 302 in IALS (Table 4.3).

Irish vs non-Irish

There is little difference between the literacy mean score of those born in Ireland between PIAAC (268) and IALS (264), but there is a statistically significant difference between the surveys for those not born in Ireland; IALS - 274 and PIAAC - 263 (Table 4.3). It is also noticeable that just 6.2% of the IALS population were born outside of Ireland compared to 26.4% of the PIAAC population.

Reading at work

Both IALS and PIAAC surveyed respondents on the frequency of their reading activities at work.

In broad terms there is a general increase in literacy proficiency associated with more frequent literacy activities at work, and those who engaged in reading activities at least once a week tended to have higher mean scores in IALS than PIAAC (Table 4.4).

The frequency with which workers engaged in different reading activities across the two surveys has remained relatively static with two exceptions. The percentage of workers who read directions or instructions at least once a week has trebled between IALS (21%) and PIAAC (65%), and the percentage of workers who read or use letters or emails has also increased from 55% in IALS to 64% in PIAAC.

Table 4.3 Mean literacy scale scores by comparable trend variables in IALS and PIAAC

Variable	Label	IALS 1994		PIAAC 2012		Change between IALS and PIAAC	
		000s	MEAN SE	000s	MEAN SE	Difference	p value
TOTAL	Total	2,124.9	264 (3.2)	2,980.3	267 (0.9)	2	0.489
Gender	Male	1,064.1	264 (5.4)	1,458.0	268 (1.2)	4	0.454
	Female	1,060.8	265 (2.5)	1,522.3	265 (1.1)	1	0.826
Age in 5 year bands	16-19	225.1	275 (3.6)	258.4	267 (2.8)	-8	0.068
	20-24	309.9	278 (4.1)	261.6	274 (2.8)	-4	0.399
	25-29	213.6	274 (4.9)	308.5	275 (2.5)	1	0.888
	30-34	265.9	270 (4.4)	418.0	276 (1.8)	7	0.159
	35-39	235.2	272 (5.5)	350.4	273 (2.6)	1	0.908
	40-44	238.6	265 (2.9)	341.5	270 (2.2)	4	0.230
	45-49	198.2	256 (4.8)	277.4	258 (2.9)	2	0.768
	50-54	163.9	246 (7.0)	277.4	261 (2.5)	15	0.047 *
	55-59	138.4	239 (10.4)	239.6	251 (2.7)	12	0.260
60-65	136.1	233 (7.6)	247.6	250 (2.4)	17	0.031 *	
Highest level of education	Primary or below	462.5	213 (4.7)	240.7	216 (3.5)	3	0.636
	Lower secondary	650.7	256 (2.1)	607.5	246 (1.9)	-10	0.000 *
	Upper secondary	606.5	286 (3.2)	665.2	269 (1.8)	-16	0.000 *
	Third level non-degree	184.5	296 (3.3)	894.1	271 (1.5)	-25	0.000 *
	Third-level degree and higher	182.7	315 (3.6)	571.0	300 (1.5)	-14	0.000 *
Worked at least one hour in job or business in last 12 months	Yes	233.6	280 (4.5)	2,035.6	273 (1.1)	-7	0.147
	No	789.8	246 (2.5)	944.7	252 (1.5)	6	0.044 *
Current work situation	Employed or self employed	1,074.9	275 (4.0)	1,692.0	274 (1.2)	-1	0.791
	Not working and looking for work	222.1	242 (4.3)	360.4	253 (2.4)	10	0.039 *
	Student (including work programs)	236.8	293 (4.5)	371.6	277 (2.2)	-16	0.001 *
	Retired	53.0	232 (13.3)	89.0	260 (3.2)	28	0.038 *
	Doing unpaid household work	446.2	245 (2.5)	302.2	253 (2.4)	9	0.012 *
	Other	88.6	234 (7.0)	164.0	229 (4.6)	-6	0.503
Hours per week at this job or business - range of hours	0 - 20 hours	165.0	272 (3.3)	366.5	264 (2.0)	-8	0.032 *
	21 - 40 hours	713.8	280 (2.9)	1,002.8	274 (1.4)	-6	0.053
	41 - 60 hours	301.9	272 (5.6)	385.4	283 (1.9)	11	0.074
	61 - 80 hours	69.3	257 (12.4)	53.0	273 (5.3)	15	0.254
	81 - 100 hours	27.1	265 (13.2)	11.1	263 (10.7)	-1	0.934
	More than 100 hours	—	—	2.1	289 (19.1)		
Annual net income before taxes and deductions	Lowest quintile	571.2	251 (4.6)	342.9	260 (2.4)	8	0.112
	Next lowest quintile	322.3	253 (4.1)	349.4	264 (2.3)	11	0.021 *
	Mid-level quintile	392.6	272 (4.5)	331.9	273 (2.2)	1	0.861
	Next to highest quintile	239.0	289 (2.9)	306.0	284 (2.1)	-5	0.142
	Highest quintile	138.5	302 (5.0)	281.6	297 (1.7)	-5	0.358
Born in Ireland	Yes	2,000.2	264 (3.2)	2,356.2	268 (0.9)	4	0.231
	No	124.8	274 (6.3)	623.5	263 (2.0)	-12	0.080

* p<0.05 (Statistically significant difference)

Source: Survey of Adult Skills (PIAAC) (2012) and OECD, IALS database and ALL database

Table 4.4 Mean literacy scale scores by work activities in IALS and PIAAC

Variable	Label	IALS 1994			PIAAC 2012		
		000s	%	MEAN SE	000s	%	MEAN SE
As part of job, read or use directions or instructions - levels collapsed	At least once a week	279.3	21.2	284 (3.5)	1,317.1	64.7	275 (1.3)
	Less than once a week	140.0	10.6	273 (6.0)	157.3	7.7	280 (3.2)
	Rarely or never	898.6	68.2	273 (4.5)	560.2	27.5	267 (2.1)
As part of job, read or use letters, memos, e-mails - levels collapsed	At least once a week	720.8	54.6	289 (3.4)	1,302.9	64.0	282 (1.1)
	Less than once a week	98.0	7.4	274 (6.7)	80.8	4.0	280 (4.3)
	Rarely or never	500.9	38.0	256 (4.6)	651.0	32.0	255 (1.9)
As part of job, read or use reports, articles, magazines, journals - levels collapsed	At least once a week	635.7	48.2	289 (4.1)	901.0	44.3	282 (1.3)
	Less than once a week	144.6	11.0	274 (7.9)	164.8	8.1	285 (2.5)
	Rarely or never	538.5	40.8	259 (3.8)	969.3	47.6	264 (1.6)
As part of job, read or use manuals, reference books, catalogues - levels collapsed	At least once a week	584.7	44.4	293 (3.2)	754.7	37.1	280 (1.4)
	Less than once a week	175.1	13.3	276 (6.2)	327.4	16.1	280 (2.1)
	Rarely or never	557.1	42.3	256 (4.5)	953.0	46.8	266 (1.5)
As part of job, read or use bills, invoices, spreadsheets, budget tables - levels collapsed	At least once a week	571.1	43.3	284 (4.5)	708.1	34.8	279 (1.5)
	Less than once a week	130.9	9.9	273 (9.6)	149.4	7.3	287 (3.7)
	Rarely or never	616.0	46.7	267 (3.4)	1,177.6	57.9	268 (1.4)
As part of job, read or use diagrams or schematics - levels collapsed	At least once a week	366.5	27.9	293 (3.7)	554.4	27.2	282 (1.7)
	Less than once a week	126.6	9.6	290 (7.1)	158.3	7.8	289 (3.4)
	Rarely or never	822.6	62.5	265 (4.5)	1,321.5	65.0	268 (1.3)

Table 4.5 Distribution of adults across levels of literacy proficiency in IALS and PIAAC

Survey	Variable	Population		Below Level 1	Level 1	Level 2	Level 3	Level 4/5
		000s	%	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.
IALS	Overall	2,124.9	-	7.1 (1.0)	15.0 (1.6)	32.2 (1.8)	34.5 (1.7)	11.2 (1.5)
PIAAC	Overall	2,980.3	-	4.3 (0.4)	13.2 (0.8)	37.7 (0.9)	36.2 (0.9)	8.5 (0.5)
Gender								
IALS	Male	1,064.1	50.1	8.2 (1.8)	14.2 (2.0)	31.2 (2.2)	35.1 (2.4)	11.3 (2.1)
	Female	1,060.8	49.9	6.0 (0.8)	15.8 (2.0)	33.3 (2.1)	33.9 (2.1)	11.0 (1.5)
PIAAC	Male	1,458.0	48.9	4.7 (0.6)	13.1 (1.0)	35.8 (1.3)	36.5 (1.2)	9.9 (0.8)
	Female	1,522.3	51.1	4.0 (0.5)	13.3 (1.0)	39.6 (1.2)	35.9 (1.4)	7.3 (0.7)
Age group								
IALS	16-19	225.1	10.6	2.8 (1.3)	9.6 (2.6)	33.5 (4.3)	44.9 (4.7)	9.2 (3.1)
	20-24	309.9	14.6	4.0 (1.8)	10.0 (2.1)	31.1 (3.8)	37.3 (3.8)	17.6 (3.2)
	25-29	213.6	10.1	5.0 (1.7)	8.6 (2.7)	32.8 (4.3)	41.3 (4.2)	12.3 (3.5)
	30-34	265.9	12.5	4.8 (1.5)	13.5 (3.0)	32.9 (5.1)	36.4 (3.9)	12.3 (2.6)
	35-39	235.2	11.1	4.6 (1.4)	12.9 (3.6)	32.3 (3.6)	37.1 (4.2)	13.2 (3.0)
	40-44	238.6	11.2	6.7 (1.6)	15.7 (2.9)	32.8 (4.7)	32.0 (3.4)	12.8 (2.5)
	45-49	198.2	9.3	10.1 (2.6)	17.6 (4.5)	30.7 (4.4)	32.9 (3.5)	8.7 (2.9)
	50-54	163.9	7.7	10.2 (3.1)	23.6 (4.9)	35.7 (3.7)	24.6 (5.1)	5.8 (2.4)
	55-59	138.4	6.5	16.8 (4.9)	23.9 (4.9)	26.8 (5.0)	25.8 (5.8)	6.7 (3.1)
	60-65	136.1	6.4	16.2 (5.4)	27.6 (5.1)	32.8 (5.7)	19.5 (4.1)	4.0 (1.9)
PIAAC	16-19	258.4	8.7	1.5 (1.0)	12.7 (2.9)	45.0 (3.4)	34.0 (3.1)	6.7 (2.0)
	20-24	261.6	8.8	2.6 (1.1)	9.0 (1.9)	35.9 (3.0)	44.4 (3.2)	8.2 (1.5)
	25-29	308.5	10.3	2.9 (0.9)	11.5 (1.8)	34.2 (2.8)	38.9 (3.1)	12.5 (2.0)
	30-34	418.0	14.0	2.4 (0.7)	8.8 (1.2)	36.3 (2.0)	40.8 (2.2)	11.7 (1.6)
	35-39	350.4	11.8	5.0 (1.2)	10.4 (1.7)	31.7 (2.1)	41.5 (2.1)	11.4 (1.4)
	40-44	341.5	11.5	4.1 (1.1)	13.1 (1.9)	34.3 (2.6)	38.2 (2.5)	10.3 (1.6)
	45-49	277.4	9.3	7.0 (1.9)	15.2 (2.2)	40.8 (3.0)	29.5 (2.3)	7.5 (1.3)
	50-54	277.4	9.3	4.8 (1.2)	14.7 (2.5)	42.9 (3.1)	32.0 (3.1)	5.7 (1.4)
	55-59	239.6	8.0	6.0 (1.7)	21.6 (3.0)	40.9 (3.2)	28.0 (2.5)	3.4 (1.2)
	60-65	247.6	8.3	8.0 (1.6)	19.8 (2.1)	40.0 (2.5)	28.7 (2.4)	3.4 (1.2)
Highest level of education								
IALS	Primary or below	462.5	22.2	24.4 (3.6)	32.9 (3.5)	30.3 (3.2)	11.2 (1.9)	1.2 (0.7)
	Lower secondary	650.7	31.2	4.7 (0.9)	18.2 (1.9)	42.6 (2.8)	30.2 (2.2)	4.3 (1.1)
	Upper secondary	606.5	29.1	0.5 (0.4)	5.7 (1.6)	32.1 (3.0)	47.6 (2.9)	14.0 (2.5)
	Third level non-degree	184.5	8.8	1.0 (1.0)	4.4 (2.0)	21.9 (4.2)	51.4 (5.8)	21.3 (4.0)
	Third-level degree and higher	182.7	8.8	0.0 (0.0)	1.1 (1.0)	14.5 (3.3)	44.6 (5.1)	39.8 (5.4)
PIAAC	Primary or below	240.7	8.1	22.7 (3.1)	32.0 (3.7)	33.6 (3.5)	11.4 (2.5)	0.2 (0.4)
	Lower secondary	607.5	20.4	6.2 (1.1)	22.7 (2.3)	47.0 (2.4)	22.4 (1.8)	1.7 (0.7)
	Upper secondary	665.2	22.3	2.0 (0.6)	10.8 (1.4)	42.3 (2.3)	38.8 (2.2)	6.1 (1.0)
	Third level non-degree	894.1	30.0	2.2 (0.6)	10.4 (1.0)	40.1 (1.6)	39.7 (1.7)	7.6 (1.0)
	Third-level degree and higher	571.0	19.2	0.3 (0.2)	2.5 (0.6)	20.7 (1.6)	52.9 (1.8)	23.6 (1.7)

COMPARING PIAAC WITH PISA

The Programme for International Student Assessment (PISA) is another OECD international survey regularly conducted in Ireland which has as its objective the assessment of how well students at age 15 are prepared to meet the challenges they may encounter in future education and life. The PISA assessment began in 2000 and is conducted in three-yearly cycles. Ireland has participated in all rounds of PISA – 2000, 2003, 2006, 2009 and 2012. PISA results for 2012 were not available for inclusion in this report and are scheduled for publication in December 2013.

PISA and PIAAC assess ostensibly similar skills, in particular literacy and numeracy, but also problem solving to an extent. In both assessments, the skills assessed are defined in terms of a set of behaviours through which the skill is observed and a set of goals that the behaviours in question are intended to achieve. They also share a common approach to the specification of the constructs measured.

Due to the similarities between the surveys there is an obvious interest in seeing if the results of the two surveys can be considered together to observe any continuous trend in the skills of those in the middle of their secondary education through to adults at retirement age. However, despite some similarities, there are significant differences between the surveys, in particular their target populations, data collection processes and assessment design.

- The target population for PISA is young people aged between 15-years and 3 months and 16 years and 2 months at the beginning of the assessment period who were “enrolled in an educational institution at Grade 7 or above” (OECD, 2010). In Ireland this excludes special schools.
- 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 four rounds of PISA between 2000 and 2009, a proportion of 15-year olds were out of school.
- PIAAC’s target population included the entire population aged 16-65 living in non-institutionalised dwellings, therefore, the ‘PISA cohorts’ surveyed in PIAAC would also include 15-year olds who were excluded from PISA because they may not have been in school at the time (e.g. home schooling, 15-year olds in special schools).
- Irrespective of any other considerations, the different rates of coverage of the cohorts are relevant to comparisons of results from both surveys for the “PISA cohorts”. In particular, it seems likely that mean proficiency scores for the full 15-year old cohort would have been lower than those observed for “in school” 15-year olds in most countries (OECD, 2013a).
- The PISA survey was a group-administered, timed-test, involving a two-hour student paper-based assessment of reading, mathematics and science taken by all students. In 2009 the survey was expanded to include a 40-minute assessment of digital reading taken by about one-third of students, and in 2012 it expanded further in to the area of computer-based assessment, with tests of reading, numeracy and problem solving taken on computer. Students, school principals and teachers of English also completed background questionnaires. PIAAC respondents took the interview in their homes, completing a background questionnaire with a field interviewer and then taking either a paper or computer-based assessment.

Chapter 5 of the OECD’s PIAAC international report (OECD, 2013a) further discusses the complex issues surrounding the comparability of these surveys. OECD advise that “it is not possible to identify with any accuracy where a 15-year-old with a particular reading literacy or mathematics score in PISA would be located on the literacy or numeracy scales of the Survey of Adult Skills” and “in the absence of evidence from a study linking the two assessments, caution is advised when comparing the results of the two assessments” (2013b).

In order to facilitate some comparison between the two surveys the OECD has isolated PIAAC results for four three-year age groups corresponding with each round of the PISA study published to date. So, those who participated in the first round of PISA in 2000 aged 15-17 were assumed to be a broadly equivalent group to those aged 26-28 in PIAAC (Table 4.5) and so on.

Table 4.6 Mean and standard scores for literacy for equivalent cohorts in PIAAC and PISA

PISA cycle	Age range in PIAAC
PISA 2000	26-28
PISA 2003	23-25
PISA 2006	20-22
PISA 2009	17-19

Making direct comparisons between the mean scores of PIAAC and PISA is not possible because the scales for both surveys are different with scores on the PIAAC literacy and numeracy assessments clustered around an average of approximately 250 while scores on the PISA assessment have an average of approximately 500. An alternative is to look at Ireland's performance relative to the average score on both surveys for each of the different groups. This is done by transforming the PIAAC and PISA mean scores on literacy and numeracy into standard scores or Z scores⁴. This allows the performance on the different scales to be broadly compared with each other.

There has been considerable debate about the PISA 2009 results for Ireland, which showed a marked decline in reading and mathematics achievement relative to previous iterations of the survey. The results have been reviewed by international experts as well as researchers in the Educational Research Centre. The combined evidence suggests that, although PISA 2009 was administered in Ireland in accordance with the OECD's technical standards, the observed declines in reading and mathematics scores are likely to be due to a combination of factors, in particular the methodologies used to produce the achievement scores, and the observation that students appeared to be less engaged in the PISA test in Ireland in 2009 than in previous cycles of PISA (Perkins et al., 2012). For this reason the PISA 2009 results are not referred to explicitly below but are included in the graphs and tables.

