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The International Survey of Adult Skills 2012: Adult literacy, numeracy and problem solving skills in England

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Report Authors and Acknowledgements

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Acronyms

ALL	Adult Literacy and Life Skills Survey
BPC	Board of Participating Countries
BQ	Background questionnaire
CBA	Computer based assessment
DIUS	Department for Innovation, Universities and Skills
ETS	Educational Testing Service
GCSE	General Certificate of Secondary Education
IALS	International Adult Literacy Survey
ICT	Information and Communication Technology
IDB	International Database (Analyzer)
IEA	International Association for the Evaluation of Educational Achievement
IRT	Item Response Theory
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification of All Economic Activities
JRA	Job Requirements Approach
NPM	National Project Manager
NQF	National Qualifications Framework
OECD	Organisation for Economic Co-operation and Development
PAF	Postcode Address File
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment

PSU	Primary Sampling Units
RP	Response Probability

Executive Summary

Background and overview

The International Survey of Adult Skills is a product of the Programme for the International Assessment of Adult Competencies (PIAAC) led by the Organisation for Economic Co-operation and Development (OECD). It assessed adults' skills in literacy, numeracy and problem solving in technology-rich environments and also collected background information about participants through a questionnaire.

In the UK, England and Northern Ireland participated in the study. The 2012 International Survey of Adult Skills was carried out on behalf of the Government by the National Foundation for Educational Research (NFER) in partnership with TNS-BMRB, NatCen Social Research (NatCen) and Northern Ireland Statistics and Research Agency (NISRA).

Results for England and Northern Ireland as a whole are included in the international report published by OECD with the results of the other 23 participating countries and sub-national regions. In order for England and Northern Ireland's results to be included in the international report, strict international quality standards had to be met at all stages of the survey to ensure equivalence in translation and adaptation of instruments, sampling procedures and survey administration.

In England, 5,131 adults participated in the survey between August 2011 and March 2012. The response rate was 59 per cent.

Distribution of adult skills in literacy

England's performance in literacy was not significantly different from the OECD average. There were eight countries that significantly outperformed England and eight countries that performed significantly below England. Of those countries that outperformed England, there was one English speaking country (Australia) and of the remaining, all but Japan and Norway were EU countries.

Compared with other participating countries, there was a relatively large difference between the score points of the lowest scoring adults and the highest scoring adults, reflecting less even skill distribution across the population compared with many other countries.

Unlike the majority of other countries, men's score averages were not significantly different from women's.

England had unusual performance amongst adults of different age groups. Contrary to international patterns, the oldest age group (55 plus) had higher average scores than those aged 16-18 (and the same score when the whole age band 16-24 is considered). There was particularly poor performance amongst England's youngest adults compared with other participating countries.

Higher literacy skills were associated with educational attainment, employment status, country of birth / mother tongue and ethnicity. People who did not have upper secondary level qualifications were less likely to achieve higher literacy scores. Equally, those in fulltime employment, as well as those who work part-time, are studying or who are retired, have higher levels of literacy than those who are unemployed. While the average score of those people born outside the UK is one of the highest of all participating countries, those people still tended to perform at the lower levels of literacy.

Distribution of adult skills in numeracy

England's performance in numeracy was significantly below the OECD average. There were 15 countries that significantly outperformed England and five countries that England significantly outperformed. The highest performing countries in this skill included: Japan, Finland, Flanders (Belgium), the Netherlands and Sweden.

As for literacy, England had a relatively large difference between the score points of the lowest scoring adults and the highest scoring adults compared with many other countries.

Men scored significantly higher than women, which was the case in every country which participated in the study. This gender difference was higher than the OECD average.

In numeracy, where adults in England perform significantly below the OECD average, there seems to be consistent lower performance by adults at all levels of qualification. As with literacy, the oldest age group performed better than the youngest (16-18) – the same pattern also occurred in the USA.

The patterns for educational attainment, employment status, country of birth and mother tongue were similar to those for literacy, but in terms of ethnicity, those people of Black/Black British origin were more likely to have scores clustered at the lower levels of achievement.

Distribution of adult skills in problem solving in technology-rich environments

Although the average score for problem solving in technology-rich environments was lower than the OECD average, this must be seen in the context of the far higher participation in this domain compared with other countries, which was particularly marked among the older age groups. The spread of scores for this domain was slightly lower than those for literacy and numeracy. Countries with the highest average scores in this skill included: Japan, Finland, Australia, Sweden and Norway. Although, of these countries, Japan, Finland and Australia had higher proportions of people who did not take part in the problem solving assessment.

Men scored significantly higher than women, which was the case in every country which participated in the study. The difference was higher than the OECD average.

Unlike the performance in other domains, the youngest age group achieved higher average scores than the oldest – adhering to the international pattern. In terms of occupation, those people still in education and training had the highest average scores,

followed by those in full-time employment. These two categories may be related as younger people are more likely to be in education or training

Distribution of adult skills by age

In general, the performance of adults grouped by different demographic characteristics is more similar for literacy and numeracy than for problem solving. Compared to other countries younger people in England perform relatively worse in literacy than their peers in other countries, while older people perform well, a similar pattern is observed for numeracy, but older people are not ranked so highly. The comparison with other countries in terms of age groups suggests that other countries are improving the literacy and numeracy skills of younger people at a faster rate than in England. Korea is a particularly good example of a country with generally similar overall performance to England, but a very different profile of skills by different age groups. Whereas in England, on average, our younger adults are performing less well compared with other countries, in Korea, the opposite is true – their older adults are less skilled compared with other participating countries, but their younger adults have very good skills compared with other participating countries.

Internationally, young people performed better than older adults in every country in problem solving, including England.

Adult skills and work

In England, adults who worked in the industry sector of information and communication had the highest average scores in literacy, numeracy and problem solving in the International Survey of Adult Skills.

On average, adults working in professional occupations had the highest literacy, numeracy and problem solving skills. This compares with adults working in elementary occupations who, on average, had the lowest scores in literacy and numeracy and low scores in problem solving.

There is a clear relationship between salary and literacy, numeracy and problem solving skills, except for those adults at the very lowest salaries. This group is likely to contain younger adults, those in education and work and those working part-time.

Participants were asked to what extent they used various skills in the workplace. These included influencing; cooperating; planning and organising; problem solving; ICT; literacy and numeracy; and learning at work. For all skills, more frequent use of these skills was associated with higher average scores in literacy, numeracy and problem solving compared with adults that use these skills infrequently, matching the OECD pattern.

Adult skills in everyday life

Participants were asked to what extent they used various skills in their everyday lives. These included literacy, numeracy and ICT skills. In general, increased frequency of skill use in everyday lives was associated with higher scores in literacy, numeracy and problem solving. However, skill use and proficiency are highly related and so it is not possible to

infer the direction of causality. For instance, it may be that because of an individual's high proficiency skills, they spend more of their free time using their literacy, numeracy and ICT skills, and vice versa.

Characteristics of those with low proficiency

The characteristics of adults in England that predict low proficiency were examined. Low proficiency was defined as achieving Level 1 or below in literacy and numeracy and below level 1 in problem solving.

In England, 17 per cent of adults had low proficiency in literacy, 24 per cent had low proficiency in numeracy and 18 per cent had low proficiency in problem solving. These were similar proportions to those found in the OECD, on average, for literacy and problem solving and a statistically significant higher proportion for numeracy.

The characteristics most likely to be associated with low proficiency were having a low level of education, belonging to certain ethnic groups, having poorer general health, having parents who have low levels of education, not having computer experience in everyday life, and working in certain occupations. Despite the age group findings it is noteworthy that being in a younger age group was not significantly associated with having lower skills. Surprisingly, speaking English as an Additional Language was also not associated with low literacy and problem solving, although it was associated with low numeracy.

Numeracy had the highest number of significant associations between characteristics and risk of low proficiency, while literacy had the fewest. Many of those that were significant only in numeracy were uncontrollable characteristics, such as gender, country of birth and first language.

Adult skills compared with International Adult Literacy Survey (IALS)

England participated in the International Adult Literacy Survey (IALS) in 1996 with Wales and Scotland. These two surveys are broadly comparable for literacy, but not for numeracy or problem solving. There have also been large demographic changes in the population since this time, the most profound being the large increase in those people who have obtained some secondary school qualification.

England is one of the few countries to have shown an improved literacy score since 1996, along with Poland, Italy, Australia and Northern Ireland. Overall, the OECD average literacy score fell slightly during this time. Unlike IALS, average literacy scores in England are now close to international averages (when compared with the other 15 countries that took part in both surveys).

Age group analysis shows that the only group to demonstrate a statistically significant change over time has been people aged 55 and over. The average scores of those under 25 appear to have declined a little, although this difference is not statistically significant and may be affected by sample size.

1. The International Survey of Adult Skills – Background and Overview

1.1 Introduction

The International Survey of Adult Skills is a product of the Programme for the International Assessment of Adult Competencies (PIAAC) led by the Organisation for Economic Co-operation and Development (OECD). In England, the 2012 International Survey of Adult Skills was carried out on behalf of the Government by the National Foundation for Educational Research (NFER) in partnership with TNS-BMRB and NatCen Social Research (NatCen).

1.2 The International Survey of Adult Skills in the context of England

The International Survey of Adult Skills adds to the body of evidence highlighting the importance of adult skills, including literacy and numeracy. The past decade saw much investment in the development of adult skills in England, following poor results in the *International Adult Literacy Survey* (IALS) in 1996[1], which revealed relatively low levels of adult literacy and numeracy[2] in Great Britain[3] in comparison with other OECD countries.

Subsequently, Sir Claus Moser's working group[4] identified the scale of the problem, finding that: 'roughly 20 per cent of adults – that is perhaps as many as seven million people – have more or less severe problems with basic skills, in particular with what is generally called 'functional literacy' and 'functional numeracy'.' The group's recommendations were embraced by the Skills for Life strategy[5] for England, launched in 2001, a major cross-government initiative to ensure adults gained the skills required to find and keep work and participate fully in society. Skills for Life introduced a learning infrastructure including national standards, a core curriculum, materials and tests, new qualifications and professional standards for tutors as well as national targets for the numbers of adults to improve their skills and gain new formal qualifications.

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[1] Carey, S., Low, S. and Hansbro, J. (1997). *Adult Literacy in Britain*. London: The Stationery Office.

[2] Numeracy in IALS was defined as 'quantitative literacy'; this is not equivalent to numeracy in the International Survey of Adult Skills.

[3] England took part with Scotland and Wales; these results were reported as Great Britain.

[4] Department for Education and Employment (1999). *A Fresh Start: Improving Literacy and Numeracy*. London: DfEE [online]. Available: http://www.lifelonglearning.co.uk/mosergroup/index [30 September, 2013].

[5] Department for Education and Skills (2002). *Skills for Life: the National Strategy for Improving Adult Literacy and Numeracy Skills. 'What Works'. Early Findings from the Pathfinder Projects* (Research Report 342). London: The Stationery Office [online]. Available: http://webarchive.nationalarchives.gov.uk/20130401151715/https://www.education.gov.uk/publications/eOrderingDownload/RR342.pdf [30 September, 2013].

In 2003, the National Skills Strategy White Paper, *21st Century Skills: Realising Our Potential*[6], emphasised the need for the continued government drive to improve adult skills. Further policy initiatives, such as the Skills White Paper[7] and the 14-19 Education and Skills White Paper[8] followed in 2005. The policy on 14-19 education stressed the importance of functional skills in English and mathematics, and established the place of Information and Communication Technology (ICT) as an essential skill for the modern world and one of the skills that all young people are now expected to acquire as part of their education.

The next important policy development was the Leitch Review of Skills[9]. In his report, published in 2006, Leitch proposed that, by 2020, 95 per cent of adults should be able to achieve the basic skills of functional literacy and numeracy.

In 2009, the Department for Innovation, Universities and Skills (DIUS) confirmed that over 5.7 million learners had taken training courses and 2.8 million had achieved nationally recognised qualifications, exceeding the 2010 Public Service Agreement target to improve the literacy, language and numeracy skills of 2.25 million adults more than two years early.[10]

These developments were followed, in 2010, by the Coalition Government's publication of its skills strategy for England, *Skills for Sustainable Growth*[11], in which it set out reform of adult learning and skills, with special attention paid to young people and those without basic literacy and numeracy skills.

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[6] Department for Education and Skills (2003). *21st Century Skills: Realising Our Potential*. London: The Stationery Office [online]. Available: http://webarchive.nationalarchives.gov.uk/20080821115857/http:/dcsf.gov.uk/skillsstrategy/uploads/documents/21st%20century%20skills.pdf [30 September, 2013].

[7] Department for Education and Skills (2005a). *Skills: Getting on in business, Getting on at Work*. London: The Stationery Office [online]. Available: http://webarchive.nationalarchives.gov.uk/20071104165907/dfes.gov.uk/publications/skillsgettingon/ [30 September, 2013].

[8] Department for Education and Skills (2005b). *14–19 Education and Skills*. London: The Stationery Office [online]. Available: https://www.education.gov.uk/publications/eOrderingDownload/CM%206476.pdf [30 September, 2013].

[9] HM Treasury (2006). *Leitch Review of Skills. Prosperity for All in the Global Economy - World Class Skills. Final Report*. London: HM Treasury [online]. Available: http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/d/leitch_finalreport051206.pdf [30 September, 2013].

[10] Department for Innovation, Universities and Skills (2009). *Skills for Life: Changing Lives*. London: Department for Innovation, Universities and Skills [online]. Available: http://www.bis.gov.uk/assets/biscore/corporate/migratedD/publications/S/SkillsforLifeChangingLives [30 September, 2013].

[11] Department for Business, Innovation and Skills (2010). *Skills for Sustainable Growth. Consultation on the Future Direction of Skills Policy*. London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32368/10-1274-skills-for-sustainable-growth-strategy.pdf [30 September, 2013].

To improve the economic and personal returns on this investment, the Government announced that it would review how provision is delivered and take steps to make this training more effective, moving away from targets to focus on fully equipping individuals with the skills and qualifications they need to get a job, progress in work and play a full part in society. Following a review of the strategy, in December 2011, the Government published the actions it is taking in *New Challenges, New Chances – Further Education and Skills System Reform Plan: Building a World Class Skills System.*[12]

Most recently, the Government announced how it intends to make the skills system more rigorous and responsive to both learner and employer need. *Rigour and Responsiveness in Skills* (April 2013)[13] sets out how the Government will respond to these needs through:

- raising standards by making the system more professional and intervening in poor provision;
- creating Traineeships to prepare young people for work;
- reforming and improving the quality of Apprenticeships;
- making qualifications relevant and valued;
- using funding to make provision more responsive; and
- giving employers and individuals the information to make the right choices.

Specifically, the Government will increase the expectations for English and mathematics within Apprenticeships, with a requirement that, from 2014/15, all intermediate Apprentices should work towards achieving a National Qualifications Framework[14] (NQF) level 2 qualification in English and mathematics. In addition, a Traineeship programme has been introduced, which provides a combination of a focused period of work preparation, a high quality work placement and training in English and mathematics.

The Government continues to recognise the economic and wider public benefits where individuals improve their English and mathematics skills, or attain a first qualification at NQF level 2 and have maintained entitlements to fully-funded English and mathematics provision. This supports progression to the standard of a good GCSE for all adult learners.

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[12] Department for Business, Innovation and Skills (2011). *New Challenges, New Chances. Further Education and Skills System Reform Plan: Building a World Class Skills System*. London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/145452/11-1380-further-education-skills-system-reform-plan.pdf [30 September, 2013].

[13] Department for Education and Department for Business, Innovation and Skills (2013). *Rigour and Responsiveness in Skills*. London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/186830/13-960-rigour-and-responsiveness-in-skills-amended.pdf [30 September, 2013].

[14] Ofqual (2013). *QCF, NQF and EQF: the National Qualifications Framework* [online]. Available: http://ofqual.gov.uk/qualifications-and-assessments/qualification-frameworks/ [27 September, 2013].

As a further commitment to improving English and mathematics standards in further education, the Government is taking steps to ensure that all providers set and deliver high aspirations for learners. It is investigating how providers can be funded on the basis of individuals' skills gain and will consider whether this can be extended to other subjects.

1.3 Aims and objectives

The overall aim of the International Survey of Adult Skills was to:

- identify and measure differences between individuals and countries in competencies believed to underlie personal and societal success;
- assess the impact of these competencies on social and economic outcomes at individual and aggregate levels;
- assess the performance of education and training systems in generating the required competencies; and
- clarify policy that could contribute to enhancing competencies.

Within this, a key goal was to conduct the International Survey of Adult Skills in England in line with internationally agreed procedures and standards, to allow comparisons between the skills' levels of adults in England with those of other participating countries. This will provide evidence to the Government about any skills shortages and inform policy about future education and training needs.

A specific objective was to achieve a participation rate of between 50 and 70 per cent. This was achieved with a response rate of 59 per cent.[15]

1.4 Description of the survey

The International Survey of Adult Skills, carried out in participants' homes, comprised two main elements – an assessment of the proficiency of adults, aged 16-65[16] in three information-processing skills which the OECD and the British Government see as essential for full participation in the knowledge-based economies and societies of the 21st century:

- literacy;

[15] Response rate calculations took into account disposition codes from the Screener; Case Initialisation, background questionnaire and Job Requirements Approach (JRA) Module; and Direct Assessments. Full details of these are available in: *PIAAC Technical Standards and Guidelines* (OECD, 2011), Chapter 10.7 and also in OECD (2013c) Chapter 16.2.3.

[16] The target population excludes adults who live in a communal arrangement of an institutional nature for disciplinary, health, custodial or other reasons, such as prisons, barracks, hospitals and nursing homes. Students mainly living away from the parental home (but still connected to it) were counted as resident at the parental home.

- numeracy; and
- problem solving in technology-rich environments.

The assessment was accompanied by a background questionnaire, which collected the following information about each person taking part in the survey:

- demographic and background characteristics such as age and gender;
- educational attainment and participation in learning activities (both formal and informal);
- job status, history and characteristics;
- social participation and health; and
- use of skills (literacy, numeracy, ICT) at work and in everyday life.[17]

The background information enabled analysis of the relationship between education, training and proficiency levels, and variation in skills development across sub-groups and age cohorts, providing a picture of how these are distributed across the workforce and the population as a whole.