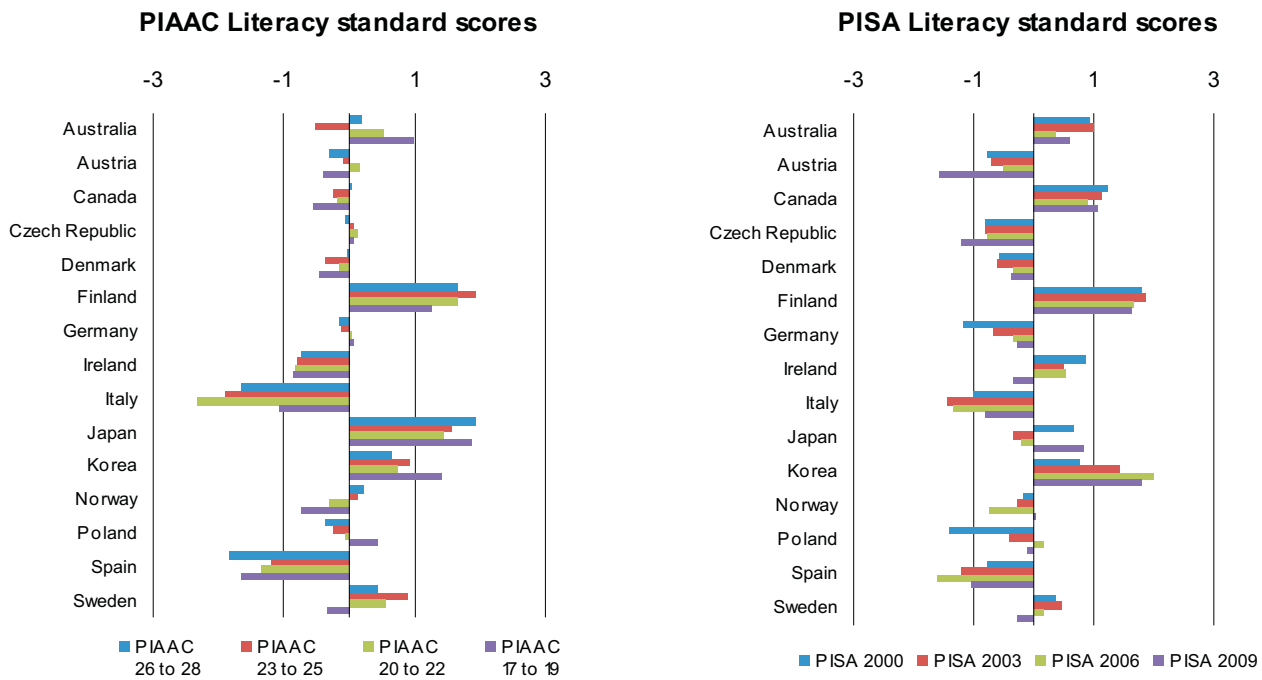
Literacy

Looking at the performance of countries on PIAAC and PISA using the standard score methodology outlined above, differences are apparent in the patterns of results across countries. Some countries perform consistently at the same level for each round of PISA and more or less at the same level for the equivalent age groups in PIAAC. For example, Finland had literacy Z scores of 1.8, 1.9, 1.7 and 1.6 for the four years of PISA (Table 4.7) and literacy Z scores of 1.7, 1.9, 1.6 and 1.3 for the comparable PIAAC age groups. This suggests that in Finland literacy performance is consistently one and a half to two standard deviations above the average on both surveys. In Italy, although the overall level of performance is much lower the pattern is also consistent between the two surveys for each of the comparison groups (Figure 4.12).

However, there are also some countries, including Ireland, where the level of performance between the two surveys is quite different. In Ireland, the PISA literacy performance of Irish 15-year olds is consistently above the average with Z scores of 0.9, 0.5 and 0.5 for the years 2000, 2003 and 2006. On the other hand, the PIAAC literacy Z scores for the equivalent age groups are below the average: -0.7, -0.8 and -0.8. Other countries where there appears to be a divergence between the level of literacy proficiency as measured by PISA and PIAAC include Canada, Germany, the Czech Republic and to some extent Australia (Figure 4.12).

⁴ Z scores transform the mean scores by casting them in terms of their difference from the average. So a Z score of 1 for a particular country indicates that its mean is one standard deviation above the average and a Z score of -1 indicates that the mean score is one standard deviation below the average. In this case the average and standard deviations are derived for those countries common to PIAAC and all four iterations of PISA.

Figure 4.12 Comparison of PIAAC and PISA literacy standard scores for equivalent groups

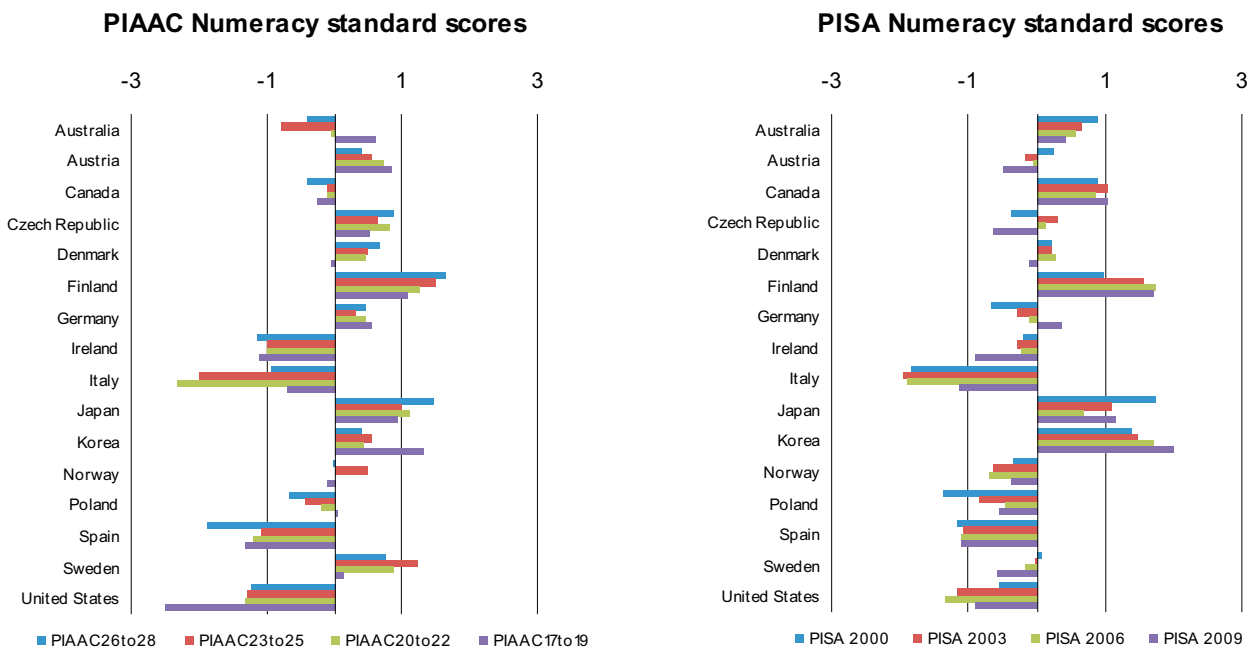


Numeracy

A similar pattern emerges when comparing the performance of PIAAC and PISA on numeracy. Some countries, like Finland and Italy, perform consistently at more or less the same level across both surveys. Then there are other countries such as Ireland, Australia, Norway and Sweden where the level of performance on numeracy proficiency on PIAAC is quite different to that found by PISA. In Ireland PISA has suggested that Irish 15-year olds are just below the average for numeracy proficiency, but the PIAAC data for the equivalent adult groups suggest a much lower numeracy level (Table 4.8).

Similarly, in Sweden the four Z scores derived from the PISA numeracy mean score, suggest that Swedish 15-year olds were around the average in 2000 (0.1) and 2003 (0.0) and dropped below it slightly in 2006 (-0.2) and more so again in 2009 (-0.6). However, the PIAAC Z scores for the equivalent adult groups suggest a numeracy performance that is consistently above the average apart from those in the youngest age group (17-19) (Figure 4.13).

Figure 4.13 Comparison of PIAAC and PISA numeracy standard scores for equivalent groups



Conclusion

It is difficult to reconcile the performance of 15-year olds on the PISA assessment with the performance of the equivalent age cohorts on PIAAC. Although the basis for comparing the results of the two surveys is a little contrived and quite simple, it is still logical to expect that PISA would broadly predict performance on PIAAC even allowing for some change in proficiency in the years since the PISA assessment was carried out and changes in the composition of each cohort. However this is clearly not the case in some countries including Ireland, where the level of PIAAC performance in literacy and numeracy is different to that found on PISA. Consequently caution must be exercised when drawing conclusions from these comparisons about the trend in proficiency and there are a number of methodological questions that need to be explored.

Table 4.7 Mean and standard scores for literacy for equivalent cohorts in PIAAC and PISA

Country	PIAAC 26 to 28	PISA 2000	PIAAC 23 to 25	PISA 2003	PIAAC 20 to 22	PISA 2006	PIAAC 17 to 19	PISA 2009
Mean scores								
Australia	288.0	528.3	277.4	525.4	288.7	512.9	287.1	514.9
Austria	282.0	492.1	283.1	490.7	284.3	490.2	273.0	470.3
Canada	286.1	534.3	281.1	527.9	280.3	527.0	271.5	524.2
Czech Republic	285.2	491.6	285.0	488.5	283.9	482.7	277.6	478.2
Denmark	285.6	496.9	279.5	492.3	280.7	494.5	272.5	494.9
Finland	306.7	546.5	309.2	543.5	302.6	546.9	290.0	535.9
Germany	284.0	484.0	282.6	491.4	282.8	494.9	277.7	497.3
Ireland	276.5	526.7	274.2	515.5	272.3	517.3	268.3	495.6
Italy	265.1	487.5	259.7	475.7	254.1	468.5	266.1	486.1
Japan	310.1	522.2	304.3	498.1	300.3	498.0	296.2	519.9
Korea	294.0	524.8	296.0	534.1	291.6	556.0	291.7	539.3
Norway	288.6	505.3	285.9	499.7	278.8	484.3	269.6	503.2
Poland	281.1	479.1	281.3	496.6	281.8	507.6	281.4	500.5
Spain	262.7	492.6	268.7	480.5	266.1	460.8	260.2	481.0
Sweden	291.4	516.3	295.7	514.3	289.2	507.3	273.5	497.4
Mean of common countries	285.8	508.5	284.3	504.9	282.5	503.3	277.1	502.6
Standard deviation	12.6	21.1	12.9	20.5	12.2	26.3	10.3	20.6
Standard scores								
Country	PIAAC 26 to 28	PISA 2000	PIAAC 23 to 25	PISA 2003	PIAAC 20 to 22	PISA 2006	PIAAC 17 to 19	PISA 2009
Australia	0.2	0.9	-0.5	1.0	0.5	0.4	1.0	0.6
Austria	-0.3	-0.8	-0.1	-0.7	0.1	-0.5	-0.4	-1.6
Canada	0.0	1.2	-0.2	1.1	-0.2	0.9	-0.5	1.1
Czech Republic	-0.1	-0.8	0.1	-0.8	0.1	-0.8	0.1	-1.2
Denmark	0.0	-0.6	-0.4	-0.6	-0.2	-0.3	-0.4	-0.4
Finland	1.7	1.8	1.9	1.9	1.6	1.7	1.3	1.6
Germany	-0.1	-1.2	-0.1	-0.7	0.0	-0.3	0.1	-0.3
Ireland	-0.7	0.9	-0.8	0.5	-0.8	0.5	-0.9	-0.3
Italy	-1.6	-1.0	-1.9	-1.4	-2.3	-1.3	-1.1	-0.8
Japan	1.9	0.7	1.5	-0.3	1.5	-0.2	1.9	0.8
Korea	0.7	0.8	0.9	1.4	0.7	2.0	1.4	1.8
Norway	0.2	-0.2	0.1	-0.3	-0.3	-0.7	-0.7	0.0
Poland	-0.4	-1.4	-0.2	-0.4	-0.1	0.2	0.4	-0.1
Spain	-1.8	-0.8	-1.2	-1.2	-1.3	-1.6	-1.6	-1.0
Sweden	0.4	0.4	0.9	0.5	0.5	0.2	-0.4	-0.3

Table 4.8 Mean and standard scores for numeracy for equivalent cohorts in PIAAC and PISA

Country	PIAAC 26 to 28	PISA 2000	PIAAC 23 to 25	PISA 2003	PIAAC 20 to 22	PISA 2006	PIAAC 17 to 19	PISA 2009
Mean scores								
Australia	274.8	533.0	266.2	524.3	273.3	519.9	273.4	514.3
Austria	285.5	515.0	284.3	505.6	283.3	505.5	276.0	495.9
Canada	274.7	533.0	275.6	532.5	272.5	527.0	263.3	526.8
Czech Republic	292.1	498.0	285.5	516.5	284.7	509.9	272.4	492.8
Denmark	289.3	514.0	283.6	514.3	279.9	513.0	265.9	503.3
Finland	302.4	536.0	297.2	544.3	290.6	548.4	278.6	540.5
Germany	286.2	490.0	281.2	503.0	279.8	503.8	272.7	512.8
Ireland	264.8	503.0	263.6	502.8	260.6	501.5	253.4	487.1
Italy	267.6	457.0	249.8	465.7	242.9	461.7	258.4	482.9
Japan	299.8	557.0	290.3	534.1	288.3	523.1	276.9	529.0
Korea	285.5	547.0	284.2	542.2	279.4	547.5	281.4	546.2
Norway	280.1	499.0	283.4	495.2	274.0	489.8	265.1	498.0
Poland	270.9	470.0	271.2	490.2	271.4	495.4	266.8	494.8
Spain	254.5	476.0	262.2	485.1	258.0	480.0	251.2	483.5
Sweden	290.3	510.0	293.3	509.0	285.4	502.4	267.8	494.2
United States	263.6	493.0	259.4	482.9	256.5	474.4	237.5	487.4
Mean of common countries	280.1	508.2	276.9	509.2	273.8	506.4	266.3	505.6
Standard deviation	13.6	28.1	13.5	22.5	13.2	23.9	11.6	20.4
Standard scores								
Country	PIAAC 26 to 28	PISA 2000	PIAAC 23 to 25	PISA 2003	PIAAC 20 to 22	PISA 2006	PIAAC 17 to 19	PISA 2009
Australia	-0.4	0.9	-0.8	0.7	0.0	0.6	0.6	0.4
Austria	0.4	0.2	0.5	-0.2	0.7	0.0	0.8	-0.5
Canada	-0.4	0.9	-0.1	1.0	-0.1	0.9	-0.3	1.0
Czech Republic	0.9	-0.4	0.6	0.3	0.8	0.1	0.5	-0.6
Denmark	0.7	0.2	0.5	0.2	0.5	0.3	0.0	-0.1
Finland	1.6	1.0	1.5	1.6	1.3	1.8	1.1	1.7
Germany	0.4	-0.6	0.3	-0.3	0.5	-0.1	0.6	0.4
Ireland	-1.1	-0.2	-1.0	-0.3	-1.0	-0.2	-1.1	-0.9
Italy	-0.9	-1.8	-2.0	-1.9	-2.3	-1.9	-0.7	-1.1
Japan	1.4	1.7	1.0	1.1	1.1	0.7	0.9	1.1
Korea	0.4	1.4	0.5	1.5	0.4	1.7	1.3	2.0
Norway	0.0	-0.3	0.5	-0.6	0.0	-0.7	-0.1	-0.4
Poland	-0.7	-1.4	-0.4	-0.8	-0.2	-0.5	0.0	-0.5
Spain	-1.9	-1.1	-1.1	-1.1	-1.2	-1.1	-1.3	-1.1
Sweden	0.7	0.1	1.2	0.0	0.9	-0.2	0.1	-0.6
United States	-1.2	-0.5	-1.3	-1.2	-1.3	-1.3	-2.5	-0.9

Chapter 5

Skill Use in Ireland

SKILL USE IN IRELAND

The final chapter in the report looks at how often various information-processing skills such as reading and writing are used at work and in everyday life by adults in Ireland. It also looks at how often more generic work-based skills such as cooperation and workplace autonomy are exercised (Table 5.1).

While a broad range of skill-use questions were asked on the background questionnaire, there may well be other common activities that fall within these skill groupings that are not covered. For example, the questionnaire made no explicit reference to the reading and writing of text messages or social media postings in every day life, yet it seems likely that these would represent significant examples of skill use. This should be kept in mind when interpreting the frequency of skill use either at work or in everyday life.

Table 5.1 Types of skill use at work and at home

	Task cluster	Tasks included	Examples
Information-processing skills (work and everyday life)	Cognitive skills	Reading, writing, numeracy and problem solving	Reading and writing activities (eg letters, memos, e-mails); Numeracy activities (eg calculating budgets); Problem solving.
	Technology	ICT skills	Using computer for e-mail, word processing, spreadsheets, information search, programming.
Generic skills (work)	Interaction	Cooperation and influencing skills	Time spent interacting with co-workers; persuading and negotiating.
	Learning	Learning activities	Learning from others; learning by doing.
	Organisational skills	Organisation and planning	Planning own activities; planning activities of others; organising own time.
	Physical	Physical requirements of work	Working physically for long periods; use of fine motor skills.

SKILL USE AT WORK

Respondents were asked questions about their literacy, numeracy and problem solving activities in their current job or, if they were not employed, their last job. They were also asked questions about their ICT usage and their use of more generic work skills (Table 5.2).

Table 5.2 Examples of questions about skill use at work

F_Q02a	How often does your current* job usually involve sharing work-related information with co-workers?
F_Q07a	Do you feel you have the skills to cope with more demanding duties than those you are required to perform in your current job?
G_Q01h	In your current job how often do you usually read diagrams, maps or schematics?
G_Q02a	In your current job how often do you usually write letters, memos or emails?
G_Q05c	In your current job how often do you usually use the internet in order to better understand issues related to your work?
G_Q06	What level of computer use is needed to perform your current job?
G_Q07	Do you think you have the computer skills you need to do your current job well?

* Questions were asked about the current job or last job held within the previous 5 years as appropriate.