The skills assessed in the International Survey of Adult Skills are conceived as 'key information-processing competencies'. They represent skills essential for accessing, understanding, analysing and using text-based information and, in addition, for mathematics, information in the form of representations (e.g. pictures, graphs). These texts and representations may exist in the form of printed material or screen-based displays. The skills (or competencies) are considered key because they are:

- necessary for fully integrating and participating in the labour market, education and training, and in social and civic life;
- relevant to all adults;
- highly transferable, in that they are relevant to multiple work situations and social fields; and
- 'learnable' and, therefore, subject to the influence of national policy.[18]

[17] Part of the background questionnaire included questions on the skills necessary for a particular job – a set of questions known as the JRA (Job Requirements Approach).

[18] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing. Chapter 2, p.1.

Prior to the OECD International Survey of Adult Skills 2012, two international assessments of adult skills were conducted in OECD countries: the International Adult Literacy Survey (IALS)[19] of 1994-98 and the Adult Literacy and Life Skills Survey (ALL)[20] of 2003-2007. The UK participated in IALS but not in ALL. IALS results were reported for England, Wales and Scotland as Great Britain, with some limited analysis of the three individual countries, and separately for Northern Ireland.

The definition of literacy for the International Survey of Adult Skills builds on and extends that used for IALS. IALS assessed three dimensions of literacy – prose (which relates to continuous or prose texts in the International Survey of Adult Skills)[21], document (which relates to non-continuous texts in the International Survey of Adult Skills) and quantitative literacy. Prose and document areas of literacy in IALS therefore provide a link between the International Survey of Adult Skills, ALL and IALS. For the International Survey of Adult Skills, 29 of the 52 items included in the computer based literacy assessment linked with the earlier studies; in the paper based version, 18 of 24 items provided linkage.

Whilst numeracy can be compared between the International Survey of Adult Skills and ALL, England did not take part in ALL, so no comparison of performance in this domain can be made. Quantitative literacy in IALS related to applying arithmetic operations; the emphasis on application makes direct comparisons with the International Survey of Adult Skills difficult as the emphasis here is on managing mathematical information and ideas in real life contexts. (See Section 1.6.2 for more detail.)

Two new domains are included in the International Survey of Adult Skills – problem solving in technology-rich environments and reading components. The former reflects the increased use of ICT both at work and in everyday life and is not comparable with problem solving in ALL, which used a paper based format to examine 'goal-directed thinking and action in situations for which no routine solution procedure is available'.[22] Reading components were developed specifically for those adults with a low level of proficiency in literacy.[23]

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[19] OECD and Statistics Canada (2000). *Literacy in the Information Age: Final Report of the International Adult Literacy Survey*. Paris: OECD Publishing [online]. Available: http://www.oecd.org/edu/skills-beyond-school/41529765.pdf [25 September, 2013].

[20] OECD and Statistics Canada (2005). *Learning a Living: First Results of the Adult Literacy and Life Skills Survey*. Paris: OECD Publishing [online]. Available: http://www.oecd.org/education/country-studies/34867438.pdf [25 September, 2013].

[21] Refer to Section 1.6.1 for more detail.

[22] OECD and Statistics Canada (2005). *Learning a Living: First Results of the Adult Literacy and Life Skills Survey*. Paris: OECD Publishing [online]. Available: http://www.oecd.org/education/country-studies/34867438.pdf [25 September, 2013], p.16.

[23] Refer to Section 1.6.1 for more detail.

The shaded areas in Table 1.1 show the domains that have comparable features across the surveys. In literacy and numeracy, the data from the earlier surveys have been rescaled to provide comparative data for the International Survey of Adult Skills.[24]

Table 1.1 Skills assessed in the International Survey of Adult Skills, ALL and IALS[25]

International Survey of Adult Skills (2012)	ALL (2003-2007)	IALS (1994-1998)
Literacy (including the reading of prose and document texts as well as digital texts)	Literacy (rescaled to combine prose and document literacy)	Literacy (rescaled to combine prose and document literacy)
	Prose literacy	Prose literacy
	Document literacy	Document literacy
Reading components		
Numeracy	Numeracy	
		Quantitative literacy
Problem solving in technology-rich environments		
	Problem solving	

In contrast to the earlier surveys, the International Survey of Adult Skills was designed as a computer based assessment, with a paper-and-pencil option for those respondents with insufficient computer skills or those who did not wish to take the assessment in computer based assessment mode (which was the case for 16 per cent of adults in England). The previous surveys were exclusively paper based assessments. Linking or 'trend' items were converted to computer based mode and designed to match the paper based mode as closely as possible.

[24] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing. Chapter 17:4.2

[25] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II*. Paris: OECD Publishing. p.82.

The International Survey of Adult Skills took place over eight months from August 2011 until the end of March 2012, with a minimum target sample size of 5,000 completed cases. This was achieved, with a response rate of 59 per cent.

The international reports, *Survey of Adult Skills (PIAAC) International Report (Volumes I*[26] and *II*[27]*)* and *Technical Report of the Survey of Adult Skills (PIAAC)*, include the outcomes for the 24 countries (or sub-national regions) that took part in the survey. The participating countries comprised 22 OECD countries and two non-OECD countries or sub-national regions.[28] At the time of writing, the data from Russia had not been processed by the consortium and their results are therefore not included.

In this report, comparisons are made with the OECD average and other individual countries and/or regions where these data can be reported. [29]

1.5 The development of the survey

Educational Testing Service (ETS) led the international consortium[30] that designed and implemented the International Survey of Adult Skills on behalf of the OECD, building on the experiences of the previous surveys (IALS and ALL). The design and implementation were guided by *Technical Standards and Guidelines*[31] that were developed to ensure that the survey yielded high-quality and internationally comparable data. The *Technical Standards and Guidelines* were supplemented by additional manuals, training materials, testing plans and toolkits as well as training sessions at appropriate points in the process.

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[26] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

[27] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing.

[28] OECD countries or sub-national regions: Australia, Austria, Belgium (Flanders), Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Republic of Ireland, Italy, Japan, Korea, Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden, United States. In the international reports, England and Northern Ireland are reported as the United Kingdom, but there are separate national reports for both of these. The two non-OECD participating countries were the Russian Federation and Cyprus. In the latter case, the Turkish government wishes to make it clear that the survey was only carried out in the southern, non-Turkish part of the island.

[29] Data protection issues in some countries mean that not all data produced by the survey can be shared in national reports.

[30] Other members of the international consortium were Westat in the USA, cApStAn in Belgium, the Research Centre for Education and the Labour Market (ROA) at the University of Maastricht, GESIS_ZUMA Centre for Survey Research, the German Institute for International Education Research (DIPF), the Data Processing Center of the International Association for the Evaluation of Educational Achievement (IEA), the Henry Tudor Centre of Research and the University of Luxembourg.

[31] OECD (2011). *PIAAC Technical Standards and Guidelines: December 2010.* Paris: OECD Publishing [online]. Available: http://www.oecd.org/site/piaac/PIAAC-NPM(2010_12)PIAAC_Technical_Standards_and_Guidelines.pdf [25 September, 2013].

The consortium was responsible for developing the background questionnaire, assessment instruments and the computer-delivery platform as well as supporting survey operations, quality control and scaling, preparing the database and providing support for analysis. Expert review panels developed the frameworks for the skills domains and also guided the development and selection of assessment items and the interpretation of results.

Participating countries implemented the assessment in their own countries, including sampling, adaptation and translation of materials, data collection and database production.

The Board of Participating Countries (BPC), comprising representatives from participating countries, oversaw the development and implementation of the survey, with additional responsibility for major decisions about budgets, reporting and monitoring progress.

A field trial was carried out in all participating countries in 2010 and the outcomes of this were used to finalise the contents and format of the background questionnaire and the assessments for the main survey in 2011-12.

1.6 What the International Survey of Adult Skills measures

The International Survey of Adult Skills measures skills in the three domains of literacy, numeracy and problem solving in technology-rich environments. Taken together, literacy and numeracy provide a foundation for the development of higher order cognitive skills which are essential for gaining access to and understanding specific domains of knowledge whether related to education, work or home life. The third domain – problem solving – is increasingly important in the 21st century, and the ability to manage information and solve problems in ICT is now a feature of most education, workplace and domestic environments. This section gives a brief description of each domain.[32]

1.6.1 Literacy

For this survey, literacy is defined as 'understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals and to develop one's

[32] For the complete framework documents, see:
PIAAC Literacy Expert Group (2009). *PIAAC Literacy: Conceptual Framework* (OECD Education Working Paper No. 34). Paris: OECD Publishing [online]. Available: http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=edu/wkp(2009)13 [25 September, 2013].
PIAAC Numeracy Expert Group (2009). *PIAAC Numeracy: Conceptual Framework* (OECD Education Working Paper No. 35). Paris: OECD Publishing [online]. Available: http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=edu/wkp(2009)14 [25 September, 2013].
PIAAC Expert Group in Problem Solving in Technology-Rich Environments (2009). *PIAAC Problem Solving in Technology-rich Environments: Conceptual Framework*, (OECD Education Working Paper No. 36). Paris: OECD Publishing [online]. Available: http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=edu/wkp(2009)15 [25 September, 2013].
Sabatini, J.P. and Bruce, K.M. (2009) *PIAAC Reading Components: Conceptual Framework* (OECD Education Working Paper No. 33). Paris: OECD Publishing [online]. Available: http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=edu/wkp(2009)12 [25 September, 2013].

knowledge and potential'.[33] It encompasses a range of skills from decoding written words and sentences to the comprehension, interpretation and evaluation of written texts. It does not involve the production of written texts.

The assessment tasks used texts with different content and contexts and there were different cognitive demands, dependent on the task. Specified contexts for literacy texts and tasks (and also for numeracy and problem solving in technology-rich environments) were: work-related, personal, society and the community, and education and training. In terms of content, texts were characterised by their medium (print-based or digital) and by their format:

- continuous or prose texts (sentences organised into paragraphs to create descriptions, narratives, instructions, arguments, etc.);
- non-continuous or document texts (texts organised in matrix format, e.g. lists, or around graphic features, e.g. graphs, maps, forms);
- mixed texts (using a combination of continuous and non-continuous elements such as a newspaper article incorporating text and a graph); and
- multiple texts (e.g. messages in an inbox, hyperlinked texts, blog posts).

For literacy, participants were expected to use three different cognitive strategies when responding to written texts: *to access and identify* information in the text, *to integrate and interpret* information, and *to evaluate and reflect*. In terms of *accessing and identifying* information, the skills demanded can range from selecting clearly identified information to using inferential reasoning and understanding of rhetorical strategies (such as persuasive elements in a text). To *integrate and interpret*, readers need to understand relationships between different parts of a text in order to construct meaning and draw inferences from the text as a whole. The final strategy – *to evaluate and reflect* – requires readers to relate information in the text to other information, knowledge and experience in order to, for example, assess the relevance or credibility of a text.

Adults with low levels of proficiency or who completed the paper based assessment were directed to an assessment of reading components which covered vocabulary, sentence comprehension and passage fluency (or cohesion). Adults were identified as having a low level of proficiency if they failed to answer sufficient questions in the 'core' items successfully and were then routed directly to the reading components booklet. 'Core' items appeared in both the paper based test and the computer based assessment. The 'core' questions were made up of four literacy and four numeracy items in the paper based test (which participants took if they had limited computer skills, refused the computer option or failed the computer screening test). In the computer based assessment, the 'core' comprised three literacy and three numeracy items. In both these cases, participants were directed to the paper based reading components if they scored three or below in the paper based test or one or two in the computer based assessment. In addition, all adults who

[33] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

completed the literacy or numeracy booklets also completed the reading components booklet. Only one per cent of adults were directed to the reading components booklet because they failed to answer sufficient questions in the computer based 'core'. The reading components assessment, as indicated above, comprised a number of simple items. See section 1.6.4 for further details of the routes participants could take through the assessment.

1.6.2 Numeracy

Numeracy in the International Survey of Adult Skills is defined 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'.[34] In terms of the assessment, this involves managing a situation or solving a problem in a real context and responding to mathematical content, information and ideas presented in multiple ways. Clearly, numeracy is in part dependent on literacy skills (reading and writing), but the tasks in the International Survey of Adult Skills also involve more than applying arithmetical skills to information embedded in text, which was the focus of quantitative literacy in IALS. They require respondents to utilise a wide range of skills and responses which may involve more than numbers.

For this domain, content is divided into related topics (mathematical content, information and ideas): quantity and number; dimension and shape; pattern, relationships and change; data; and chance (although these latter two are related, they are separate topics). The topics can be represented in five ways – by objects and pictures, numbers and symbols, visual displays (e.g. diagrams, maps, graphs, tables, etc.), text, and technology-based displays. Each topic is self-contained (with the exception of the related topics data and chance):

- *Quantity* includes such things as the number of features or items, prices, size, temperature, populations, revenue and profit, etc. while *number* relates directly to quantification and includes numbers themselves and mathematical operations.

- *Dimension* covers projections, lengths, perimeters, areas, planes, surfaces, locations, etc. – focusing on description; *shape* involves real images and entities in two or three dimensions, such as buildings, packaging, crystals, etc.

- *Pattern* presents regularities such as those encountered in musical forms, nature and traffic, while *relationships and change* relates to the ways in which things in the world are associated with one another or develop over time.

- *Data* covers ideas related to variability, sampling, error, prediction and statistical topics, with *chance* specifically related to probability and associated statistical methods.

[34] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing. Chapter 2, p.47.

Four cognitive strategies are associated with numeracy. The first, to *identify, locate or access* mathematical information relevant to a purpose or goal, often requires a low level of mathematical understanding or the application of a simple arithmetic skill, but it is usually combined with one of the additional strategies, namely the requirements to *act upon or use*; *interpret*; and *evaluate and analyse*. Of these, *acting upon or using* includes ordering, counting, estimating, calculating, measuring and modelling and *interpreting* involves evaluating the meaning and implications of mathematical or statistical information and developing an opinion. The final strategy – *evaluating and analysing* – is an extension of interpretation, taking it further to include the evaluation of a solution against some criteria or demands, with the added necessity of reviewing the interpretation, analysis and evaluation stages.

1.6.3 Problem solving in technology-rich environments

This domain is defined as 'using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks'. The tasks focus 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'.[35]

The majority of the population in England now has access to ICT and this new domain recognises its increasing importance in all aspects of people's lives and its implication for future national policy and planning. The competence or skill is the intersection of the capacity to use ICT tools and applications and the cognitive skills to solve problems. Although some basic knowledge of input devices, file management tools, application and graphic interfaces is essential for problem solving in technology-rich environments, the domain does not test the use of these tools but focuses on the ability of adults to use them effectively.

In terms of content, the assessments cover two areas: *technology* and *tasks*. Technological devices were limited to laptop computers with a restricted number of simulated software applications (email, word processing, spreadsheets, databases and websites). The tasks are defined in terms of their intrinsic complexity and the explicitness of the problem; intrinsic complexity includes a consideration of such things as the number of steps required to solve the task, the number of options at each stage and the amount of transformation needed to communicate a solution. Tasks which give straightforward instructions such as filing a number of emails are much more explicit than those where the respondent has to work out his or her own criteria and the path to a solution; the latter is clearly more demanding. As the assessment is delivered on a dedicated laptop, information about such things as the length of time devoted to a particular problem and the number of steps taken to arrive at a solution was collected for each respondent, providing a rich data set for further exploration.

The four cognitive strategies allied to this domain are *setting goals and monitoring progress*; *planning*; *acquisition and evaluation* of information; and the *use* of this information. All of these relate to the mental structures and processes involved in solving a

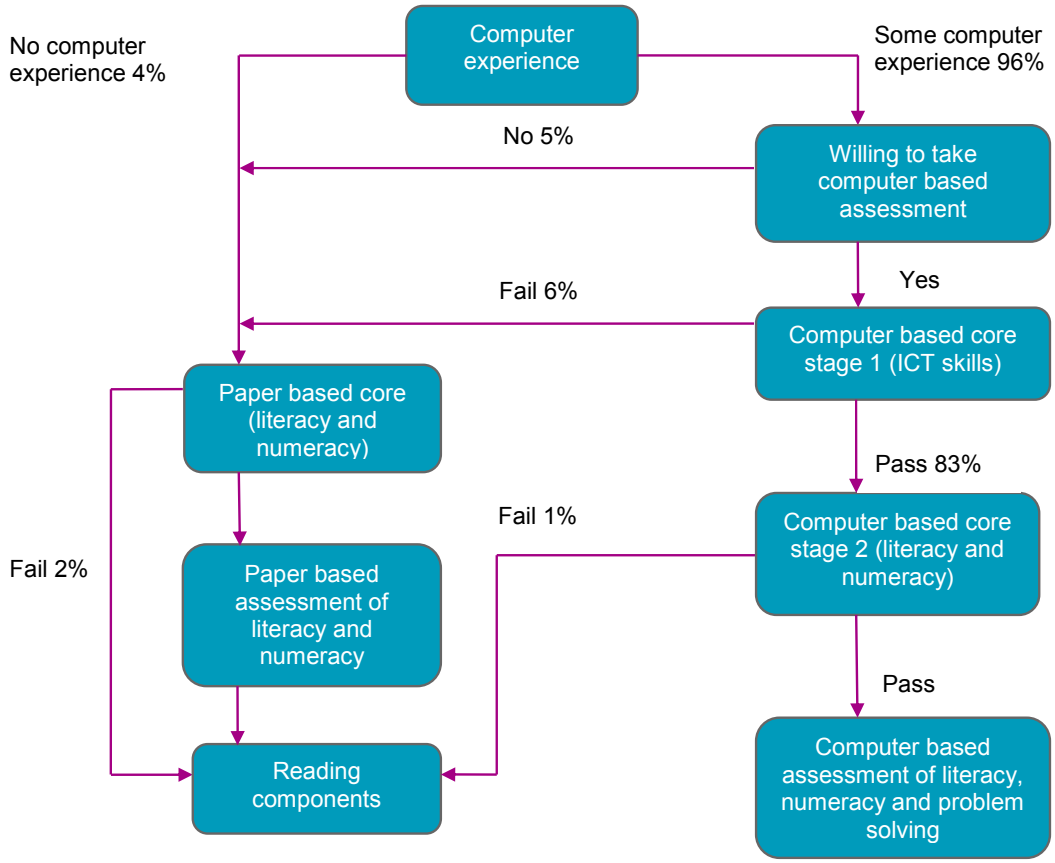
[35] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing. Chapter 2:80

problem and are similar in scope to those used for literacy and numeracy tasks, transposed to a technological environment.