The most commonly used reading skills are the reading of *letters, memos or emails* and *directions or instructions* with 54.5% and 46.4% of workers respectively doing these every day (Table 5.3). Similarly, in terms of writing skills, the writing of *letters, memos or emails* and *filling in forms* are the most common work-based writing tasks undertaken by 52.8% and 48.9% of workers respectively at least once a week.

Numeracy skills are less commonly used in the workplace. Almost 40% (39.6%) of workers use a *calculator (hand-held or computer-based)* every day while 27.6% *use or calculate fractions, decimals or percentages* every day. In the area of problem solving skills, almost half (48.9%) of workers solve simple problems every day while just 12.2% of workers solve complex problems every day.

Looking at more generic work skills, most workers are required to *use skill or accuracy with their hands or fingers* (76.2%), *share work-related information with colleagues* (65.3%) and *organise own time* (64.4%) every day. About half (49.7%) of workers *co-operate or collaborate with co-workers 'all of the time'*.

Internationally, there is considerable variation in skill use at work across countries and there appears to be no strong relationship between skill use and proficiency in literacy or numeracy. Ireland is very close to the PIAAC average for the frequency of skill use at work in the areas of reading, writing, numeracy and ICT. Looking at the generic work skills, Ireland has the lowest frequency of use of task discretion of the participating countries and is slightly below the average in the use of self-organising skills. On the other hand Ireland is above the average in the use of influencing skills, cooperative skills, manual dexterity and physical skills and the same as the average for the use of learning skills at work (OECD 2013a).

Table 5.3 Frequency of skill use at work

WORK SKILLS	FREQUENCY OF USING WORK SKILLS									
	Never		Less than once a month		Less than once a week but at least once a month		At least once a week but not every day		Every day	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
READING										
Letters, memos or emails	26.8	(0.8)	5.2	(0.4)	4.0	(0.4)	9.6	(0.6)	54.5	(1.0)
Directions or instructions	16.1	(0.7)	11.4	(0.6)	7.7	(0.5)	18.4	(0.8)	46.4	(1.0)
Articles in newspapers, magazines or newsletters	38.2	(1.0)	9.5	(0.5)	8.1	(0.4)	19.5	(0.7)	24.8	(0.7)
Bills, invoices or other financial statements	51.0	(1.0)	6.9	(0.5)	7.3	(0.5)	13.8	(0.6)	21.0	(0.8)
Manuals or reference materials	26.7	(0.9)	20.1	(0.7)	16.1	(0.6)	18.4	(0.6)	18.7	(0.8)
Diagrams, maps or schematics	53.9	(1.1)	11.0	(0.6)	7.8	(0.5)	10.7	(0.5)	16.6	(0.7)
Books	61.1	(0.9)	15.3	(0.6)	6.9	(0.4)	7.4	(0.4)	9.3	(0.5)
Articles in professional journals or academic publications	51.9	(0.9)	14.3	(0.7)	11.8	(0.7)	14.3	(0.7)	7.7	(0.5)
WRITING										
Letters, memos or emails	37.0	(1.0)	6.2	(0.5)	4.0	(0.3)	9.9	(0.6)	42.9	(1.0)
Filling in forms	24.1	(0.8)	15.0	(0.6)	12.0	(0.6)	15.4	(0.7)	33.5	(0.8)
Reports	43.6	(1.0)	11.5	(0.6)	9.8	(0.6)	14.9	(0.7)	20.2	(0.6)
Articles in newspapers, magazines or newsletters	88.0	(0.6)	7.6	(0.5)	2.7	(0.3)	1.0	(0.2)	0.7	(0.1)
NUMERACY										
Use a calculator, either hand-held or computer-based	35.2	(0.9)	5.6	(0.3)	6.0	(0.4)	13.6	(0.6)	39.6	(0.8)
Use or calculate fractions, decimals or percentages	48.2	(0.9)	7.0	(0.4)	5.6	(0.4)	11.6	(0.6)	27.6	(0.7)
Calculate prices, costs or budgets	44.9	(0.9)	8.7	(0.5)	7.4	(0.5)	12.7	(0.6)	26.4	(0.8)
Use simple algebra or formulas	71.2	(0.7)	6.1	(0.5)	4.1	(0.4)	7.0	(0.5)	11.6	(0.6)
Prepare charts, graphs or tables	63.2	(0.8)	10.3	(0.6)	8.0	(0.4)	10.1	(0.6)	8.3	(0.4)
Use more advanced mathematics	89.7	(0.5)	5.0	(0.4)	1.8	(0.2)	1.7	(0.2)	1.8	(0.2)
PROBLEM SOLVING										
Problem solving - simple tasks	34.7	(1.0)	5.7	(0.5)	2.8	(0.3)	8.0	(0.5)	48.9	(1.0)
Problem solving - complex tasks	26.9	(0.8)	21.0	(0.7)	15.0	(0.6)	24.9	(0.7)	12.2	(0.7)
GENERIC SKILLS										
Using skill or accuracy with hands or fingers	14.2	(0.7)	2.9	(0.3)	2.0	(0.3)	4.7	(0.4)	76.2	(0.8)
Sharing work-related information with colleagues	12.6	(0.7)	4.4	(0.4)	4.8	(0.4)	12.8	(0.6)	65.3	(0.9)
Organising own time	22.8	(0.9)	2.9	(0.3)	3.2	(0.4)	6.7	(0.5)	64.4	(0.9)
Planning your own activities	22.6	(0.9)	4.2	(0.4)	3.9	(0.4)	9.3	(0.6)	59.9	(1.0)
Working physically for a long period	34.7	(1.0)	5.7	(0.5)	2.8	(0.3)	8.0	(0.5)	48.9	(1.0)
Influencing or persuading people	32.5	(0.8)	6.4	(0.4)	5.7	(0.4)	13.6	(0.6)	41.8	(0.8)
Negotiating with people	37.2	(0.8)	8.9	(0.6)	7.6	(0.5)	12.8	(0.6)	33.6	(0.8)
Planning the activities of others	48.9	(0.9)	6.1	(0.5)	5.5	(0.4)	11.2	(0.6)	28.2	(0.7)
Co-operating or collaborating with co-workers*	8.8	(0.6)	17.1	(0.7)	11.1	(0.6)	13.3	(0.7)	49.7	(1.0)

Note: Respondents to these questions were asked about their current or last job (within previous 5 years).

* The response format for this question was 1) None of the time 2) Up to a quarter of the time 3) Up to half of the time 4) More than half of the time 5) All of the time

Tasks are sorted in the order of those performed most frequently every day at work.

ICT skills at work

PIAAC also collected a broad range of information about the use of ICT skills at work.

Approximately two thirds (65%) of workers use a computer at work (Table 5.4). Of these, 92% consider that they have the necessary computer skills to perform their jobs. Just 7% (6.8%) indicate that a lack of computer skills has affected their chances of being hired or getting a promotion. More than 90% of workers consider that the complexity of their computer usage at work is straightforward (41.8%) or moderate (51.5%) and just 7% consider their computer usage at work to be complex.

Of those who use a computer at work, two-thirds (66.9%) use email every day while 17% do not use it at all. Just under half of those who use a computer at work use the internet (47.2%) and word processing software (46.2%) every day, with over a third (36.5%) using spreadsheets and very few (3.3%) using a programming language or writing computer code.

Again it should be remembered that the list of ICT related tasks covered by the PIAAC background questionnaire was not exhaustive and may not fully reflect the full range of common ICT skills used in the modern workplace.

Table 5.4 Frequency of ICT skill use at work

ICT SKILLS AT WORK	YES		NO	
	%	S.E.	%	S.E.
Do you use a computer at work	65.3	(0.8)	34.7	(0.8)
Do you have the computer skills you need to perform your current job?	92.0	(0.6)	8.0	(0.6)
Has a lack of computer skills affected your chances of being hired for a job or getting a promotion or pay rise?	6.8	(0.5)	93.2	(0.5)

What level of computer use is/was needed to perform your current/last job?	Straightforward		Moderate		Complex	
	%	S.E.	%	S.E.	%	S.E.
	41.8	(1.1)	51.5	(1.2)	6.7	(0.5)

ICT SKILLS AT WORK	Never		Less than once a month		Less than once a week but at least once a month		At least once a week but not every day		Every day	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Use email	17.0	(0.9)	3.7	(0.4)	3.3	(0.4)	9.1	(0.6)	66.9	(1.1)
Use the internet for work-related issues	20.1	(0.9)	6.5	(0.6)	7.1	(0.5)	19.1	(0.8)	47.2	(1.2)
Use a word processor	25.7	(1.0)	5.5	(0.5)	5.3	(0.4)	17.2	(0.8)	46.2	(1.1)
Use spreadsheets	35.7	(1.1)	8.4	(0.6)	6.8	(0.5)	12.6	(0.7)	36.5	(1.1)
Conduct transactions on the internet	58.9	(1.1)	7.7	(0.6)	6.3	(0.5)	10.6	(0.6)	16.5	(0.9)
Participate in real-time discussion on the internet	77.5	(0.9)	8.6	(0.6)	4.4	(0.4)	4.8	(0.4)	4.7	(0.4)
Use a programming language or write computer code	90.3	(0.7)	3.1	(0.4)	1.4	(0.2)	1.9	(0.3)	3.3	(0.4)

Note:

Respondents to these questions were asked about their current or last job (within previous 5 years).

ICT skills are sorted in the order of those performed most frequently every day at work.

SKILL USE AT WORK INDICES

This section collapses the individual questions asked about skill use into broad skill indices and further analyses them by age group, highest level of education, occupational category and industrial sector. This gives a sense of the variation of skill use at work across a range of socio-economic variables.

Technical note – Creation of skill indices

While answers to the individual skill questions themselves are interesting, it is much more meaningful to consider the answers to all of them together especially when considering their interaction with other variables. In order to examine skill use across the various domains outlined above, Item Response Theory (IRT) was used to construct a series of twelve indices which reflect the respondents' answers to clusters of questions.

For example, there are eight questions that refer to the use of reading skills at work (G_Q01a to G_Q01h). A single index (READWORK) has been constructed using IRT methodology (see OECD, 2013a for more details) to take account of all the responses to these eight questions. The constructed index is a continuous variable, with the majority of scores lying between 0 and 4. Respondents with scores approaching 4 on this variable have a higher probability of frequently using reading skills at work.

All of the indices constructed in this way have been standardised to have a mean score of 2 and a standard deviation of 1, across the international sample. As above, higher scores on these indices indicate a higher frequency of use and lower scores a lower frequency of use.

The IRT methodology was used to construct seven of the twelve skill indices. Five indices are based on a single question only and it was not possible to use IRT on these. The non-IRT indices have response categories that range from 0, indicating that the skill is never used, to 4 indicating that the skill is used every day. For this reason the mean index value for these indicators is consistently higher and caution should be exercised when comparing between IRT and non-IRT indices.

See OECD, 2013a and 2013b for more detail.

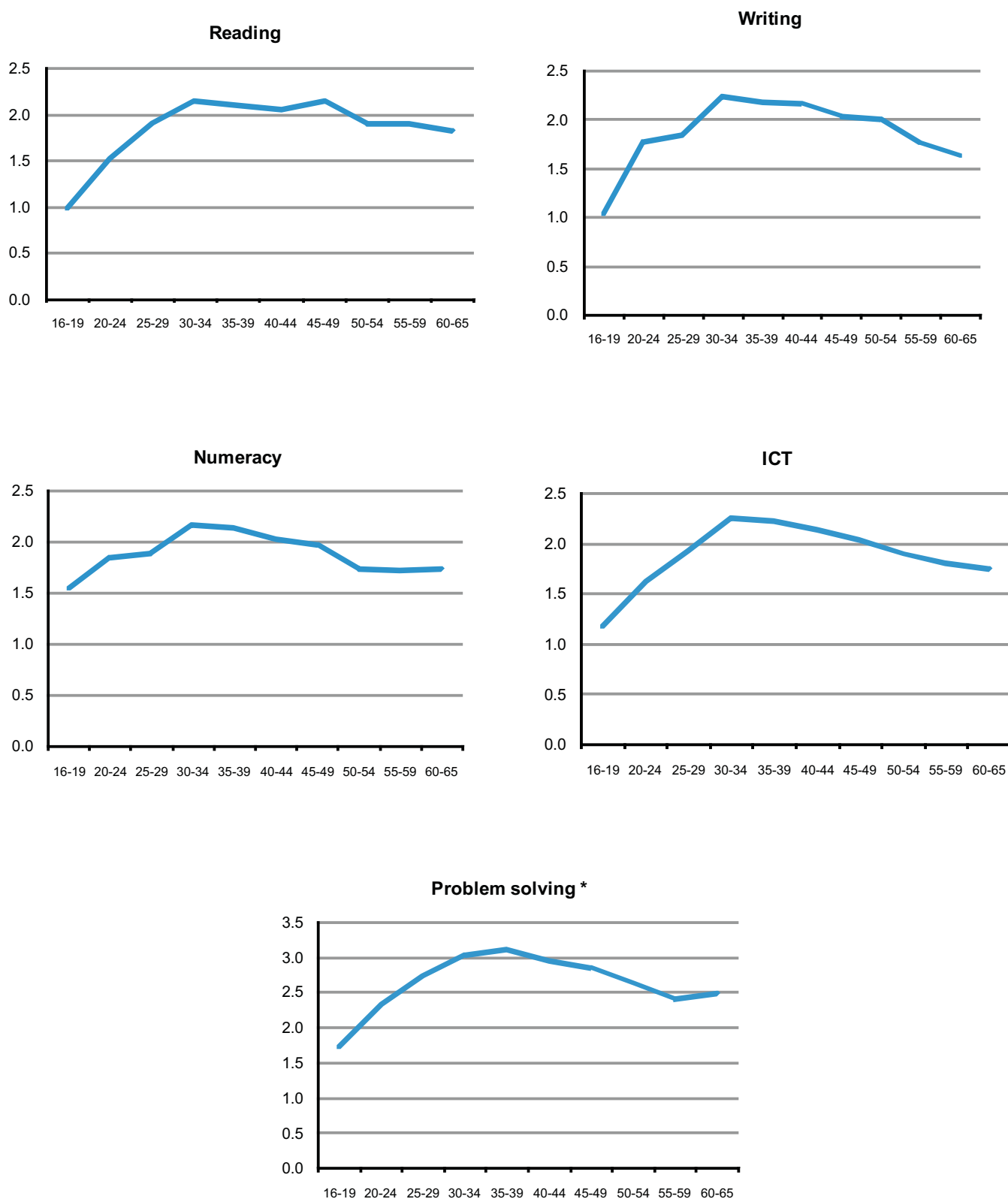
Gender

There are few differences between the skill use of male and female workers. In general males tend to use complex problem solving and physical skills more frequently than females (Table 5.5). This trend is also found at the international level (OECD, 2013a).

Age groups

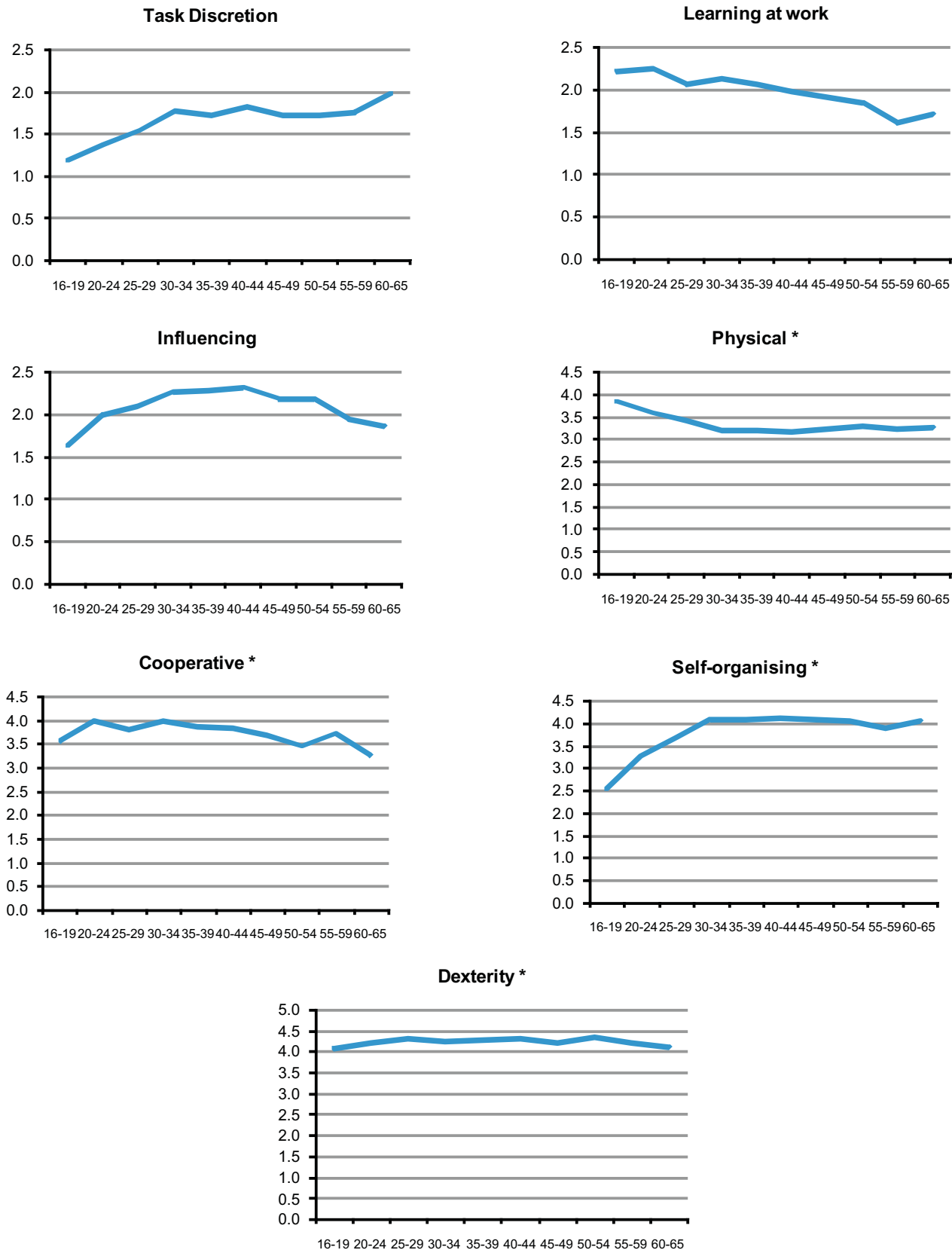
The use of information processing skills by workers generally increases with age, peaking between the ages of 30 and 49 and declining slightly for older workers as shown in Figure 5.1. In the case of the index of ICT usage at work this may be slightly surprising given a perception that younger people are amongst the heaviest ICT users. However, it may be the case that the roles that younger people find themselves in are not the most demanding of their ICT skills but that this changes as they move through their working lives.