1.6.4 Assessment design

There were a number of pathways that participants could take through the International Survey of Adult Skills, dependent on answers to questions in the background questionnaire and performance in the 'core' stages of the assessment. These are outlined in Figure 1.1 below and the percentages of participants in England who followed particular pathways are indicated. The routing specifically affects consideration of national and international results in problem solving in technology-rich environments and the reading components. This is discussed in section 1.7 below and in Chapter 2.

Figure 1.1 International Survey of Adult Skills assessment design



(The sum of percentages may not add to 100 because of rounding.)

1.7 Proficiency scales and levels

The International Survey of Adult Skills uses proficiency scales and levels to present the results of the assessments. Each scale ranges from 0 to 500 and these have been grouped into levels: below level 1 and levels 1 to 5 for literacy and numeracy, and below level 1 and levels 1 to 3 for problem solving. The reduced scale for problem solving

reflects the far smaller number of items used in the assessment (16 items compared with 56 items each for literacy and numeracy).

The populations for whom proficiency scores for problem solving in technology-rich environments are reported are not identical across countries. Proficiency scores relate only to the proportion of the target population in each participating country that was able to undertake the computer based version of the assessment (see Figure 1.1 above)[36], and thus met the preconditions for displaying competence in this domain. A level in this domain is therefore not equivalent to the same level in literacy and numeracy.

The descriptors of the proficiency levels were derived from those used in IALS and ALL but were revised for the current survey. Full details are available in Annex A of the *Survey of Adult Skills (PIAAC) International Report, Volume I.*[37]

1.7.1 Proficiency scales

The proficiency scales relate to both test takers and test items: test takers are located in terms of their proficiency and test items are located in terms of their difficulty. Therefore, each scale point represents a point on the scale at which an individual has a 67 per cent chance of successfully completing items located at that point on the scale and also at which an item will probably be answered correctly by 67 per cent of respondents with that scale score. If an individual has a particular proficiency score, he or she would probably answer items of lesser difficulty with greater success and would possibly be able to complete items of greater difficulty, but with less chance of success.

1.7.2 Proficiency levels

Items on the proficiency scale in each domain are located at different points according to their difficulty, as described above. In order to aid the interpretation of results, the scales have been divided into 'proficiency levels' which are defined by score-point ranges. Each level, as shown in Tables 1.2 to 1.4,[38] implies an ability to cope with a particular type of task and is based on the shifts in the skills needed to complete items at different points along the scale successfully. The tables describe the features of the tasks, with difficulty values within these ranges in more detail, providing a summary of what adults with particular proficiency scores in a particular skills domain can do. These descriptions are presented in full in Appendix A (Tables A2 to A4; section A9), and Tables 1.2 to 1.4 below summarise the descriptions and describe some typical tasks at each level.

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[36] The percentages in the figure show the proportion of participants in England taking each route.

[37] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

[38] Tables 1.2 to 1.4 are based on Table 4.2 (literacy and numeracy) and Table 4.7 (problem solving in technology-rich environments) in OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing. Chapter 4.

Table 1.2 International Survey of Adult Skills literacy proficiency levels and typical tasks

Level and score bands	Level description	Typical tasks in the assessments
Below 1 (0 - 175)	Reading brief texts on familiar topics to locate a single piece of specific information. Understanding relies on basic vocabulary, with no need to use other text features. Requested information is identical in form to information in the question or directive. Tasks below level 1 do not make use of any features specific to digital texts.	Identifying a telephone number in a short piece of text, such as a flyer or advertisement; locating the name of a street in an address.
1 (176 - 225)	Reading relatively short digital or print texts (continuous, non-continuous or mixed) to locate a single piece of information which is the same as the information given in the question. More than one piece of information may be presented in the text. Respondents are expected to recognise basic vocabulary, evaluate the meaning of sentences and be able to read paragraphs.	Entering personal information in a document; identifying the location of a named place in a short descriptive paragraph; finding the most popular holiday destination on a simple bar graph.
2 (226 - 275)	More complex texts with tasks that require readers to paraphrase or make simple, low-level inferences. Not all information will relate to the task and respondents may have to: • read through or integrate two or more pieces of information based on given criteria; • compare and contrast or reason about information requested in the question; • navigate within digital texts to access and identify information from various parts of a document.	Identifying a particular part of a text for more information; making simple inferences in a narrative text, e.g. by inferring a contrasting situation or description; identifying the most important points in a short article; comparing information in a simple table.
3 (276 - 325)	Texts may be dense or lengthy, requiring an understanding of text and rhetorical structures, especially in complex digital texts. Tasks require the identification, interpretation or evaluation of information, with varying levels of inference. Respondents may have to: • construct meaning across larger chunks of text; • perform multi-step operations to identify and formulate responses (particularly in digital texts). Irrelevant or competing information may be present but it will not be more prominent than the	Identifying some of the main points of an argument; finding and collating information from several sources, such as different timetables.

Level and score bands	Level description	Typical tasks in the assessments
	correct information.	
4 (326 - 375)	Tasks often require respondents to integrate, interpret or synthesise information from several complex or lengthy continuous texts. Respondents may have to: • make complex inferences and apply background knowledge; • identify and understand one or more specific, non-central ideas in the text in order to interpret or evaluate subtle evidence claims or relationships between different parts of texts; • understand conditional and competing information (which may be as prominent as correct information).	Making predictions in narrative text, e.g. what a character will do as the result of an event; understanding complex tables with multiple categories such as food labels; recognising when conditional information (if…?) is relevant to the task.
5 (376 - 500)	Texts may be dense. Respondents may have to: • search for and integrate information across multiple texts; • construct syntheses of similar and contrasting ideas or points of view; • evaluate evidenced based arguments; • apply and evaluate logical and conceptual models of ideas or the reliability of evidentiary sources; • select key information – this is frequently a key requirement. Respondents need to be aware of subtle, rhetorical cues and to make high-level inferences or use specialised background knowledge.	Extracting arguments from scientific papers; explaining and supporting different points of view; evaluating the reliability of web-based and other sources. Note: only one task was set specifically at this level.

Table 1.3 International Survey of Adult Skills numeracy proficiency levels and typical tasks

Level and score bands	Level description	Typical tasks in the assessments
Below 1 (0 - 175)	Tasks are set in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors. Respondents will be expected to perform only simple processes such as counting; sorting; performing basic arithmetic operations with whole numbers or money; or recognising common spatial representations.	Calculating the number of cans in a plastic wrapper; adding the number of people present at three events; recognising simple geometric figures, e.g. a square; identifying date order.
1 (176 - 225)	Tasks require respondents to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit. There will be little text and minimal distractors. Respondents may have to carry out simple one-step or two-step processes.	Dividing simple prices or quantities; identifying large percentage reductions or increases (e.g. 50%) and multiplying or dividing for the full amount.
2 (226 - 275)	Respondents need to identify and act on mathematical information and ideas embedded in a range of common contexts. The mathematical content is fairly explicit or visual with relatively few distractors. Tasks require the application of two or more steps or processes.	Relating a gauge to a quantity and working out how much one quarter is in volume; identifying departure times and calculating time remaining; multiplying numbers with up to two decimal places; using simple scales for conversions (e.g. lengths, temperatures); interpreting relatively simple data and statistics in texts, tables and graphs; simple addition and subtraction in a single task.
3 (276 - 325)	Mathematical information may be less explicit, embedded in less familiar contexts and represented in more complex ways. Tasks have several steps and may involve choices about problem solving methods and relevant processes.	Working out the percentage of a discount; using a scale to convert between different temperatures and applying the result to other data beyond the scale; deriving and applying a formula; understanding and interpreting scale drawings; analysing basic data and statistics in tables and graphs.
4 (326 -	Respondents need to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. Tasks involve multiple steps and the choice of	Using a formula to work out a complex calculation; carrying out calculations to assess the veracity of a statement where

Level and score bands	Level description	Typical tasks in the assessments
375)	relevant problem solving strategies and processes. Tasks tend to require analysis and more complex reasoning and may also require comprehending arguments or communicating well-reasoned explanations for answers or choices.	background knowledge about relative sizes of countries (for example) must be taken into account; understanding and using statistics and chance and spatial relationships.
5 (376 - 500)	Tasks require respondents 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; draw inferences; develop or work with mathematical arguments or models; justify, evaluate and critically reflect upon solutions or choices.	Note: no tasks were set specifically at this level.[39]

[39] An individual would achieve level 5 by successfully completing more of the items at lower levels and therefore accumulating a total score of 376 or above.