Table 5.1 Frequency (index) of skill use (information processing) at work by 5-year age group



As shown in Figure 5.2 below, the pattern for the more generic work skills is not as uniform. The use of task discretion, self-organising and influencing skills increases consistently with age, though the use of influencing skills declines for those aged over 40. Physical skills and learning skills are more commonly used by younger workers and decline with age. Cooperative and manual dexterity skills are used consistently by workers across age groups.

Table 5.2 Frequency (index) of skill use (generic skills) at work by 5-year age group



* Non-IRT indices

Education

Across all levels of education the general pattern is for more frequent use of all skills at work with the exception of physical skills and manual dexterity. In other words, adults with higher levels of education tend to be in jobs requiring more frequent use of most skills than adults with lower levels of education. The frequency of use of physical skills declines as education increases while the use of manual dexterity at work is consistently high across educational categories (Figure 5.3).

Figure 5.3 Frequency (index) of skill use (manual skills) at work by highest level of education achieved

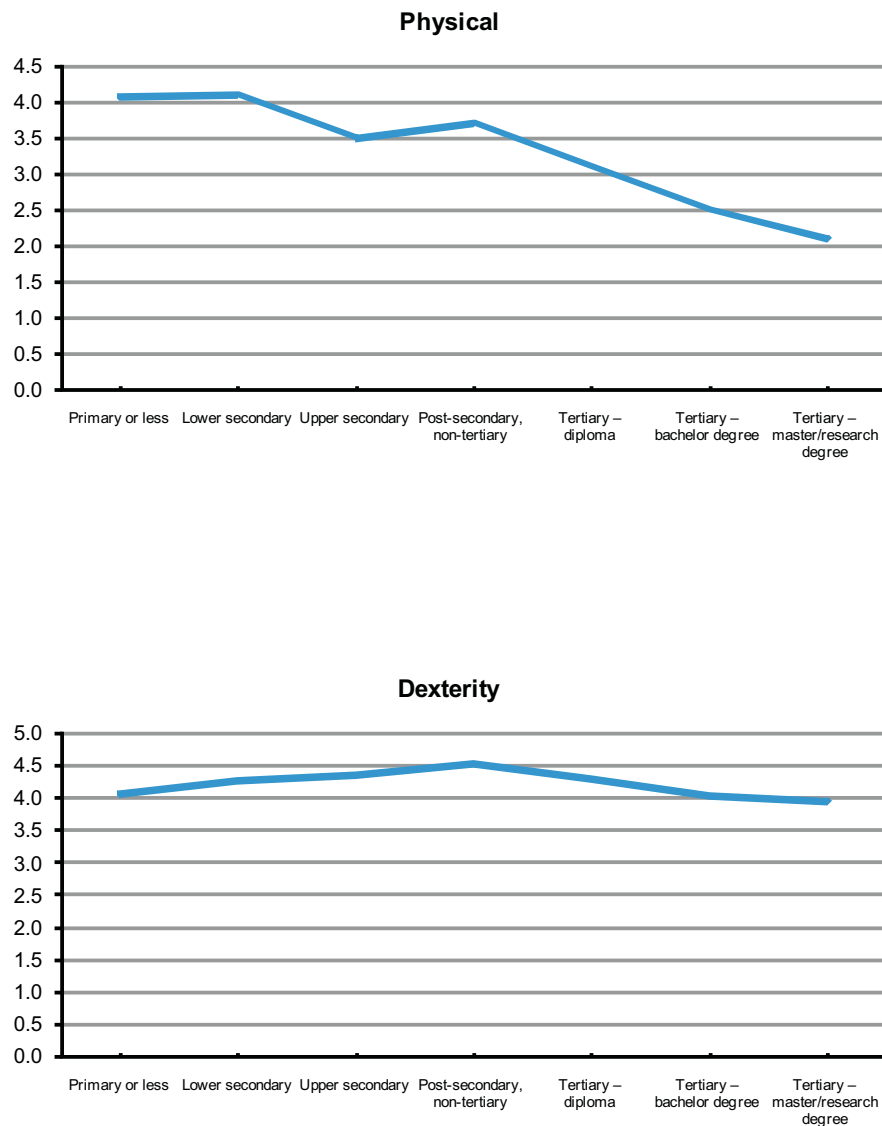


Table 5.5 Frequency (index) of skill use at work

Variable	Level	Reading	Writing	Numeracy	ICT	Problem solving*	Task discretion	Learning at work	Influencing Physical *	Cooperative*	Self-organising*	Dexterity*
Gender	Male	2.0	2.0	2.0	2.1	2.9	1.8	2.0	2.1	3.5	3.8	4.2
	Female	1.9	2.0	1.9	2.0	2.6	1.6	2.0	2.2	3.1	3.8	4.3
Age (5 year)	16-19	1.0	1.0	1.5	1.2	1.7	1.2	2.2	1.6	3.8	3.6	4.1
	20-24	1.5	1.8	1.8	1.6	2.3	1.4	2.3	2.0	3.6	4.0	4.2
	25-29	1.9	1.9	1.9	1.9	2.7	1.5	2.1	2.1	3.4	3.8	4.3
	30-34	2.1	2.2	2.2	2.3	3.0	1.8	2.1	2.3	3.2	4.0	4.3
	35-39	2.1	2.2	2.1	2.2	3.1	1.7	2.1	2.3	3.2	3.9	4.3
	40-44	2.1	2.2	2.0	2.1	3.0	1.8	2.0	2.3	3.2	3.8	4.3
	45-49	2.1	2.0	2.0	2.0	2.9	1.7	1.9	2.2	3.2	3.7	4.2
	50-54	1.9	2.0	1.7	1.9	2.6	1.7	1.8	2.2	3.3	3.4	4.3
Education	55-59	1.9	1.8	1.7	1.8	2.4	1.8	1.6	1.9	3.2	3.7	4.2
	60-65	1.8	1.6	1.7	1.8	2.5	2.0	1.7	1.9	3.3	3.3	4.1
	Primary or less (ISCED 1 or less)	1.2	1.0	1.6	1.4	2.1	1.7	1.8	1.6	4.1	3.6	4.0
	Lower secondary (ISCED 2, ISCED 3C short)	1.5	1.5	1.6	1.5	2.3	1.5	1.8	1.8	4.1	3.6	4.3
	Upper secondary (ISCED 3A-B, C long)	1.7	1.8	1.8	1.8	2.4	1.6	1.9	2.0	3.5	3.9	4.3
	Post-secondary, non-tertiary (ISCED 4A-B-C)	1.9	1.8	1.9	1.8	2.6	1.6	1.9	1.9	3.7	3.9	4.5
	Tertiary – diploma (ISCED 5B)	2.1	2.2	2.1	2.1	3.0	1.7	2.1	2.3	3.1	3.8	4.3
	Tertiary – bachelor degree (ISCED 5A)	2.3	2.4	2.3	2.3	3.3	1.8	2.2	2.5	2.5	3.8	4.4
Tertiary – master/research degree (ISCED 5A/6)	2.6	2.5	2.2	2.4	3.5	2.0	2.3	2.8	2.1	3.6	4.6	

Note: Seven of the 12 indices of skills use were derived from multiple questions using an IRT model. The remaining skills use indicators (*) are based on individual questions.

Table 5.5 Frequency (index) of skill use at work (contd.)

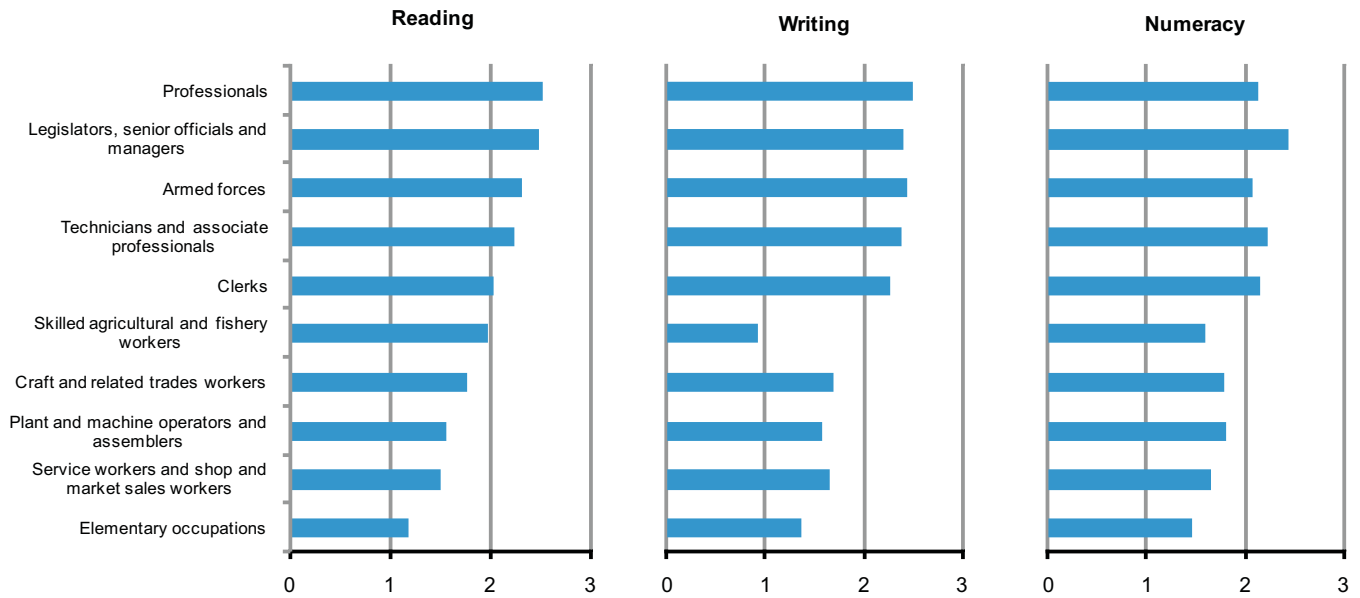
Variable	Level	Reading	Writing	Numeracy	ICT	Problem solving*	Task discretion	Learning at work	Influencing	Physical*	Cooperative*	Self-organising*	Dexterity*
Occupation (current job)	Armed forces	2.3	2.5	2.1	2.0	3.2	1.3	1.7	1.9	3.7	4.3	3.3	4.5
	Legislators, senior officials and managers	2.5	2.4	2.4	2.5	3.5	2.2	2.1	2.8	3.0	4.1	4.6	4.1
	Professionals	2.5	2.5	2.1	2.3	3.4	1.9	2.3	2.7	2.4	3.7	4.6	4.1
	Technicians and associate professionals	2.3	2.4	2.2	2.3	3.2	1.8	2.2	2.3	2.6	3.8	4.4	4.3
	Clerks	2.0	2.3	2.2	2.2	2.9	1.6	2.0	1.9	1.9	3.7	4.0	4.4
	Service workers and shop and market sales workers	1.5	1.7	1.6	1.4	2.2	1.4	1.9	2.0	3.8	3.8	3.3	4.2
	Skilled agricultural and fishery workers	2.0	0.9	1.6	1.0	2.5	2.2	1.9	1.4	4.6	4.6	3.2	4.6
	Craft and related trades workers	1.8	1.7	1.8	1.8	2.8	1.7	1.9	1.8	4.4	4.4	3.9	3.8
	Plant and machine operators and assemblers	1.6	1.6	1.8	1.3	2.3	1.4	1.7	1.7	3.9	3.7	3.4	4.4
	Elementary occupations	1.2	1.4	1.5	1.5	2.0	1.3	1.6	1.6	4.4	4.4	3.7	3.1
Industrial classification (current job)	Agriculture, forestry and fishing	1.9	1.0	1.6	1.1	2.5	2.1	1.9	1.4	4.5	3.3	4.5	4.6
	Industry	1.9	2.1	2.2	2.1	2.9	1.6	1.9	2.0	3.4	4.0	3.6	4.4
	Construction	1.9	1.7	2.1	2.5	3.1	2.0	2.1	1.9	4.2	3.9	4.2	4.6
	Wholesale and retail trade; repair of motor vehicles and motorcycles	1.7	1.7	2.1	1.7	2.5	1.6	2.0	2.1	3.6	3.8	3.5	4.3
	Transportation and storage	1.8	1.8	1.9	1.8	2.4	1.6	1.8	1.8	3.2	3.8	4.0	4.0
	Accommodation and food service activities	1.4	1.7	1.8	1.7	2.3	1.5	2.0	2.1	4.5	4.3	3.4	4.5
	Information and communication	2.4	2.5	2.2	2.9	3.7	2.1	2.5	2.4	1.9	3.7	4.6	3.9
	Financial, insurance and real estate activities	2.4	2.6	2.7	2.6	3.6	1.7	2.2	2.3	1.4	3.9	4.3	4.1
	Professional, scientific and technical activities	2.5	2.5	2.4	2.5	3.3	2.0	2.0	2.2	1.9	3.2	4.7	3.9
	Administrative and support service activities	1.7	1.8	1.7	2.4	2.5	1.7	1.7	2.0	3.4	3.4	3.5	4.2
Human health and social work activities	Public administration and defence; compulsory social security	2.3	2.5	1.8	2.1	3.3	1.6	1.9	2.1	2.1	3.9	4.1	4.2
	Education	2.4	2.1	1.8	1.9	2.8	1.7	2.1	3.1	2.5	3.4	4.2	4.2
	Human health and social work activities	2.0	2.3	1.5	1.7	2.8	1.5	2.1	2.3	3.8	3.8	3.9	4.3
	Other activities	1.8	1.8	1.6	1.9	2.3	1.8	1.9	2.1	3.5	3.7	4.0	4.3

Note: Seven of the 12 indices of skills use were derived from multiple questions using an IRT model. The remaining skills use indicators (*) are based on individual questions.

Occupation

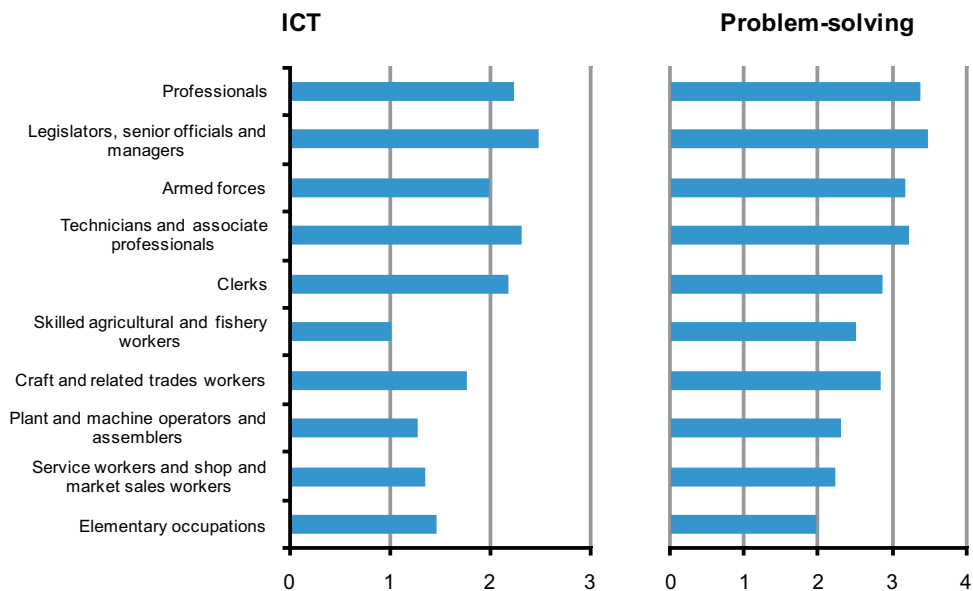
Information-processing skills (i.e. reading, writing, numeracy, ICT and problem solving) are used more often by *Professionals* and *Legislators, senior officials and managers*, *senior officials and managers* (Figures 5.4a and 5.4b).

Fig 5.4a Frequency (index) of skill use (information processing) at work by occupation



Note: Occupations are sorted in ascending order of use of reading skill at work.

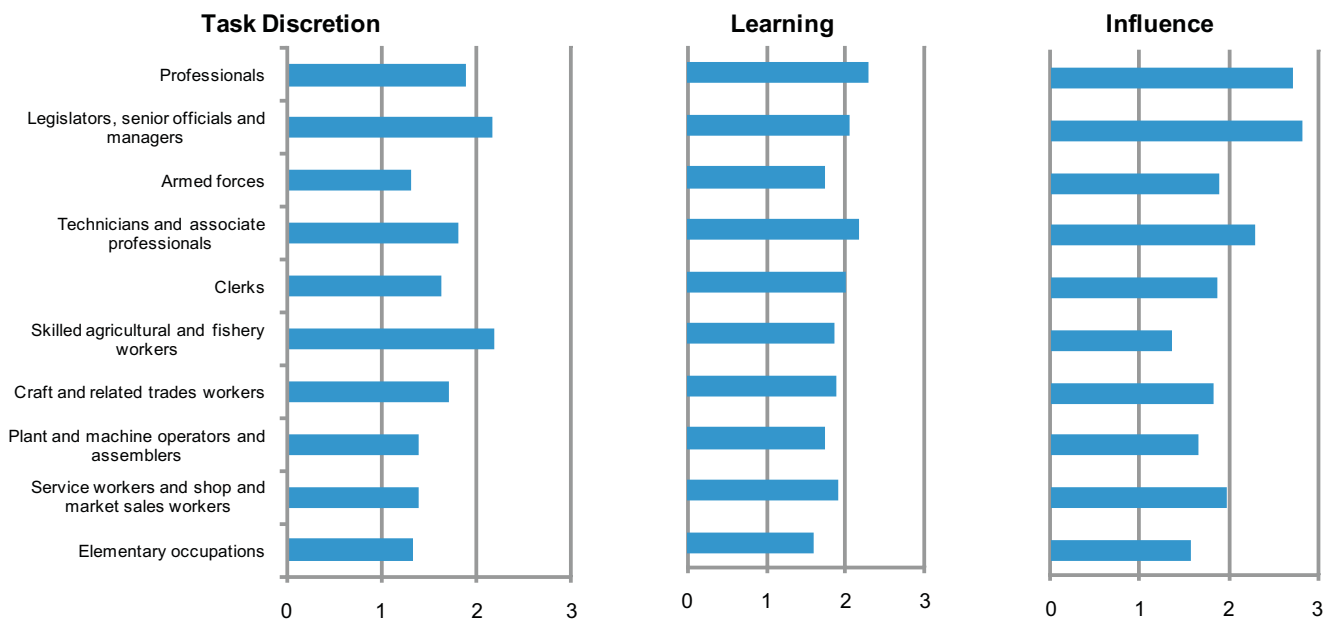
Figure 5.4b Frequency (index) of skill use (information processing) at work by occupation (cont.)



Note: Occupations are sorted in ascending order of use of reading skill at work.

However, there is a variation in the use of more generic work skills, with *Skilled agricultural and fishery workers* being amongst the highest users of task discretion, physical skills and self-organising, yet amongst the lowest users of influence and co-operation. *Clerks* are amongst the least frequent users of task discretion and physical skills (Figure 5.4c and 5.4d).

Fig 5.4c Frequency (index) of skill use (generic skills) at work by occupation



* Note: Occupations are sorted in ascending order of use of reading skill at work.

Figure 5.4d Frequency (index) of skill use (generic and manual skills) at work by occupation



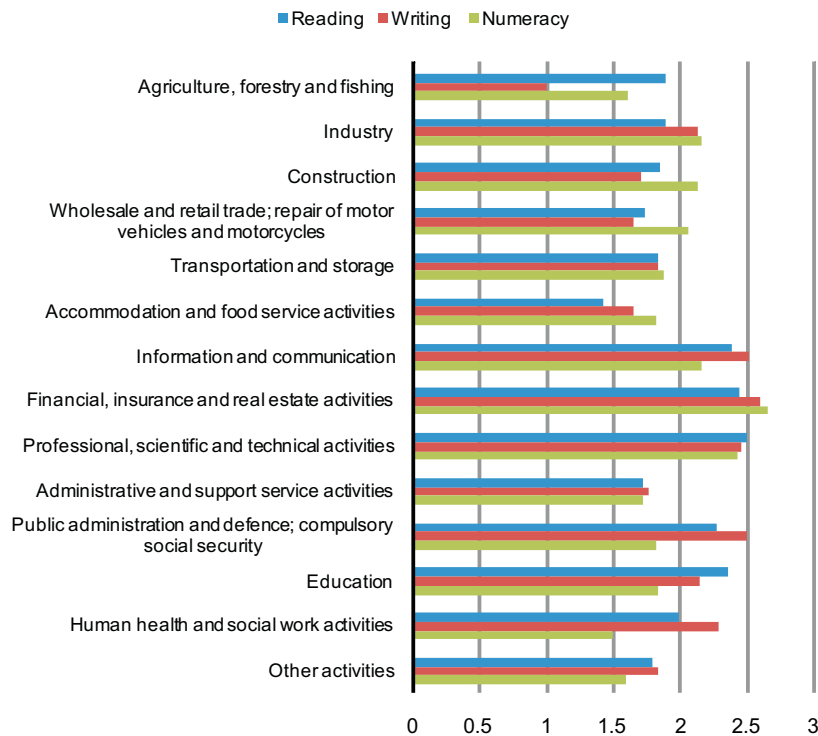
Note: Occupations are sorted in ascending order of use of reading skill at work.

* Non-IRT indices

Industry

Adults working in the *Professional, scientific and technical, Financial, insurance and real estate and Information and communication* sectors are the most frequent users of reading and numeracy skills. They are also amongst the most frequent users of writing skills along with those working in *Education and Public administration and defence* (Figure 5.5).

Figure 5.5
Index of frequency of skill use by industrial sector



SKILL USE IN EVERYDAY LIFE

PIAAC also asked a series of questions about the frequency of use of information-processing skills in everyday life (Table 5.6).

Table 5.6 Examples of questions about skill use in everyday life

H_Q01b	How often do you usually read letters, memos or e-mails?
H_Q02d	How often do you usually fill in forms?
H_Q03b	How often do you usually calculate prices, costs or budgets?
H_Q05a	How often do you usually use e-mail?
H_Q05f	How often do you usually use a word processor, e.g. Word?

Literacy skills used in everyday life

Table 5.7 shows the frequency with which various skills are used in everyday life. The most common reading skills used outside of work are the *reading of articles in newspapers, magazines and newsletters* (86.1%) and *letters, memos or emails* (77.9%), which the majority of people read either every day or at least once a week. Other reading activities are practiced less frequently, including the reading of maps, diagrams, academic publications and reference manuals. Interestingly, almost 25% of the population indicate that they never read books with a further 18% reading a book less than once a month.

The most commonly used writing skill outside of the work environment is the writing of *letters, memos or emails*, which 55% of people do on at least a weekly basis.

Numeracy skills used in everyday life

The most common numeric skill used in everyday life is the *calculation of prices, costs or budgets* which is undertaken by almost 50% of people on at least a weekly basis. The other numeracy skills covered by the questionnaire, such as the use of algebra or advanced mathematics, are undertaken much less frequently in everyday life.

Table 5.7 Frequency of skill use in every day life

EVERYDAY LIFE SKILLS	FREQUENCY OF USING EVERYDAY LIFE SKILLS				
	Never	Less than once a month	Less than once a week but at least once a month	At least once a week but not every day	Every day
	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.
READING					
Articles in newspapers, magazines or newsletters	5.8 (0.4)	3.3 (0.3)	4.8 (0.4)	26.1 (0.7)	60.0 (0.9)
Letters memos or emails	9.9 (0.4)	6.1 (0.3)	6.2 (0.3)	23.2 (0.6)	54.7 (0.7)
Books, fiction or non-fiction	24.5 (0.6)	18.1 (0.7)	11.6 (0.5)	16.6 (0.5)	29.3 (0.7)
Directions or instructions	16.5 (0.7)	18.9 (0.6)	12.8 (0.5)	23.7 (0.6)	28.1 (0.8)
Bills, invoices or other financial statements	11.0 (0.4)	13.1 (0.6)	21.3 (0.7)	36.4 (0.7)	18.2 (0.5)
Articles in professional journals or academic publications	53.2 (0.9)	15.2 (0.6)	10.2 (0.4)	12.6 (0.5)	8.9 (0.5)
Manuals or reference materials	39.3 (0.8)	26.4 (0.7)	13.5 (0.5)	13.4 (0.5)	7.4 (0.4)
Diagrams, maps or schematics	54.4 (1.0)	21.6 (0.6)	10.0 (0.5)	9.4 (0.4)	4.5 (0.3)
WRITING					
Letters, memos or emails	19.5 (0.6)	12.7 (0.5)	12.2 (0.5)	29.4 (0.7)	26.2 (0.7)
Filling in forms	19.2 (0.9)	44.6 (0.8)	23.5 (0.7)	11.3 (0.6)	1.5 (0.2)
Reports	84.0 (0.5)	6.6 (0.4)	3.9 (0.3)	4.2 (0.3)	1.2 (0.2)
Articles in newspapers, magazines or newsletters	93.4 (0.3)	3.7 (0.2)	1.2 (0.2)	1.1 (0.2)	0.5 (0.1)
NUMERACY					
Calculate prices costs or budgets	21.2 (0.7)	15.1 (0.6)	14.3 (0.5)	30.6 (0.7)	18.9 (0.7)
Use a calculator either hand-held or computer-based	33.4 (0.6)	18.2 (0.6)	14.6 (0.5)	21.8 (0.6)	11.9 (0.5)
Use or calculate fractions, decimals or percentages	52.4 (0.8)	14.3 (0.5)	9.2 (0.5)	14.4 (0.6)	9.7 (0.4)
Use simple algebra or formulas	78.1 (0.6)	7.3 (0.4)	3.7 (0.3)	5.7 (0.4)	5.1 (0.3)
Use more advanced mathematics	89.9 (0.4)	3.5 (0.3)	1.9 (0.2)	2.1 (0.3)	2.5 (0.2)
Prepare charts, graphs or tables	82.0 (0.6)	7.8 (0.6)	3.9 (0.5)	4.7 (0.6)	1.5 (0.5)

Note:

Tasks are sorted in the order of those performed most frequently in every day life.

ICT skills used in everyday life

Looking at ICT skills (Table 5.8), 90% of people have used a computer², either at work or in their everyday lives, while 84% of people currently use a computer in their everyday lives outside of work. The most commonly used ICT skills outside of work are email and internet search activities. However, a small proportion of people have never used email (6%) or the internet (7%), despite claiming to use a computer in their everyday lives outside of work. It should be noted that the background questionnaire did not make any mention of the use of social networking or gaming applications and this may account for this slight anomaly.

Table 5.8 Frequency of ICT skill use in everyday life

ICT SKILLS IN EVERYDAY LIFE	YES		NO	
	000s S.E.	% S.E.	000s S.E.	% S.E.
Have you ever used a computer?	2,678.1 (11.9)	89.9 (0.4)	301.6 (11.5)	10.1 (0.4)
Do you use a computer in your everyday life now outside work?	2,245.8 (15.9)	83.8 (0.6)	433.2 (15.8)	16.2 (0.6)

ICT SKILLS AT WORK	Never	Less than once a month	Less than once a week but at least once a month	At least once a week but not every day	Every day
	% S.E.	% S.E.	% S.E.	% S.E.	% S.E.
Use email	6.0 (0.4)	6.0 (0.4)	6.7 (0.4)	26.3 (0.8)	55.0 (0.9)
Use the internet to better understand health, finance etc.	7.3 (0.4)	9.0 (0.4)	12.7 (0.6)	32.1 (1.0)	38.9 (1.0)
Participate in real-time discussion on the internet	48.6 (1.0)	7.0 (0.4)	6.4 (0.4)	15.5 (0.6)	22.6 (0.8)
Use a word processor	32.5 (0.8)	20.8 (0.8)	15.7 (0.7)	20.1 (0.7)	11.0 (0.5)
Conduct transactions on the internet	21.2 (0.9)	17.0 (0.7)	20.8 (0.7)	31.2 (1.0)	9.8 (0.5)
Use spreadsheets	63.2 (0.8)	16.9 (0.6)	9.0 (0.5)	7.7 (0.4)	3.1 (0.3)
Use a programming language or write computer code	93.6 (0.5)	3.0 (0.3)	1.1 (0.2)	1.1 (0.2)	1.2 (0.2)

Note: Only respondents who indicated that they use a computer in everyday life outside work were asked these questions.

Tasks are sorted in the order of those performed most frequently every day.

² A computer was defined as “a mainframe, desktop or laptop computer, or any other device that can be used to do such things as sending or receiving e-mail messages, processing data or text, or finding things on the internet” (PIAAC Background Questionnaire, 2011).

As was the case for skills used at work, there are no gender differences in the use of reading, writing, numeracy or ICT skills in everyday life (Table 5.9). However, these skills are used most frequently by those in the youngest age groups and their frequency decreases for older age groups. The more frequent use of these skills for younger age groups, particularly numeracy, is possibly related to participation in full-time education. The use of information processing skills in everyday life also appears to be related to the highest level of education achieved and those with higher levels of education tend to use these skills more frequently in their everyday lives.

Table 5.9 Mean usage (index) of skills in everyday life

	Reading	Writing	Numeracy	ICT
Gender				
Male	2.1	1.9	1.9	1.9
Female	2.1	1.9	1.7	1.9
Age group				
Aged 16-19	2.3	2.3	3.1	2.0
Aged 20-24	2.3	2.3	2.0	2.2
Aged 25-29	2.1	2.1	1.8	2.1
Aged 30-34	2.2	2.0	1.8	2.0
Aged 35-39	2.1	1.9	1.7	2.0
Aged 40-44	2.0	1.9	1.7	1.8
Aged 45-49	2.0	1.8	1.6	1.7
Aged 50-54	2.0	1.7	1.5	1.7
Aged 55-59	1.9	1.5	1.4	1.7
Aged 60-65	1.8	1.5	1.4	1.4
Highest level of education				
Primary or less (ISCED 1 or less)	1.3	1.1	1.1	0.9
Lower secondary (ISCED 2, ISCED 3C short)	1.8	1.7	2.0	1.5
Upper secondary (ISCED 3A-B, C long)	2.0	2.0	1.8	1.9
Post-secondary, non-tertiary (ISCED 4A-B-C)	2.1	1.9	1.7	1.8
Tertiary – professional degree (ISCED 5B)	2.3	2.0	1.8	2.1
Tertiary – bachelor degree (ISCED 5A)	2.5	2.2	2.0	2.2
Tertiary – master/research degree (ISCED 5A/6)	2.6	2.4	2.1	2.4

QUALIFICATION AND SKILL MISMATCH

As well as skill use at work PIAAC collected some information about the mismatch between the qualifications and skills that workers have and the qualifications and skills they actually require to carry out their jobs. The OECD have devised a methodology using this data to identify workers whose level of education or literacy and numeracy skills are either higher or lower than those held on average for specific occupations.

The OECD international report contains a significant amount of additional detail and analysis around this topic.

Qualification mismatch

The PIAAC survey asked workers to report the educational qualification they believed would be necessary to get their own jobs today. By comparing this level with the level of education actually attained it is possible to derive an estimate of the percentage of workers who are overqualified or under-qualified in their current jobs.

In Ireland almost 30% (27.2%) of workers considered that they had higher educational qualifications than would be required to get their own job today, compared to 21.4% on average. This percentage is amongst the highest of the participating countries along with Japan (31.1%), England (30.2%) and Australia (27.8%), while the countries with the lowest percentage of workers in this category are Italy (13.3%) and the Netherlands (14.8%) (Table 5.10).

Skills mismatch

Related questions in PIAAC asked workers if they “have the skills necessary to cope with more demanding duties than those they are required to perform in their current job” and also whether they believe that they “need further training in order to cope well with their present duties”. According to the OECD the literacy and numeracy proficiency of workers is considered to be well-matched to their current jobs if their mean literacy and numeracy scores are within the minimum and maximum score of workers in the same occupation who answered “no” to both questions.

For example, if the range of literacy scores for *Professionals* who do not have the skills to cope with a more demanding job and who do not require further training for their current role is 300 to 400, then a person in this occupational category with a mean score of 350 is considered to have a good match between his/her literacy skills and the demands of the job. If the literacy score for that person is above or below the range for the specific occupation, the person is considered to be over- or under-skilled in terms of literacy.

In Ireland 80.4% of workers are considered to have a level of literacy proficiency that is well-matched to their current roles and 82.5% are considered to have a level of numeracy proficiency that is well-matched. This compares to 86.2% for literacy and 86.4% for numeracy on average across participating countries. The percentages of over-skilled workers in Ireland for literacy (15.1%) and numeracy (13.0%) proficiency are above the study averages (literacy 10.3% and numeracy 10%) (Table 5.10).

Interaction between skills and qualification mismatch

The OECD has also done some additional analysis on the overlap between qualifications mismatch and skills mismatch, as defined by the methodology outlined above. They have concluded that there is little overlap between those who are over-qualified and over-skilled and between those who are under-qualified and under-skilled.

In Ireland 25% of those who are over-qualified are also over-skilled in literacy proficiency (20.9% numeracy), compared to 14.2% on average for literacy (13.6% numeracy). This is also the highest percentage across participating countries for literacy proficiency (Table 5.11). The majority of adults in Ireland who consider themselves to be under-qualified for their current jobs actually have literacy (86.7%) and numeracy (85.7%) skills that are well-matched with their current roles (OECD, 2013a).