Table 1.4 International Survey of Adult Skills problem solving in technology-rich environments proficiency levels and typical tasks

Level and score bands	Level description	Typical tasks in the assessments
Below 1 (0 - 240)	Tasks are based on well-defined problems involving the use of only one function to meet one explicit criterion.	Note: no tasks were set specifically at this level.[40]
1 (241 - 290)	Tasks are based on widely available and familiar technology applications, such as email software or web browser. Little or no navigation is required to access the information. The task involves few steps and a minimal number of operators. Task statements make goals easily understood, e.g. by the use of explicit criteria.	Locating a specific piece of information in a database; assigning emails to relevant folders.
2 (291 - 340)	Tasks typically require the use of both generic and more specific technology applications (including some functions). Some navigation across pages and applications is required to solve the problem. Tasks may involve multiple steps and operators. Criteria for completion are specific but the route to solution may have to be defined. Evaluation, integration and inferential reasoning may be needed.	Using and completing online forms; setting up folders for email; applying criteria to e-commerce sites; evaluating different websites for reliability.
3 (341 - 500)	Tasks typically require the use of both generic and more specific technology applications, including the use of tools (e.g. sort function). Respondents need to navigate across pages and applications to solve the problem. The goal may have to be defined by the respondent and criteria for completion may not be explicit. Evaluation, integration and inferential reasoning may be needed to a large extent.	Integrating online calendars with email and other information to create a work schedule; evaluating the source of web information in order to assess trustworthiness and value; sorting data to allow evaluation by category.

[40] An individual would be classed as below level 1 if he or she failed to score more than 240 points on level 1 tasks.

1.8 Interpreting differences between countries

A major objective of the International Survey of Adult Skills was to examine the determinants of literacy, numeracy and problem solving in technology-rich environments across a number of countries, languages and cultures. It is important to know what can reasonably be concluded from the data and which interpretations would be going beyond what can be reliably supported by the results. This section outlines some points that need to be borne in mind while reading this report.

Box 1.1 below (reproduced from the international report[41]) provides further explanation about the comparisons of countries and population subgroups. Further information about plausible values and weighting is included in Appendix A, Section A8.

[41] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing. Chapter 2, Box 2.5.

Box 1.1 Comparing results among countries and population subgroups

The statistics in this [international] report are estimates of national performance based on samples of adults, rather than values that could be calculated if every person in the target population in every country had answered every question. Consequently, it is important to measure the degree of uncertainty of the estimates. In the [International] Survey of Adult Skills, each estimate has an associated degree of uncertainty, which is expressed through a standard error.[42] The use of confidence intervals provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. From an observed sample statistic, and assuming a normal distribution, it can be inferred that the result for the corresponding population would lie within the confidence interval in 95 out of 100 replications of the measurement on different samples drawn from the same population.

In many cases, readers are primarily interested in whether a given value in a particular country is different from a second value in the same or another country, e.g. whether women in a country perform better than men in the same country. In the tables and figures used in this report, differences are labelled as statistically significant when there is less than a 5% chance of a reported difference between the populations of interest being erroneously attributed as real.

In addition to error associated with sampling, there are a range of other possible sources of error in sample surveys such as the [International] Survey of Adult Skills including error associated with survey non-response. While the likely level of bias associated with non-response is assessed as minimal to low for most countries participating in the study, the possibility of biases associated with non-response cannot be ruled out. Readers should, therefore, exercise caution in drawing conclusions from small score point differences between countries or population groups, even if the differences concerned are statistically significant.

1.8.1 International standards

Data from all countries were checked and adjudicated to ensure that the same processes and quality controls were adhered to throughout the survey, in line with the *Technical Standards and Guidelines*[43], in order to make the data internationally comparable. Adjudication reports were produced for each country, based on sampling, coverage and non-response bias, data collection and instrumentation. The data for England were considered to be of a suitable quality for inclusion in the international report. Data were weighted to correct known biases and it is these data that are reported. Full details of the

[42] Standard errors are included in parentheses in most tables.

[43] OECD (2011). *PIAAC Technical Standards and Guidelines: December 2010.* Paris: OECD Publishing [online]. Available: http://www.oecd.org/site/piaac/PIAAC-NPM(2010_12)PIAAC_Technical_Standards_and_Guidelines.pdf [25 September, 2013].

weighting process are included in Chapter 15 of the *Technical Report of the Survey of Adult Skills*[44].

1.8.2 Sources of uncertainty

There are two sources of uncertainty which have to be taken into account in the statistical analysis and interpretation of any test results. These are described as *sampling error* and *measurement error*.

Sampling error stems from the inherent variation of human populations which can never be summarised with absolute accuracy. It affects virtually all research and data collection that makes use of sampling. Only if every eligible adult aged between 16 and 65 in each participating country had taken part in the survey could it be stated with certainty that the results are totally representative of the attainment of the entire population of adults in those countries. In reality the data was collected from a sample of adults. Therefore, the results are a best estimation of how the total adult population could be expected to perform in these tests. There are statistical methods to measure how good the estimation is. However, it is important to recognise that all data on human performance or attitudes that are based on a sample carry a margin of error.

Measurement error relates to the results obtained by each individual, and takes account of variations in their scores which are not directly due to underlying ability in the subject but which are influenced by other factors related to individuals or by the nature of the assessments.

The OECD *Technical Report* contains further information about the measures taken to minimise such error.

1.8.3 Interpreting rank order

Because of the areas of uncertainty described above, interpretations of very small differences between two sets of results are often meaningless. Were they to be measured again it could well be that the results would turn out the other way round. For this reason, this report focuses on statistically significant differences between mean scores, rather than the simple rank order of countries. Statistically significant differences are unlikely to have been caused by random fluctuations due to sampling or measurement error. Differences are reported as statistically significant if there is a probability – at the five per cent or lower level – that these differences are not due to chance.

Where significant differences between countries are found, these may be the result of a great number of factors. Although the background questionnaire provided a considerable amount of data against which to quantify results, there are many other differences in the experiences of such a large number of adults that could play a part in these differences. The International Survey of Adult Skills can, therefore, only explain the reasons for differences between countries to a limited extent. It is important to bear this in mind while reading this report.

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[44] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing.

1.9 Survey administration

The survey administration was carried out internationally on behalf of OECD by a consortium led by Educational Testing Service (ETS) (see section 1.5). This consortium worked with the national centre in each country through the National Project Manager (NPM). For England, the national centre was a consortium led by NFER, with TNS-BMRB and NatCen. The National Project Manager and National Data Manager were based at NFER and the National Sampling Manager at TNS-BMRB. NFER was responsible for making local adaptations to instruments and manuals and for translation where necessary and these were completed according to the *Technical Guidelines*[45] provided by the international consortium. TNS-BMRB and NatCen shared the data collection in England.

Sampling used a multistage sampling frame based on postcodes in England to generate a sample that would be representative of the population of non-institutionalised civilians aged between 16 and 65. Once the samples were drawn and agreed, letters were sent to the selected households to inform them about the survey and establish its legitimacy. These were followed up by trained interviewers who visited each of the identified addresses and established if there were eligible persons in the household. Where there was more than one eligible person, the interviewer sampled one individual using a Kish grid. To ensure a good response rate, interviewers made repeat visits to households (up to a maximum of seven) and also offered participants an incentive as a token of appreciation (£30 voucher for a high street retailer).

The survey was administered in two stages: completion of the background questionnaire and completion of the assessments. There could be a break between the two stages, although it was preferable if the respondent could complete both in one session. A trained interviewer delivered the background questionnaire using a specially developed computer program. Respondents could seek help from others in the household in the case of language difficulties, etc., but proxy respondents were not allowed. Following this, respondents either completed an initial series of tasks on the interviewer's laptop (computer based assessment) or were directed to alternative paper based tests. The initial series of tasks (known as the ICT core assessment) then screened respondents. If they 'failed' this core, they were directed to the paper based assessments. Others who took the paper based route were those who had some experience of computers but refused to take the computer based assessment or those who did not attempt the ICT core for literacy-related reasons.

Respondents could not receive help with the cognitive assessments, unless there was a problem with the computer application or a question about how to proceed with the overall assessment. In some cases, where there were specific language or other difficulties, the survey was terminated after the background questionnaire when it was evident that the respondent would be unable to access the assessments.

[45] OECD (2011). *PIAAC Technical Standards and Guidelines: December 2010.* Paris: OECD Publishing [online]. Available: http://www.oecd.org/site/piaac/PIAAC-NPM(2010_12)PIAAC_Technical_Standards_and_Guidelines.pdf [25 September, 2013].

The entire survey took approximately one and a half hours to complete, with the cognitive assessment taking on average between 41 and 50 minutes. The assessments (referred to as 'tasks' or 'exercises') had links to items included in IALS and ALL, but aimed (particularly in the domain relating to problem solving in technology-rich environments) to present problems that adults would encounter in their work, domestic or social life.

The data from the questionnaire and computer based assessment tasks were downloaded automatically using secure systems. Further data from the paper based tests were added to the overall database once these tests had been scored. This was done in line with training provided by the international consortium and met the required accuracy standards.

The background questionnaire was adaptive, so not all respondents answered all the questions: responses to early questions routed respondents to later sections which asked in more detail about such things as training courses and workplace practices in their current job. These questions would obviously be inappropriate for those who were out of work at the time of the survey or who were not working for other reasons.