Table 5.10 Percentage of workers in each category of qualification and skills mismatch

	Qualification mismatch						Skills mismatch												
	Over-qualified			Under-qualified			Well-matched			Over-skilled			Under-skilled			Well-matched			
	% S.E.	Under-qualified	Well-matched	Over-skilled	Under-skilled	% S.E.	Well-matched	Over-skilled	Under-skilled	% S.E.	Well-matched	Over-skilled	Under-skilled	% S.E.	Well-matched	Over-skilled	Under-skilled	% S.E.	
Japan	31.1 (0.7)	8.0 (0.6)	61.0 (0.7)	9.6 (0.6)	3.1 (0.3)	87.3 (0.7)	7.9 (0.5)	3.7 (0.4)	88.4 (0.6)										
England	30.2 (0.8)	12.4 (0.7)	57.4 (1.0)	6.9 (0.6)	6.5 (0.6)	86.6 (0.7)	5.6 (0.5)	6.9 (0.6)	87.5 (0.7)										
Australia	27.8 (0.9)	13.9 (0.6)	58.4 (1.0)	9.1 (0.5)	2.8 (0.3)	88.1 (0.6)	9.4 (0.5)	2.5 (0.3)	88.1 (0.6)										
Ireland	27.2 (1.0)	15.7 (0.8)	57.1 (1.1)	15.1 (0.7)	4.5 (0.4)	80.4 (0.8)	13.0 (0.7)	4.5 (0.4)	82.5 (0.8)										
Canada	26.8 (0.5)	14.7 (0.5)	58.5 (0.6)	6.5 (0.3)	3.6 (0.3)	89.8 (0.4)	7.0 (0.4)	4.1 (0.3)	88.8 (0.4)										
Estonia	26.5 (0.6)	12.2 (0.5)	61.3 (0.7)	7.1 (0.4)	4.7 (0.3)	88.2 (0.5)	6.6 (0.4)	3.8 (0.3)	89.5 (0.5)										
Germany	23.2 (0.9)	11.1 (0.6)	65.8 (0.9)	14.5 (0.7)	1.4 (0.2)	84.1 (0.7)	15.3 (0.7)	1.9 (0.3)	82.8 (0.7)										
Northern Ireland	22.0 (1.1)	14.1 (1.0)	63.9 (1.4)	6.9 (0.6)	2.4 (0.4)	90.7 (0.8)	10.4 (0.9)	2.8 (0.5)	86.7 (1.0)										
Spain	21.7 (0.8)	9.5 (0.6)	68.7 (0.9)	16.8 (0.8)	2.7 (0.4)	80.4 (0.8)	15.8 (0.8)	3.2 (0.4)	81.0 (0.9)										
Average	21.4 (0.2)	12.9 (0.1)	65.8 (0.2)	10.3 (0.1)	3.6 (0.1)	86.2 (0.2)	10.0 (0.1)	3.6 (0.1)	86.4 (0.2)										
Korea	21.2 (0.8)	10.7 (0.6)	68.1 (0.8)	10.8 (0.7)	1.8 (0.2)	87.4 (0.7)	13.1 (0.7)	2.5 (0.3)	84.4 (0.8)										
Austria	21.0 (0.8)	14.1 (0.7)	64.9 (0.8)	18.1 (0.8)	1.3 (0.2)	80.6 (0.8)	17.8 (0.8)	1.9 (0.3)	80.3 (0.9)										
Czech Republic	20.6 (1.0)	7.8 (0.7)	71.5 (1.1)	16.2 (1.2)	1.8 (0.3)	82.0 (1.1)	13.5 (1.0)	2.7 (0.4)	83.8 (1.1)										
Norway	19.8 (0.7)	15.2 (0.6)	65.0 (0.8)	8.8 (0.6)	4.7 (0.4)	86.5 (0.6)	6.4 (0.4)	4.1 (0.4)	89.5 (0.4)										
United States	19.7 (0.9)	12.8 (0.8)	67.5 (1.1)	8.9 (0.7)	3.9 (0.5)	87.2 (0.8)	9.4 (0.7)	3.0 (0.4)	87.7 (0.7)										
Sweden	18.7 (0.7)	21.2 (0.8)	60.1 (1.0)	5.8 (0.4)	5.0 (0.5)	89.2 (0.6)	6.1 (0.5)	4.7 (0.4)	89.2 (0.6)										
Denmark	18.4 (0.6)	10.0 (0.5)	71.6 (0.7)	7.8 (0.6)	4.1 (0.3)	88.1 (0.6)	6.9 (0.5)	3.6 (0.3)	89.5 (0.5)										
Slovak Republic	18.0 (0.9)	4.1 (0.4)	77.9 (0.9)	12.1 (0.8)	3.8 (0.4)	84.1 (0.9)	11.9 (0.7)	3.5 (0.4)	84.6 (0.9)										
Finland	16.8 (0.7)	14.3 (0.6)	69.0 (0.8)	6.4 (0.5)	3.7 (0.3)	89.9 (0.5)	7.0 (0.5)	3.5 (0.3)	89.6 (0.5)										
Poland	16.4 (0.8)	9.2 (0.6)	74.4 (1.0)	7.2 (0.5)	2.6 (0.3)	90.2 (0.7)	11.2 (0.6)	1.4 (0.3)	87.4 (0.7)										
Cyprus	15.9 (0.8)	15.8 (0.8)	68.3 (1.1)	9.2 (0.7)	6.9 (0.6)	84.0 (0.8)	6.2 (0.5)	5.2 (0.6)	88.5 (0.7)										
Flanders (Belgium)	15.8 (0.7)	13.6 (0.6)	70.7 (0.9)	7.9 (0.5)	3.9 (0.4)	88.2 (0.6)	6.8 (0.4)	4.1 (0.4)	89.1 (0.6)										
Netherlands	14.8 (0.6)	17.6 (0.7)	67.5 (0.8)	6.8 (0.5)	2.7 (0.3)	90.5 (0.6)	5.1 (0.4)	3.0 (0.3)	91.9 (0.5)										
Italy	13.3 (0.8)	22.4 (1.1)	64.4 (1.2)	11.7 (0.9)	6.0 (0.7)	82.3 (1.1)	12.6 (1.0)	7.5 (0.7)	80.0 (1.1)										

Notes: Qualification mismatch is defined relative to the qualification needed to get the job, as reported by the respondents.

Countries are sorted in order of decreasing percentage of Over-qualified qualification mismatch

Table 5.11 Percentage of workers in each category of skills mismatch, by over-qualification mismatch status

	Over-qualified											
	Literacy mismatch						Numeracy mismatch					
	Over-skilled		Under-skilled		Well-matched		Over-skilled		Under-skilled		Well-matched	
%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	
Average	14.2	(0.3)	2.7	(0.2)	83.2	(0.4)	13.6	(0.3)	2.7	(0.2)	83.7	(0.4)
Australia	13.8	(1.2)	2.2	(0.5)	83.9	(1.2)	12.9	(1.2)	1.8	(0.4)	85.3	(1.3)
Austria	23.4	(1.8)	1.4	(0.6)	75.2	(1.9)	24.5	(1.9)	2.6	(0.8)	72.9	(2.2)
Flanders (Belgium)	11.6	(1.4)	3.3	(0.8)	85.2	(1.8)	10.8	(1.5)	3.4	(0.8)	85.7	(1.7)
Canada	10.1	(0.9)	2.6	(0.4)	87.3	(0.9)	8.9	(0.9)	2.8	(0.4)	88.3	(1.0)
Czech Republic	16.8	(2.1)	2.2	(1.0)	81.0	(2.2)	17.2	(2.2)	2.2	(0.9)	80.6	(2.3)
Cyprus	15.0	(1.9)	6.1	(1.6)	78.8	(2.1)	8.1	(1.3)	5.0	(1.5)	86.9	(1.9)
Denmark	13.5	(1.5)	4.9	(0.7)	81.6	(1.6)	9.3	(1.4)	3.9	(0.7)	86.9	(1.4)
England	6.9	(1.0)	4.1	(0.9)	88.9	(1.3)	4.5	(0.8)	4.2	(0.9)	91.3	(1.1)
Estonia	7.4	(0.7)	3.5	(0.6)	89.1	(0.8)	5.8	(0.7)	2.6	(0.5)	91.5	(0.8)
Finland	10.4	(1.3)	1.5	(0.6)	88.1	(1.3)	11.6	(1.5)	1.9	(0.7)	86.5	(1.6)
Germany	21.9	(1.6)	0.3	(0.2)	77.8	(1.5)	22.8	(1.8)	0.7	(0.6)	76.5	(1.8)
Ireland	25.2	(1.9)	2.4	(0.5)	72.4	(1.9)	20.9	(1.7)	2.3	(0.6)	76.7	(1.9)
Italy	16.4	(2.4)	4.3	(1.4)	79.3	(2.6)	16.2	(2.6)	3.7	(1.2)	80.1	(2.7)
Japan	9.2	(1.0)	1.6	(0.4)	89.3	(1.1)	7.9	(1.0)	2.1	(0.4)	90.0	(1.1)
Korea	11.3	(1.4)	2.0	(0.6)	86.6	(1.4)	13.7	(1.3)	2.5	(0.7)	83.8	(1.6)
Netherlands	16.1	(1.8)	1.8	(0.8)	82.0	(1.9)	11.4	(1.5)	0.3	(0.3)	88.4	(1.5)
Northern Ireland	10.8	(1.6)	1.2	(0.4)	88.1	(1.6)	18.9	(2.3)	1.2	(0.6)	79.9	(2.3)
Norway	12.5	(1.5)	3.3	(0.8)	84.2	(1.6)	8.0	(1.2)	3.6	(0.9)	88.4	(1.3)
Poland	8.1	(1.3)	3.3	(0.8)	88.6	(1.6)	11.9	(1.5)	3.0	(0.8)	85.1	(1.8)
Slovak Republic	15.4	(1.5)	2.7	(0.9)	82.0	(1.8)	14.4	(1.7)	4.3	(1.1)	81.3	(1.9)
Spain	20.2	(1.7)	2.4	(0.8)	77.4	(1.8)	24.8	(2.3)	1.8	(0.6)	73.5	(2.4)
Sweden	11.2	(1.4)	3.7	(0.9)	85.1	(1.7)	12.5	(1.3)	4.1	(0.9)	83.4	(1.5)
United States	12.9	(1.8)	2.8	(0.7)	84.3	(1.8)	13.3	(1.6)	2.9	(1.0)	83.8	(1.8)

Notes: Qualification mismatch is defined relative to the qualification needed to get the job, as reported by the respondents.

Countries are sorted alphabetically

References

- Central Statistics Office, (forthcoming), *PIAAC Technical report: Ireland*.
- Central Statistics Office, (2011), *This is Ireland, Highlights From Census 2011 Part 1*. Dublin: Stationery Office.
- Morgan, M., Hickey, B, and Kellaghan, T. (1997), *International Adult Literacy Survey: Results for Ireland*. Dublin: Stationery Office.
- Murray, T.S., I. Kirsch and L. Jenkins (eds) (1998), *Adult Literacy in OECD Countries: Technical Report on the First International Adult Literacy Survey*, National Centre for Education Statistics, Office of Educational Research and Improvement, Washington.
- OECD (2013a), *OECD Skills Outlook: first results from the Survey of Adult Skills (PIAAC)*. OECD Publishing.
- OECD (2013b), *The Survey of Adult Skills: Reader's Companion*. OECD Publishing.
- OECD (2013c), *Technical Report of the Survey of Adult Skills (PIAAC) (PIAAC)*, OECD Publishing.
- OECD (2012), *Literacy, Numeracy and Problem Solving in Technology-Rich Environments: Framework for the OECD Survey of Adult Skills*, OECD Publishing. Retrieved from <http://dx.doi.org/10.1787/9789264128859-en>
- OECD (2011), *PIAAC Technical Standards and Guidelines*. OECD Publishing.
- OECD (2010), *PISA 2009 Results: Learning Trends: Changes in Student Performance Since 2000*. OECD Publishing.
- OECD (2009). *PIAAC Background Questionnaire JRA V5.0 – Conceptual Framework*, OECD Publishing. Retrieved from <http://www.oecd.org/edu/48865373.pdf>
- OECD (n.d.), *PIAAC Background Questionnaire*. Retrieved from <http://www.oecd.org/dataoecd/1/41/48442549.pdf>
- Perkins, R., Cosgrove, J., Moran, G., and Shiel, G. (2012). *PISA 2009: Results for Ireland and changes since 2000*. Dublin: Educational Research Centre.
- PIAAC Expert Group in Problem Solving in Technology-Rich Environments (2009), *PIAAC Problem Solving in Technology-rich Environments: Conceptual Framework*, OECD Education Working Papers NO. 36, OECD, Paris.
- PIAAC Literacy Expert Group (2009), *PIAAC Literacy: Conceptual Framework*, OECD Education Working Papers NO. 34, OECD, Paris.
- PIAAC Numeracy Expert Group (2009), *PIAAC Numeracy: Conceptual Framework*, OECD Education Working Papers NO. 35, OECD, Paris.
- Sabatini, J.P. and K.M. Bruce (2009), *PIAAC Reading Components: Conceptual Framework*, OECD Education Working Papers NO. 33, OECD, Paris.

Background Notes

Acknowledgments

The Central Statistics Office (CSO) wishes to sincerely thank the 5,983 respondents who took part in the PIAAC survey for their time and co-operation, and the 65 field interviewers who collected the data for their commitment and professionalism.

The CSO would like to acknowledge the technical advice on Item Response Theory provided by staff at the Educational Research Centre and CSO also recognises the interest and contribution of staff at the Department of Education and Skills over the lifetime of the project.

Finally, the CSO is grateful to the OECD and the members of the international PIAAC consortium for their advice and support throughout this project.

GOVERNANCE

PIAAC or the Survey of Adult Skills is a survey of the Organisation for Economic Co-operation and Development (OECD). The OECD is a Paris-based international organisation that aims to promote policies that will improve the economic and social well-being of people around the world.

The development and implementation of the PIAAC survey was overseen by the PIAAC Board of Participating Countries (BPC), consisting of representatives for each of the participating countries with the exception of Cyprus and Russia. Ireland was represented at the BPC by the Department of Education and Skills and the CSO acted as National Project Manager.

An international consortium of institutions was contracted by the OECD to design and implement PIAAC, led by Educational Testing Services (ETS) in the USA.

SURVEY DESIGN

The OECD Consortium was responsible for developing questionnaires, the assessment tasks and the computer platform, supporting survey operations, quality control, scaling, database preparation as well as providing support for analysis. Participating countries were responsible for national implementation of the assessment, including sampling, adaptation and translation of assessment materials, data collection and database production.

Each country was required to complete a National Survey Design and Planning Report (NSDPR) for the main study prior to data collection. This provided a detailed description of the final survey design so the Consortium could assess the appropriateness of the plan. The Consortium reviewed the planning report to determine whether the survey requirements were being satisfied. To ensure comparability of the PIAAC results across participating countries, it was important that each country's survey design plan was consistent with the PIAAC objectives and standards, was methodologically sound and operationally practical.

Survey Instrument

Adaptation and translation of the direct assessment materials and the Background Questionnaire (BQ) were crucial to the comparability and psychometric stability of the PIAAC data collection. The Consortium prepared a set of guidelines for the translation and adaptation of the assessment tasks as well as the BQ.

Assessment Design

PIAAC was designed to ensure that the direct assessments generated data that was psychometrically appropriate by maintaining consistent implementation across participating countries, using sound design principles and methods. All participating countries were required to follow the international guidelines for implementing the assessment design.

The PIAAC psychometric assessment design for the field trial served several purposes, including

- to test the survey operations procedures
- to identify and correct assessment items that were performing poorly, with particular reference to the quality of translation and scoring procedures
- to examine item characteristics for establishing comparability (i.e. to evaluate the equivalence of item parameters in two aspects: the linking of items from IALS/ALL to PIAAC and linking between the paper-and-pencil and computer formats).

In the main study, the PIAAC psychometric assessment design was based on a minimum sample size of 5,000 adults per country/per reporting language. It served several purposes, including:

- to provide good measurement of all the domains included in PIAAC
- to provide a baseline for assessing trends or changes over time in future rounds of PIAAC or similar assessments.

Newly developed cognitive test items

All PIAAC cognitive test instruments were evaluated for linguistic correctness and for equivalence to the source version. Every effort was made by the Consortium to produce psychometrically equivalent instruments in each national language being tested. Adaptations to the local context and/or for the mode of delivery (paper-and-pencil vs. computer-based) were implemented, documented and agreed upon.

Cognitive test items used for linking

Cognitive test items from previous surveys were used for the purpose of analysing trends and making valid comparisons between the assessment results of PIAAC and the International Adult Literacy Survey (IALS) and the Adult Literacy and Life skills survey (ALL). PIAAC countries that participated in IALS and ALL were responsible for the preparation of their linking items.

IMPLEMENTATION OF PIAAC

The design and implementation of PIAAC was guided by technical standards and guidelines (OECD, 2011¹) developed to ensure that the survey yielded high-quality and internationally comparable data. The Technical Standards and Guidelines articulates the standards to which participating countries were expected to adhere in implementing the assessment, describes the steps that should be followed in order to meet the standards and offers recommendations for actions relating to the standards that were not mandatory but that could help to produce high-quality data.

The Consortium reviewed each country's planning report (i.e. the NSDPR) to determine whether the survey requirements were being satisfied and to ensure comparability of the PIAAC results across participating countries. For more information please see PIAAC Standards and Technical Guidelines (OECD, 2011).

Background Questionnaire

PIAAC's Background Questionnaire (BQ) collected a comprehensive set of information designed to support the major analytical objectives of PIAAC. Its development was overseen by the PIAAC Background Questionnaire Expert Group and was designed to collect comparable information on respondents' backgrounds across countries and, where applicable, from one PIAAC cycle to the next or in relation to previous surveys.

¹ http://www.oecd.org/site/piaac/PIAAC-NPM%282010_12%29PIAAC_Technical_Standards_and_Guidelines.pdf

Background Questionnaire national adaptations

The Consortium prepared a master version of all instruments in English and a set of guidelines for translation and adaptation of the survey instruments. The subject matter and placement of any country-specific BQ questions had to be documented and agreed upon with the Consortium. In particular, where national classifications were used to capture information such as educational attainments or occupation categories, it was essential that they could be mapped to the appropriate international classifications.

Participating countries could opt to include a limited number of country-specific questions in its BQ, in addition to the required international core questions as well as the corresponding response categories and coding schemes developed by the Consortium. The total combined duration of all such additional country-specific questions could not exceed five minutes on average.

THE PIAAC SURVEY IN IRELAND

The PIAAC Main Study data collection period was conducted between August 2011 and March 2012. For more information on the methodology of the survey, including processing and quality control, please see PIAAC Technical Standards and Guidelines (OECD, 2011).

Field staff recruitment

The successful implementation of data collection required field co-ordinators and interviewers to have clearly defined roles and responsibilities. Field staff recruitment and training commenced eight weeks prior to data collection in line with PIAAC's Technical Standards and Guidelines. The data collection process was carried out by a team of four Temporary Full-Time Field Co-ordinators and 65 Temporary Part-Time Field Interviewers.

Field staff training

As outlined in the Technical Standards and Guidelines, interviewers received home study training prior to in-person training on all aspects of survey work. Training materials provided by the Consortium were used along with country-specific training guides developed by the CSO.

Sample Design

The core PIAAC target population consisted of all non-institutionalised adults between the ages of 16 and 65 (inclusive) residing in the country (whose usual place of residency is in the country) at the time of data collection. Adults were to be included regardless of citizenship, nationality or language.

Participating countries were required to use a probability sample representative of the target population. Each person in the PIAAC target population had a calculable non-zero probability of being selected as part of the sample, i.e. every in-scope person was required to have a chance of being selected.

Sample Size

The minimum sample size requirement for the main study was 5,000 completed interviews for the core target population, for a self-weighting (proportional to the population) core design.

Respondent Selection

Ireland's PIAAC sample was selected by county and stratum, proportional to the 2006 Census of Population. The Technical Standards and Guidelines instructed that persons must be selected from within households using a fully enumerated grid of household members. A nationally representative sample was selected using the latest geo-directory information and a three-stage sample design with areas, households and adults selected at random within each county.

No substitution of sampling units was allowed. Ireland's sample selection involved the sub-selection of a person within a selected household and required a set of screening questions to identify the target population members within a selected household and to facilitate the random selection of one person.

Data Collection

A computer-assisted data collection instrument was used at all stages of the survey, including completion of the Background Questionnaire. Face to face interviews were used to complete the Background Questionnaire and administer the direct assessments (literacy, numeracy and problem solving in technology-rich environments).

While conceived primarily as a computer based assessment (CBA), the option of taking the literacy and numeracy components of the assessment in paper and pencil format (PBA) had to be provided for those adults who had insufficient experience with computers to take the assessment in CBA mode.

Proxy responses were not acceptable for the direct assessments.

Quality Control Procedures

All national versions of newly developed materials were put through a two-step verification procedure:

- a sentence-by-sentence check of linguistic correctness, equivalence to the source version and appropriateness of national adaptations, with suggested corrections listed and justified in the Verification Follow-up Form
- A final optical check to verify the final layout of the instruments after verification, the equivalence of computer and paper forms, and the correct implementation of verifiers' crucial suggestions from the first step.

Quality Control monitoring forms were submitted to the Consortium on a monthly basis during survey planning and data collection, reporting the status of all aspects of the survey and discussing these issues with the Consortium during scheduled quality control monthly phone calls.

Respondent incentives

Ireland used a €30 gift voucher incentive to obtain respondent cooperation as was allowed by the PIAAC consortium. Other countries also used incentives.

Response Rates

Nonresponse to a survey increases the possibility that bias may exist in the survey results. The risk of bias increases as the response rate decreases. All reasonable efforts were made during the data collection phase to maximise survey response. Response rates were computed using a standard formula for the Screener, Background Questionnaire and Assessment items. Countries were required to compute item response rates and conduct an item nonresponse bias analysis for any Background Questionnaire items with response rates below 85%. To facilitate nonresponse adjustment, the Consortium instructed countries to use variables that had less than 5% missing data.

Ireland achieved a response rate of 72% or 5,983 cases.

Sample monitoring

During data collection, participating countries submitted monthly quality control monitoring forms to the Consortium. The report contained the number of cases completed, the number of cases worked, response rates by demographic variables and expected yield. The report was reviewed by the Consortium and any concerns were addressed.

At the end of sample selection, a survey control file with a record for each sampled household was constructed.

PIAAC SURVEY DEFINITIONS

Dwelling Unit

A dwelling unit (DU) is defined as a room or a group of rooms used, or intended to be used, for living purposes. A DU must be suitable for permanent human habitation and must have a private entrance either outside or from a common hall, lobby, vestibule or stairway inside the building. A private entrance is one that can be used without passing through the living quarters of someone else with cooking, living, sleeping and sanitary facilities that the occupants of the dwelling do not have to share with any persons other than their own household members.

Private Household

A private household comprises either one person living alone or a group of people (not necessarily related) living at the same address with common housekeeping arrangements - that is, sharing at least one meal a day or sharing a living room or sitting room.

Non-private Household (Communal Establishment)

A non-private household is a group of persons enumerated in a boarding house, hotel, guest house, hostel, barrack, hospital, nursing home, boarding school, religious institution, welfare institution, prison or ship, etc. A non-private household may include usual residents and/or visitors. However, proprietors and managers of hotels, principals of boarding schools, persons in charge of various other types of institutions and members of staff who, with or without their families, occupy separate living accommodation on the premises are classified as private households.

Usual Resident

A person is defined as a "Usual Resident" of a private household if he or she:

- (i) lives regularly (spending four nights per week) at the dwelling in question
- (ii) shares the main living accommodation (i.e. kitchen, living room or bathroom) with the other members of the household.

PROCESSING AND PRODUCTION OF RESULTS

At the end of data collection, sample selection data for each sampled unit was returned to the Consortium, including sampling strata, probabilities of selection, ID variables, disposition codes and auxiliary variables for weighting adjustments (i.e. Sample Design International File - SDIF).

Sampling Weights

Sampling weights are designed to take account of differential sampling rates, differential response rates and under coverage, and are calibrated to population control totals. They ensure that the estimates represent each country's target population and reduce the potential for bias due to nonresponse. The OECD Consortium calculated Ireland's sample weights based on information supplied to them.

Replicate Weights

Replicate weights are created to capture the variation due to the sample design and selection as well as weighting adjustments to generate more accurate standard errors. Replicate weights were created using a jack-knife approach which effectively uses the variation within the sample to estimate the likely quality of the sample.

Literacy-Related Non Response

Literacy-related non-respondents could not be represented by survey respondents as their reason for not completing the survey was directly related to the survey outcome. Therefore, they were excluded from the adjustment for non-literacy-related nonresponse. However, the literacy-related non-respondents were included in the benchmarking adjustment with the survey respondents as they were considered part of the PIAAC target population.

CLASSIFICATIONS USED IN THE OUTPUT

Highest Level of Education (ISCED 97)

This classification is derived from a single question and refers to educational standards that have been attained and can be compared in some measurable way. The question is included in the Background Questionnaire and is phrased as follows: "What is the highest level of education or training you have successfully completed?"

UNESCO developed the International Standard Classification of Education (ISCED) to facilitate comparisons of education statistics and indicators across countries on the basis of uniform and internationally agreed definitions. The current revision of ISCED is ISCED 1997 (ISCED97). At the national level the National Framework of Qualifications (NFQ) was launched in 2003 and it is now the single structure mechanism for recognising all education and training in Ireland. All framework awards now have an NFQ Level, numbered from 1 to 10, which tells you about the standard of learning and an NFQ Award-Type which tells you about the purpose, volume and progression opportunities associated with a particular award.

In this publication educational attainment results are presented using a descriptive name and the corresponding NFQ levels. For information on the NFQ: <http://www.nfq.ie/nfq/en/>. For information on the ISCED97 classification: http://www.uis.unesco.org/ev_en.php?ID=7433_201&ID2=DO_TOPIC

Industrial Classification (ISIC Rev4)

Four-digit codes from the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4, were used to code the sector in which the respondent is working: (<http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27&Lg=1>).

The industry in which a person is engaged is determined (regardless of their occupation) by the main economic activity carried out in the local unit in which he or she works. If, however, the local unit provides an ancillary service to another unit in the business (e.g. administration, storage, etc.) then the persons in the ancillary unit are classified to the industry of the unit it services. Thus, while the occupational classification is concerned only with the particular work performed by an individual regardless of the activity carried on at the local unit, the industrial classification is concerned only with the ultimate purpose of the unit or end product regardless of the precise nature of the work performed by each individual.

A manufacturing or commercial unit may employ persons with many different occupations for the purpose of making a particular product or for giving a particular service. Conversely, there are cases in which particular occupations are largely confined to a single industry. For example, the majority of persons with agricultural occupations are in the agriculture industry and most miners are in the mining industry.

The basis of the industrial classification is, in the case of employees, the business or profession of their employer and in the case of self-employed persons, the nature of their own business or profession.

Occupational Classification (ISCO08)

The occupation data in this publication are based on the UK Standard Occupation Classification (SOC) with some modifications to reflect Irish Labour Market conditions. The latest version of SOC is SOC2010.

The code to which a person's occupation is classified is determined by the kind of work he or she performs in earning a living, irrespective of the place in which, or the purpose for which, it is performed. The nature of the industry, business or service in which the person is working has no bearing upon the classification of the occupation. For example, the occupation "clerk" covers clerks employed in manufacturing industries, commerce, banking, insurance, public administration, professions and other services.

Once the data was collected the SOC coding was translated into the ISCO08 classification system in order to maintain international comparability. Further information on ISCO08 can be found at: <http://www.ilo.org/public/english/bureau/stat/isco/isco08/>

Principal Economic Status (PES) classification

Results are also available using the Principal Economic Status (PES) classification which is used in the Labour Force Survey and the Census of Population. The PES classification is based on a single question in which respondents were asked: “which ONE of the statements best describes your current situation”. Response options are listed below:

- Full-time employed (self employed, employee)
- Part-time employed (self employed, employee)
- Unemployed
- Pupil, student
- Apprentice, internship
- In retirement or early retirement
- Permanently disabled
- Fulfilling domestic tasks or looking after children/family
- Other

NOTES ON THE TABLES

Rounding

The row or column percentages in tables may not add to 100% due to rounding and the exclusion of a small number of 'don't know' or 'not stated' responses. Individual figures have been rounded independently and the sum of the component items therefore may not necessarily add to the totals shown.

Statistical Significance

All estimates based on sample surveys are subject to error, some of which is measurable. Where an estimate is statistically significantly different from another estimate it means that differences between those two estimates are not due to sampling error. Unless otherwise stated, changes and differences mentioned in the text have been found to be statistically significant at the 95% confidence level.

Standard Error

A standard error (SE) is an estimate of how accurately the survey mean reflects the population mean with smaller standard errors indicating a more precise estimate.

For more information please see <http://www.cso.ie/en/surveysandmethodology/education/piaac/>

Annex 1

PROFICIENCY LEVELS

An important role of international assessments such as PIAAC is to identify in real terms what a scale score means in terms of a particular proficiency. In other words, there are certain skills that characterise persons at the bottom, middle and top of the range of scale scores (0-500). Using the scale scores and item difficulties for each domain, the OECD has derived a number of benchmarks or categories that they believe characterise different types of skill along the proficiency continuum for all three domains. Proficiency levels have a descriptive purpose and are intended to aid the interpretation and understanding of the scales.

This annex describes the skills persons scoring at different levels on each of the three proficiency domains is likely to have. It also contains some sample items that were used in the PIAAC field trial that map to different levels of proficiency. Some of the items used in the PIAAC survey will be re-used in future rounds of PIAAC and also in the OECD's online version of PIAAC (Education and Skills Online – ESOL) that is due to be released in 2014. For this reason the actual items cannot be provided here.

1. LITERACY

Level	LITERACY
5 (376 - 500)	At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidenced based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a key requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.
4 (326 - 375)	Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesize information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform successfully. Many tasks require identifying and understanding one or more specific, non-central ideas in the text in order to interpret or evaluate subtle evidence-claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information.
3 (276 - 325)	Texts at this level are often dense or lengthy, including continuous, non-continuous, mixed, or multiple pages. Understanding text and rhetorical structures become more central to successfully completing tasks, especially in navigation of complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inferencing. Many tasks require the respondent construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate text content to answer accurately. Competing information is often present, but it is not more prominent than the correct information.
2 (226 - 275)	At this level the complexity of text increases. The medium of texts may be digital or printed, and texts may be comprised of continuous, non-continuous, or mixed types. Tasks in this level require respondents to make matches between the text and information, and may require paraphrase or low level inferences. Some competing pieces of information may be present. Some tasks require the respondent to <ul style="list-style-type: none"> • cycle through or integrate two or more pieces of information based on criteria, • compare and contrast or reason about information requested in the question, or • navigate within digital texts to access-and-identify information from various parts of a document.
1 (176 - 225)	Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information which is identical to or synonymous with the information given in the question or directive. Some tasks may require the respondent to enter personal information onto a document, in the case of some non-continuous texts. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognizing basic vocabulary, evaluating the meaning of sentences, and reading of paragraph text is expected.
Below 1 (0 - 175)	The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. While the texts can be continuous, the information can be located as if the text were non-continuous. As well, tasks below level 1 do not make use of any features specific to digital texts.

Literacy – Sample Item 1


Item difficulty: Level 2

Respondents who score at Level 2 on the literacy scale (i.e. between 226 and 275) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the literacy scale would have a smaller chance of getting it correct.

Sample item 1 focuses on these aspects of the literacy construct:

- Cognitive Process: Access and identify
- Context: Personal
- Medium: Print

In this sample item, respondents are asked to click on the chart with information about exercise equipment to mark their response. Each of the cells and all of the images are “clickable” and multiple responses can be selected.


Section 4

Unit 2 - Question 1/3

Look at the exercise equipment chart. Click on the chart to answer the question below.

Which muscles will benefit most if you use the gym bench?

Physical Exercise Equipment

How to choose?

- 1 Decide what effect you want the exercise to have on your body.
- 2 Assess the space you have available at home.
- 3 Choose the equipment that suits your objectives. If necessary ask a specialist for advice.

For example:

OBJECTIVE	STRATEGY	EQUIPMENT
Burn off calories	Cardiovascular exercises	Rowing machine, Bicycle, Skimachine, Treadmill, Stairs, ...
Strengthen your muscles	Endurance exercises	Bench for Press-ups, Weights and Dumbbells, Elastic Tubes,

Effects on...	Cardio-Training					Muscle Building							
	Exercise bicycle	Rowing machine	Stepper	Treadmill	Air trainer	Dumbbells, weights	Elastic	Gym bench	Muscle-building bench	Multi-trainer	AB trimmer	AB shaper	AB roller
Arm strength	Ineff-ective	Good	Average	Ineff-ective	Good	Very good	Very good	Good	Good	Good	Very good	Good	Good
Leg strength	Good	Very good	Average	Very good	Good	Ineff-ective	Good	Average	Good	Good	Ineff-ective	Good	Good
Abdominal muscles	Average	Very good	Good	Good	Average	Ineff-ective	Good	Very good	Good	Average	Very good	Very good	Very good
Overall muscle building	Ineff-ective	Very good	Ineff-ective	Average	Ineff-ective	Average	Good	Good	Good	Average	Good	Good	Good
Heart/arteries	Very good	Good	Very good	Very good	Good	Ineff-ective	Average	Average	Average	Good	Average	Average	Average
Flexibility	Ineff-ective	Good	Ineff-ective	Ineff-ective	Average	Average	Average	Good	Ineff-ective	Ineff-ective	Average	Good	Good
Joints	Good	Very good	Good	Good	Good	Good	Average	Average	Good	Good	Average	Average	Average
Slimming	Good	Average	Very good	Good	Good	Ineff-ective	Average	Good	Average	Average	Good	Good	Good
Dangers	None	Back	None	Legs									

It is best to learn to use these types of apparatus properly before you make a major effort

Correct Response: Click on 'Abdominal muscles'.


Literacy – Sample Item 1, continued

Item difficulty: Level 2

Respondents who score at Level 2 on the literacy scale (i.e. between 226 and 275) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the literacy scale would have a smaller chance of getting it correct.

Most of the literacy items have more than one question associated with each stimulus. A second item in this set as shown below focuses on the following aspects of the literacy construct:

- Cognitive Process: Integrate and interpret
- Context: Personal
- Medium: Print



Section 4

Unit 2 - Question 3/3

Look at the exercise equipment chart. Click on the chart to answer the question below.

Which piece of equipment listed received the largest number of "Ineffective" ratings?

Physical Exercise Equipment i

How to choose?

- 1 Decide what effect you want the exercise to have on your body.
- 2 Assess the space you have available at home.
- 3 Choose the equipment that suits your objectives. If necessary ask a specialist for advice.

For example:

OBJECTIVE Burn off calories	STRATEGY Cardiovascular exercises	EQUIPMENT Rowing machine, Bicycle, Skimachine, Treadmill, Stairs, ...
Strengthen your muscles	Endurance exercises	Bench for Press-ups, Weights and Dumbbells, Elastic Tubes,

Effects on...	Cardio-Training					Muscle Building							
	Exercise bicycle	Rowing machine	Stepper	Tread-mill	Air trainer	Dumb-bells weights	Elastic	Gym bench	Muscle-building bench	Multi-trainer	AB trimmer	AB shaper	AB roller
Arm strength	Ineff-ective	Good	Average	Ineff-ective	Good	Very good	Very good	Good	Good	Good	Very good	Good	Good
Leg strength	Good	Very good	Average	Very good	Good	Ineff-ective	Good	Average	Good	Good	Ineff-ective	Good	Good
Abdominal muscles	Average	Very good	Good	Good	Average	Ineff-ective	Good	Very good	Good	Average	Very good	Very good	Very good
Overall muscle building	Ineff-ective	Very good	Ineff-ective	Average	Ineff-ective	Average	Good	Good	Good	Average	Good	Good	Good
Heart/arteries	Very good	Good	Very good	Very good	Good	Ineff-ective	Average	Average	Average	Good	Average	Average	Average
Flexibility	Ineff-ective	Good	Ineff-ective	Ineff-ective	Average	Average	Average	Good	Ineff-ective	Ineff-ective	Average	Good	Good
Joints	Good	Very good	Good	Good	Good	Good	Average	Average	Good	Good	Average	Average	Average
Slimming	Good	Average	Very good	Good	Good	Ineff-ective	Average	Good	Average	Average	Good	Good	Good
Dangers	None	Back	None	Legs		It is best to learn to use these types of apparatus properly before you make a major effort							

Correct Response: Click on 'Dumbbell weights'.

Literacy – Sample Item 2


Item difficulty: [Level 3](#)

Respondents who score at Level 3 on the literacy scale (i.e. between 276 and 325) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the literacy scale would have a smaller chance of getting it correct.

This literacy sample focuses on the following aspects of the literacy construct:

- Cognitive Process: Access and identify
- Context: Personal
- Medium: Print


Respondents are asked to answer the question shown in the left pane by highlighting information in the list of rules for a preschool.

 PIAACSection _42

Unit 1 - Question 1/3

Look at the list of preschool rules. Highlight information in the list to answer the question below.

What is the latest time that children should arrive at preschool?



Preschool Rules

Welcome to our Preschool! We are looking forward to a great year of fun, learning and getting to know each other. Please take a moment to review our preschool rules.

- Please have your child here by 9:00 am.
- Bring a small blanket or pillow and/or a small soft toy for naptime.
- Dress your child comfortably and bring a change of clothing.
- Please no jewelry or candy. If your child has a birthday please talk to your child's teacher about a special snack for the children.
- Please bring your child fully dressed, no pajamas.
- Please sign in with your full signature. This is a licensing regulation. Thank you.
- Breakfast will be served until 7:30 am.
- Medications have to be in original, labeled containers and must be signed into the medication sheet located in each classroom.
- If you have any questions, please talk to your classroom teacher or to Ms. Marlene or Ms. Tree.