1.10 England sample

The full details of the sample, together with more information on the sampling procedures, are available in Appendix A.

The total achieved sample for England was 5,131, with a 59 per cent response rate (and 58 per cent coverage).

1.11 Organisation of the report

Chapter 2 gives further information about the distribution of adult skills in England; Chapter 3 presents the results of the survey in terms of adult skills and work, with Chapter 4 focusing on skills in everyday life. Chapter 5 concentrates on the characteristics of those with low proficiency in literacy, numeracy or problem solving in technology-rich environments. A comparison – where possible – with the results of IALS is the focus of Chapter 6.

More detailed analyses of international results can be found in the OECD report on the International Survey of Adult Skills (PIAAC), which also includes results for England and Northern Ireland reported as the UK (reflecting the fact that the UK is a member of the OECD and the individual countries within the UK are not).

In this report, the findings for England and Northern Ireland are reported separately and are compared with 22 other participating countries. (Russian data are currently unavailable.)

1.12 Report conventions

All tables are derived from the Data Explorer produced by the international consortium, with source data from PIAAC 2012, unless otherwise indicated. The data from Australia is not available in the International Database (IDB) Analyzer (the alternative program for

analysing the data) and therefore data in these tables do not include Australia in the international average.

Tables show correlations between scores and other variables but these do not imply causality, as unknown and unexamined variables may be the cause of similarities in results. As noted in section 1.8.3, differences are reported as statistically significant if there is a probability, at the five per cent or lower level, that these differences are not due to chance.

The sum of percentages in tables may not add to 100 per cent due to rounding.

Symbols used in the report are as follows:

† Not applicable

‡ Reporting standards not met (i.e. there were fewer than 60 cases in this cell therefore robust inferences cannot be made)

* Significant at five per cent level

m Missing value

Figure is larger than zero but less than 0.5

() standard errors are presented in parentheses in tables

2. Distributions of adult skills in England

Key findings

In general, the performance of adults grouped by different demographic characteristics is more similar for literacy and numeracy than for problem solving. However, the comparison with other countries, particularly in terms of age groups, suggests that other countries are improving the literacy and numeracy skills of younger people at a faster rate than in England.

Literacy

England's performance in literacy was not significantly different from that of other English-speaking countries (with the exception of Australia, which had a significantly higher mean score, and the Republic of Ireland, which had a significantly lower mean score). There was a relatively large difference between the score points of the lowest scoring adults and the highest scoring adults in England compared with many other countries.

Men's average scores were higher than those of women, but the difference was not significant, unlike in the majority of other countries.

However, contrary to international patterns, the oldest age group (55-65) had higher average scores than those aged 16-18 (and the same average score as the wider age band 16-24).

As would be expected, higher literacy skills are associated with educational attainment, employment status, country of birth / mother tongue and ethnicity. People who did not have upper secondary level qualifications were less likely to achieve level 3 or above than those with higher level qualifications. Equally, those in full-time employment, as well as those who work part-time, are studying or who are retired, have higher levels of literacy than those who are unemployed. While the average score of those people born outside the UK is one of the highest of all participating countries, those people still tended to perform at the lower levels of literacy. In terms of ethnicity, Black/Black British or Asian/Asian British participants were more clustered at the lower levels.

Numeracy

England's performance in numeracy was significantly below the OECD average. England had a relatively large difference between the score points of the lowest scoring adults and the highest scoring adults compared with many other countries.

Men scored significantly higher than women, as was the case in every country which participated in the study. This gender difference in England was higher than the OECD average.

In numeracy, there is consistent lower performance by adults at all levels of

qualification. As with literacy, the oldest age group performed better than the youngest (16-18). A similar pattern occurred in the United States.

The patterns for educational attainment, employment status, country of birth / mother tongue were similar to those for literacy, but in terms of ethnicity, those people of Black/Black British origin were more likely to have scores clustered at the lower levels of achievement.

Problem solving in technology-rich environments

Although the average score for problem solving in technology-rich environments was lower than the OECD average, this must be seen in the context of the far higher participation in this domain compared with other countries, which was particularly marked among the older age groups. The spread of scores for this domain was slightly lower than those for literacy and numeracy.

Men scored significantly higher than women, as was the case in every country which participated in the study. The difference in England was higher than the OECD average.

Unlike the performance in other domains, the youngest age group achieved a higher average score than the oldest, adhering to the international pattern. In terms of occupation, those people still in education and training had the highest average scores, followed by those in full-time employment. These two characteristics (age and occupational status) may be related as younger people are more likely to be in education or training.

2.1 Introduction

This chapter reports the attainment of adults in England in literacy, numeracy and problem solving in technology-rich environments. It draws on findings outlined in the international report[46] and places outcomes for England in the context of those findings.

The international report includes outcomes for 24 participating countries and sub-national regions (a full list of participating countries can be found in Chapter 1). It describes outcomes for England/Northern Ireland (UK) as a whole which, for this survey, consist of the combined, weighted results from England and Northern Ireland. Scotland and Wales did not take part.

In this national report, scores for England and Northern Ireland are reported separately and no combined UK scores are provided. As a result, this report compares England's results with NI and 22 other participating countries.

[46] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

As outlined in Chapter 1, the survey measured the proficiency of adults' 'key information-processing skills' in the three domains of literacy, numeracy and problem solving in technology-rich environments.

Each domain was measured on a scale from 0 to 500. These scores have been grouped into levels: numeracy and literacy each have six levels, with 'Below Level 1' representing the lowest ability level. Problem solving has been grouped into four levels, with 'Below Level 1' again representing the lowest ability level. Descriptions of the proficiency levels for each domain, detailing the scale scores and expected skills at each level are presented in Tables A2 to A4 in Section A9 of Appendix A.

The sections that follow describe the distribution of skills among adults of working age (16-65 years) living in private households in England. Patterns of performance in literacy, numeracy and problem solving in England are compared with all other participating countries.

In addition, the chapter presents the results of analyses of demographic variables of interest, including gender, age, educational attainment and occupational status. Chapter 5 deals more specifically with the correlation of variables to provide predictors of low performance.

There were a number of routes through the assessment that participants might take, dependent upon their familiarity with computers, random allocation of literacy, numeracy and problem solving groups of items, and their skill level. The percentages of participants taking different routes through the assessment are shown in Figure 1.1 in Chapter 1 and the assessment design is described in more detail in Appendix A. The routes taken by participants are particularly important when comparing scores for problem solving in technology-rich environments with those in other participating countries. Not all adults took the computer based assessment (for a variety of reasons including lack of computer skill or disinclination); in England fewer respondents either had no computer experience, opted out of this element or failed the ICT core than the OECD average (16 per cent in England against the OECD average of 24 per cent). It is probable, therefore, that the sample of respondents who took problem solving in England included more participants of lower ability than in other countries. It is important to bear this in mind when making comparisons between lower performers in each country on problem solving.

Reading components

To provide more detailed information about adults with poor literacy skills, the International Survey of Adult Skills included a test of reading component skills. Reading components are the basic set of decoding skills regarded as essential for extracting meaning from written texts: knowledge of vocabulary (word recognition), the ability to process meaning at the level of the sentence, and fluency in reading passages of text.

Only 16 per cent of participants – those who were routed to the paper based booklets or failed the computer based 'core' – took the reading components booklet. This means that the group of adults who took the reading components test are not representative of the sample and are also likely to have different characteristics compared with respondents in other countries. Differences in familiarity with, and use of, computers across countries will impact on the proportion and background of respondents who were routed to this part of the assessment. The factors that need to be taken into consideration when making comparisons between the subgroups that took the reading components test are complex and analysis of this aspect of the assessment does not therefore form part of this report. OECD will explore reading components in further analyses in the future.

2.2 Scores in England

The mean scores[47] for adults in England are presented in Table 2.1 alongside the international OECD means[48] for each of the three domains. Analysis in the international report suggests that an increase in seven score points is approximately equivalent to an additional year in education.[49]

[47] The mean score is the estimate of the country's average skill score.

[48] Please note, the OECD means quoted throughout do not include Cyprus, which joined the study as a non-OECD partner. Nor do they include Russia (See Chapter 1).

[49] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

Table 2.1 Mean scores for England in each domain

Domain	England mean	OECD mean
Literacy	273	273
Numeracy	262*	269
Problem solving in a technology-rich environment	281*	283

Source: PIAAC (2012)
* The difference between England and OECD mean scores is statistically significant at the 5 per cent level

Scores in each of the domains are on a scale from 0 to 500. Comparisons between scores should be made relative to other participating countries rather than across domains. For literacy, England's mean score was in line with the OECD average. However, for numeracy and problem solving, scores in England were significantly below the OECD averages. Section 2.3 describes and discusses performance in terms of proficiency levels for the three domains.

Comparisons between England's performance and that of other countries are outlined for each of the three domains in sections 2.2.1 to 2.2.3 below.

The comparison of mean scores in each domain with other participating countries indicates that adults in England are relatively stronger in their literacy skills than in numeracy and problem solving.

2.2.1 Literacy

For literacy, England's mean score was not significantly different from the OECD average.

Mean scores for literacy were significantly higher in eight of the other participating countries, as shown in Table 2.2. Seven countries performed at a similar level to England, while the remaining eight countries had significantly lower mean scores.