Correct Response: Highlight the first bullet point, 'Please have your child here by 9.00 a.m.'

2. NUMERACY

Level	NUMERACY
5 (376 - 500)	Tasks in this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; justify, evaluate and critically reflect upon solutions or choices.
4 (326 - 375)	Tasks in this level require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about e.g. quantities and data; statistics and chance; spatial relationships; change, proportions and formulas. Tasks in this level may also require comprehending arguments or communicating well-reasoned explanations for answers or choices.
3 (276 - 325)	Tasks in this level require the respondent to understand mathematical information which may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of e.g. number sense and spatial sense; recognizing and working with mathematical relationships, patterns, and proportions expressed in verbal or numerical form; interpretation and basic analysis of data and statistics in texts, tables and graphs.
2 (226 - 275)	Tasks in this level require the respondent to identify and act upon mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving e.g. calculation with whole numbers and common decimals, percents and fractions; simple measurement and spatial representation; estimation; interpretation of relatively simple data and statistics in texts, tables and graphs.
1 (176 - 225)	Tasks in this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. Tasks usually require simple one-step or two-step processes involving e.g., performing basic arithmetic operations; understanding simple percents such as 50%; or locating, identifying and using elements of simple or common graphical or spatial representations.
Below 1 (0 - 175)	Respondents classified at this level may have difficulty with many tasks at Level 1. They may be able to cope with very simple tasks set in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors, and that require only simple processes such as counting; sorting; performing basic arithmetic operations with whole numbers or money, or recognizing common spatial representations.

Numeracy – Sample Item 1

Item difficulty: Level 3

Respondents who score at Level 3 on the numeracy scale (i.e. between 276 and 325) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the numeracy scale would have a smaller chance of getting it correct.

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

- Content: Data and chance
- Process: Interpret and evaluate
- Context: Community and society

For PIAAC, item difficulty is reported along a five-level scale with Level 1 being the easiest items and Level 5 being the hardest. This sample is a Level 3 item. Respondents are asked to respond by clicking on one or more of the time periods provided in the left pane on the screen.

OECD PIAACSection _42

Unit 5 - Question 2/2

Look at the graph about the number of births. Click to answer the question below.

During which period(s) was there a decline in the number of births? Click all that apply.

- 1957 - 1967
- 1967 - 1977
- 1977 - 1987
- 1987 - 1997
- 1997 - 2007

Year	Number of Births
1957	4,300,000
1967	3,520,959
1977	3,326,632
1987	3,809,394
1997	3,880,894
2007	4,315,000

The following graph shows the number of births in the United States from 1957 to 2007. Data are presented every 10 years.

Correct Response: 1957 - 1967 AND 1967 – 1977

Numeracy – Sample Item 2


Item difficulty: [Level 3](#)

Respondents who score at Level 3 on the numeracy scale (i.e. between 276 and 325) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the numeracy scale would have a smaller chance of getting it correct.

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

- Content: Dimension and shape
- Process: Identify, locate or access;
Act upon, use (estimate)
- Context: Everyday life or Workplace

Respondents are asked to type in a numerical response based on the graphic provided.

PIAAC


Section_42


Unit 2 - Question 1/2

Look at the thermometer. Using the number keys, type your answer to the question below.

What is the temperature shown on the thermometer in degrees Fahrenheit (°F)?

°F





Correct Response: Any value between 77.7 and 78.3

Numeracy – Sample Item 2 continued

Item difficulty: [Level 3](#)

Respondents who score at Level 3 on the numeracy scale (i.e. between 276 and 325) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the numeracy scale would have a smaller chance of getting it correct.

This second item in the set focuses on the following aspects of the numeracy construct:

- Content: Dimension and shape
- Process: Identify, locate or access;
Act upon, use (measure)
- Context: Everyday life or Workplace

Again, respondents are asked to type in a numerical response based on the graphic provided.

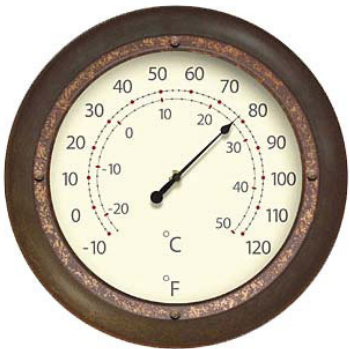
OECD PIAACSection _42

Unit 2 - Question 2/2

Look at the thermometer. Using the number keys, type your answer to the question below.

If the temperature shown decreases by 30 degrees Celsius, what would the temperature be in degrees Celsius (°C)?

°C



?

Correct Response: Any value between -4 and -5

Numeracy – Sample Item 3

Item difficulty: Level 4

Respondents who score at Level 4 on the numeracy scale (i.e. between 326 and 375) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the numeracy scale would have a smaller chance of getting it correct.

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

- Content: Quantity and Number
- Process: Act upon, use (compute)
- Context: Community and society

Respondents are asked to type in a numerical response based on the information provided.

OECD PIAACSection 4


Unit 11 - Question 1/1

Read the article about wind power stations. Using the number keys, type your answer to the question below.

How many wind power stations would be needed to replace the power generated by the nuclear reactor?

Wind Power Stations

In 2005, the Swedish government closed the last nuclear reactor at the Barsebäck power plant. The reactor had been generating an average energy output of 3,572 GWh of electrical energy per year.



Work continues in Sweden on installing large offshore wind farms using wind power stations. Each wind power station produces about 6,000 MWh of electrical energy per year.

For your information:
Electrical energy is measured in Watt hours (Wh)

1 kWh	= 1 kilo Wh	=	1,000 Wh
1 MWh	= 1 Mega Wh	=	1,000,000 Wh
1 GWh	= 1 Giga Wh	=	1,000,000,000 Wh

←?→

Correct Response: Either 595, 596 OR 600

3. PROBLEM SOLVING IN TECHNOLOGY RICH ENVIRONMENTS

Level	PSTRE
<p>3 (341-500)</p>	<p>At this level, tasks typically require the use of both generic and more specific technology applications. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) is required to make progress toward the solution. The task may involve multiple steps and operators. In terms of cognitive processing, the problem goal may have to be defined by the person, and the criteria to be met may or may not be explicit. There are typically high monitoring demands. Unexpected outcomes and impasses are likely to occur. The task may require evaluating the relevance and the reliability of information in order to discard distractors. Integration and inferential reasoning may be needed to a large extent.</p>
<p>2 (291-340)</p>	<p>At this level, tasks typically require the use of both generic and more specific technology applications. For instance, the person may have to make use of a novel online form. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) can facilitate the resolution of the problem. The task may involve multiple steps and operators. In terms of cognitive processing, the problem goal may have to be defined by the person, though the criteria to be met are explicit. There are higher monitoring demands. Some unexpected outcomes or impasses may appear. The task may require evaluating the relevance of a set of items to discard distractors. Some integration and inferential reasoning may be needed.</p>
<p>1 (241-290)</p>	<p>At this level, tasks typically require the use of widely available and familiar technology applications, such as email software or web browser. There is little or no navigation required to access the information or commands required to solve the problem. The problem may be solved regardless of one's awareness and use of specific tools and functions (e.g., a sort function). The task involves few steps and a minimal number of operators. At a cognitive level, the person can readily infer the goal from the task statement; problem resolution requires one to apply explicit criteria; there are few monitoring demands (e.g., the person does not have to check whether they have used the adequate procedure or made progress toward the solution). Identifying contents and operators can be done through simple match; only simple forms of reasoning, e.g.; assigning items to categories are required; there is no need to contrast or integrate information.</p>
<p>Below 1 (0-240)</p>	<p>Tasks are based on well-defined problems involving the use of only one function within a generic interface to meet one explicit criterion without any categorical, inferential reasoning or transforming of information. Few steps are required and no subgoal has to be generated.</p>

Problem Solving – Sample Item 1

Item difficulty: Level 2

Respondents who score at Level 2 on the problem solving scale (i.e. between 291 and 340) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the problem solving scale would have a smaller chance of getting it correct.

In this sample item, respondents need to select a set of files to download onto a portable music player. As shown in Figure 1, the item requires respondents to select files meeting specified criteria in terms of genre (jazz and rock) and file size (maximum of 20 MB).

The software includes an automatic summing functionality (“Total Size Selected”) that facilitates the task by updating the total file size as files are selected or deselected. Respondents must monitor progress as they select files, checking against the provided criteria to know when they have satisfied the constraints presented in the problem.

Figure 1

DECD PIAAC Section 1

Spreadsheet

File Edit Data Help

You want to copy some music files to your portable music player.

The music player has room for 20 MB and you want as many files as possible. You want to include only jazz and rock music.

Select the files to include.

Once you have selected the files, click Next to continue.

	Title	Size	Time	Artist	Genre
<input type="checkbox"/>	A Foreign Affair	14.8 MB	11:40	Don Rader Quartet	Jazz
<input type="checkbox"/>	About the Blues	4.3 MB	3:08	Julie London	Blues
<input type="checkbox"/>	Another Mind	7.8 MB	8:44	Hiroshi Uehara	Jazz
<input type="checkbox"/>	Blue Trane	10 MB	9:03	John Coltrane	Jazz
<input type="checkbox"/>	Don't Give up on Me	3.5 MB	3:45	Solomon Burke	Blues
<input type="checkbox"/>	Far Out	5.3 MB	5:25	Antonio Farao	Jazz
<input type="checkbox"/>	Fire and Water	5.3 MB	4:00	Free	Blues
<input type="checkbox"/>	If	4.9 MB	5:48	Myriam Alter	Jazz
<input type="checkbox"/>	Imagine	2.2 MB	3:04	John Lennon	Rock
<input type="checkbox"/>	Inclined	7.1 MB	5:59	Carol Welsman	Jazz
<input type="checkbox"/>	On an Island	16 MB	6:47	David Gilmore	Blues
<input type="checkbox"/>	Pass It On	3.1 MB	3:36	Albert Calvo	Jazz
<input type="checkbox"/>	Raindrops, Raindrops	5.2 MB	3:46	Karin Krog	Jazz
<input type="checkbox"/>	Say You Will	8.8 MB	3:47	Fleetwood Mac	Rock
<input type="checkbox"/>	Skin Deep	7.1 MB	4:28	Buddy Guy	Blues
<input type="checkbox"/>	Speak No Evil	6.9 MB	5:13	Flora Purim	Jazz
<input type="checkbox"/>	The Other Side of Blue	6.5 MB	5:08	Jean Shy & Jobo	Jazz
<input type="checkbox"/>	The Rise	7.3 MB	7:28	Julien Lourau	Jazz
<input type="checkbox"/>	The Rising	4.5 MB	4:50	Bruce Springsteen	Rock

Total Size Selected (MB)

Spreadsheet

It is also possible to sort the spreadsheet by file size and/or genre, a strategy that can increase task efficiency. The connection between the use of resources in a technology rich environment and resulting efficiencies for solving problems is one aspect of the domain that is emphasised in the framework and therefore included across items in the assessment.

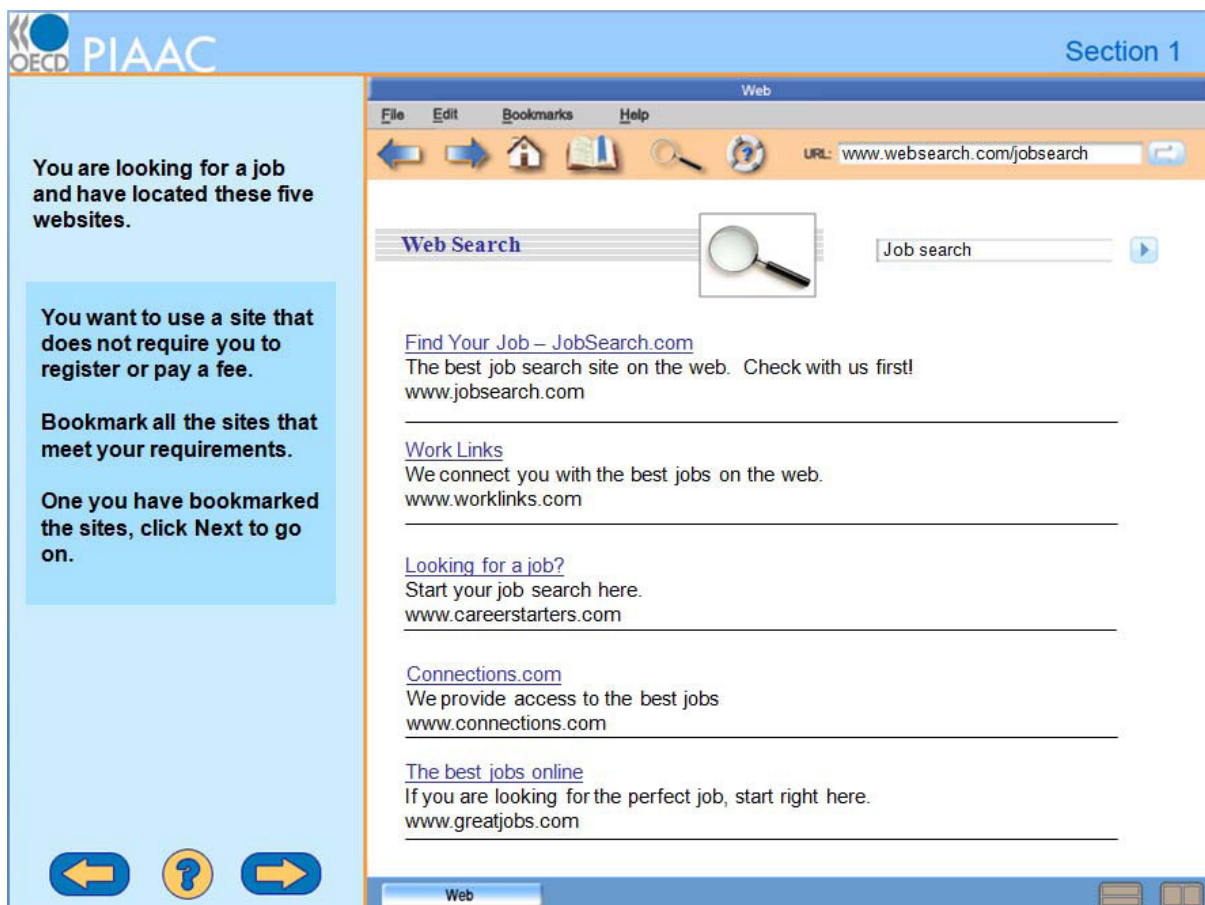
Problem Solving – Sample Item 2

Item difficulty: Level 3

Respondents who score at Level 3 on the problem solving scale (i.e. between 341 and 500) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the problem solving scale would have a smaller chance of getting it correct.

In this item, respondents must access and evaluate information in the context of a simulated job search. As shown in the item directions, located on the left side of the screen, respondents must find one or more sites that do not require users to register or pay a fee.

Figure 2: Opening screen of job search task



As the screen clip above shows, this item is situated in a simulated web environment that includes tools and functionality similar to those found in real-life applications. Users are able to:

- Click on links on both the results page and associated web pages
- Navigate using the Back and Forward arrows or Home icon
- Bookmark web pages and view or change those bookmarks

Problem Solving – Sample Item 2, continued

Item difficulty: Level 3

Respondents who score at Level 3 on the problem solving scale (i.e. between 341 and 500) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the problem solving scale would have a smaller chance of getting it correct.

The response mode in this item is reflective of real-life actions within the environment. In this case, respondents are asked to bookmark their selection. In addition to scoring this item based on the selection of the two correct sites, the process data and path tracking that are possible in this computer-based item also contribute to the response data. For example, one of the websites, as shown in Figure 2, meets the specified criteria, but the relevant information about fees and registration is not on the opening page.

If a respondent bookmarks this site as a correct answer without clicking on the “Learn More” link (shown in Figure 3) to view the relevant information (shown in Figure 4) the response might be interpreted differently than if that page had been viewed. This breadth of information, combined with frameworks that specify behaviours of interest, allow us to learn more about what adults know and can do relative to the problem-solving construct as it is being measured in PIAAC.

Figure 3: Website where relevant information regarding fees and registration is not on opening screen

The image shows a screenshot of a PIAAC task interface. On the left, a light blue sidebar contains instructions: "You are looking for a job and have located these five websites.", "You want to use a site that does not require you to register or pay a fee.", "Bookmark all the sites that meet your requirements.", and "One you have bookmarked the sites, click Next to go on." Below these instructions are navigation icons: a left arrow, a question mark, and a right arrow. The main area displays a browser window with the URL "http://www.worklinks.com". The browser's address bar shows "http://www.worklinks.com". The website content includes a header "Work Links" and a sub-header "Connecting you to the BEST Jobs". Below this is a large image of a diverse group of people giving thumbs up, with a "Learn More" button to the right. Underneath the image, it says "Thousands of new jobs in the last 7 days" and "Search job sites, newspapers, associations and company career pages". The browser's status bar at the bottom shows "Web" and some system icons.

Problem Solving – Sample Item 2, continued

Item difficulty: Level 3

Respondents who score at Level 3 on the problem solving scale (i.e. between 341 and 500) would be expected to have a 67% chance of getting this item correct. Respondents who score at a lower level on the problem solving scale would have a smaller chance of getting it correct.

Figure 4: Second page of same website – relevant information is located in the directions for the form which indicate that users must sign up (register) and pay a fee.

The screenshot shows a web browser window with the URL <http://www.worklinks.com/signup>. The browser's address bar and menu bar are visible. The page content includes a navigation bar with the 'Work Links' logo and the tagline 'Connecting you to the BEST Jobs'. A sign-up form is displayed with the following fields:

- First Name
- Last Name
- Your Email Address
- Re-Enter Email
- Create a password
- Re-Enter Password

Below the form, the pricing is listed as **\$15.00 for 1 month or \$33.00 for monthly access plan**. There are also fields for Credit Card Type, Credit Card Number, and Expiration Date.

On the left side of the browser window, there is a light blue sidebar with the following text:

You are looking for a job and have located these five websites.

You want to use a site that does not require you to register or pay a fee.

Bookmark all the sites that meet your requirements.

One you have bookmarked the sites, click Next to go on.

At the bottom of the sidebar, there are three icons: a left arrow, a question mark, and a right arrow.