Almost all the English speaking countries (England, Canada, the United States and Northern Ireland) fell into the same category for literacy. The exceptions were the Republic of Ireland whose mean score was significantly lower and Australia, which had a mean score significantly higher than England and the OECD mean.

Table 2.2 Literacy scores in participating countries

	Country	Mean score	
Countries outperforming England in literacy	Japan	296	(0.7)
	Finland	288	(0.7)
	The Netherlands	284	(0.7)
	Australia	280	(0.9)
	Sweden	279	(0.7)
	Norway	278	(0.6)
	Estonia	276	(0.7)
	Flanders (Belgium)	275	(0.8)
Countries not significantly different from England in literacy	Czech Republic	274	(1.0)
	Slovak Republic	274	(0.6)
	Canada	273	(0.6)
	OECD Average	273	(0.2)
	England	**273**	**(1.1)**
	Korea	273	(0.6)
	Denmark	271	(0.6)
	United States	270	(1.0)
	Northern Ireland	269	(1.9)
Countries significantly below England in literacy	Germany	270	(0.9)
	Austria	269	(0.7)
	Cyprus	269	(0.8)
	Poland	267	(0.6)
	Republic of Ireland	267	(0.9)
	France	262	(0.6)
	Spain	252	(0.7)
	Italy	250	(1.1)

Source: PIAAC (2012)
Statistical significances are calculated at the 5 per cent level
() Standard errors appear in parentheses
Note: Although the mean score for Northern Ireland is lower than Germany's, the standard error of 1.9 means that it is not significantly different from England.

2.2.2 Numeracy

In numeracy, the mean score for England was significantly below the OECD average.

Table 2.3 shows that, for numeracy, 15 of the other participating countries had a significantly higher mean score than England. Three countries performed at a similar level to England, while only five countries (Republic of Ireland, France, the United States, Italy and Spain) had significantly lower mean scores than England for numeracy.

Table 2.3 Numeracy scores in participating countries

	Country	Mean Score	
Countries outperforming England in numeracy	Japan	288	(0.7)
	Finland	282	(0.7)
	Flanders (Belgium)	280	(0.8)
	The Netherlands	280	(0.7)
	Sweden	279	(0.8)
	Norway	278	(0.8)
	Denmark	278	(0.7)
	Slovak Republic	276	(0.8)
	Czech Republic	276	(0.9)
	Austria	275	(0.9)
	Estonia	273	(0.5)
	Germany	272	(1.0)
	OECD Average	269	(0.2)
	Australia	268	(0.9)
	Canada	265	(0.7)
	Cyprus	265	(0.8)
Countries not significantly different from England in numeracy	Korea	263	(0.7)
	England	**262**	**(1.1)**
	Poland	260	(0.8)
	Northern Ireland	259	(1.8)
Countries significantly below England in numeracy	Republic of Ireland	256	(1.0)
	France	254	(0.6)
	United States	253	(1.2)
	Italy	247	(1.1)
	Spain	246	(0.6)

Source: PIAAC (2012)
Statistical significances are calculated at the 5 per cent level
() Standard errors appear in parentheses

2.2.3 Problem solving in technology-rich environments

England's mean score for problem solving was also significantly lower than the OECD average. Four countries (France, Cyprus, Italy and Spain) did not take part in problem solving, hence the smaller number of countries listed in Table 2.4.

Nine of the other participating countries had significantly higher mean scores than England for problem solving, five countries performed at a similar level to England, and five countries had mean scores that were significantly lower (see Table 2.4). However, the discussion in Section 2.1 about the higher proportion of respondents taking this assessment in England should be borne in mind.

Table 2.4 Problem solving scores in participating countries

	Country	Mean score	
Countries outperforming England in problem solving	Japan	294	(1.2)
	Finland	289	(0.8)
	Australia	289	(0.9)
	Sweden	288	(0.6)
	Norway	286	(0.6)
	The Netherlands	286	(0.8)
	Austria	284	(0.7)
	OECD Average	**283**	(0.2)
	Denmark	283	(0.7)
	Korea	283	(0.8)
Countries not significantly different from England in problem solving	Czech Republic	283	(1.1)
	Germany	283	(1.0)
	Canada	282	(0.7)
	Slovak Republic	281	(0.8)
	Flanders (Belgium)	281	(0.8)
	England	**281**	**(1.0)**
Countries significantly below England in problem solving	Estonia	278	(1.0)
	United States	277	(1.1)
	Republic of Ireland	277	(1.0)
	Northern Ireland	275	(2.0)
	Poland	275	(1.3)

Source: PIAAC (2012)
Statistical significances are calculated at the 5 per cent level
() Standard errors appear in parentheses.

In summary, the mean score in England was not significantly different to the OECD average for literacy. However, for numeracy and problem solving, England's scores were significantly below the OECD averages.

2.2.4 Adult skills by region

In order to explore any regional differences, the mean scores were calculated in each of the three domains and split by the different regions of England. These are presented in Table 2.5.

Table 2.5 Average scores in literacy, numeracy and problem solving by region

Region	Literacy		Numeracy		Problem solving	
	mean		mean		mean	
South East	282	(2.4)	274	(2.5)	286	(2.2)
Eastern	279	(2.5)	269	(2.9)	289	(2.7)
South West	279	(3.3)	270	(3.6)	284	(2.4)
East Midlands	274	(3.6)	263	(4.2)	280	(2.8)
London	270	(3.6)	256	(4.2)	282	(2.8)
Yorkshire and Humberside	269	(2.9)	258	(2.7)	275	(2.9)
North West (including Merseyside)	268	(2.4)	258	(2.8)	279	(1.9)
West Midlands	264	(2.9)	251	(3.5)	271	(2.7)
North East	259	(4.1)	247	(4.9)	268	(5.1)
ENGLAND (overall)	**273**	**(1.1)**	**262**	**(1.1)**	**281**	**(1.0)**

Source: PIAAC (2012) IDB analyzer
() Standard errors appear in parentheses
Note: Regions are ordered by average literacy score.

Adults in the South East region had the highest mean scores for literacy and numeracy, while those in the Eastern region had the highest mean score for problem solving. The lowest mean scores for all three domains were found in the North East region. The unweighted numbers of adults from each region are included in Appendix A, table A5. Region was one of the variables used to weight England's data.

2.3 Differences between highest and lowest achievers

In addition to knowing how well adults in England performed overall in the three domains assessed, it is also important to examine the spread in performance between the highest and lowest achievers. A narrow spread of performance indicates a situation where many respondents have a very similar ability level, although the causes of this may be very difficult to establish. A wider spread of performance indicates a bigger gap between the highest and lowest achievers, creating a much more diverse work-force in terms of ability.

Amongst countries with similar mean scores there may be differences in the numbers of high- and low-scoring adults. A country with a wide spread of attainment may have large

numbers of adults who are performing at the lowest levels as well as adults performing at the highest levels. A country with a lower spread of attainment may have fewer very high achievers but may also have fewer adults performing at the lower levels. Therefore, two countries may have a very similar mean score, but the pattern of performance may vary considerably, with different policy implications. For instance, it may be important at a national level to know whether there is a large group of people with very poor skills, or if most people have very similar skills levels. Whether a country has a narrow spread or a wide spread will determine how best resources could be spent improving adult skills, whether it is to target underachievers, a lack of high achievers, specific demographics, or the general population if the spread is narrow.

2.3.1 Percentile distributions

The first way in which the spread of performance in each country can be examined is by looking at the distribution of scores and the difference between very low and very high achievers (at the 5th and 95th percentiles).

The 5th percentile is the point at which five per cent of adults score lower than the rest of the population. The 95th percentile is the point at which five per cent score higher than the rest of the population. The difference between those with scores at the 5th and 95th percentiles is a better measure of the typical spread of attainment than the difference between the lowest and highest scoring individuals. This is because the latter can be affected by unusually high or low scores.

Table 2.6 Spread of attainment (percentiles)

		Percentiles				Difference between 5th and 95th percentile
		5th		95th		
Literacy	England	188	(4.1)	347*	(2.2)	159
	OECD Average	190	(0.6)	342	(0.4)	152
Numeracy	England	167*	(3.3)	346	(2.2)	178
	OECD Average	178	(0.7)	346	(0.4)	167
Problem solving	England	210	(2.2)	346	(2.0)	137
	OECD Average	210	(0.6)	349	(0.5)	138

Source: PIAAC (2012)
*The difference in scores at the 5th/95th percentile is statistically significant at the 5 per cent level for England compared with the OECD average
() Standard errors appear in parentheses.

Table 2.6 shows that England has a wider spread of attainment than the OECD averages for literacy and numeracy. For problem solving, the spread of attainment in England is just slightly lower than the OECD average. Equivalent tables showing the 5th and 95th percentiles for all participating countries are presented in Appendix B; B1, B2 and B3.

Literacy

For literacy, the score of adults in England at the 5th percentile was 188 while the score of those at the 95th percentile was 347, a difference of 159 score points. The score at the 95th percentile was significantly highly than that of the OECD average. The difference in literacy scores at the 5th and 95th percentiles was narrower for the youngest age group, aged 16-18 (143 score points), than for any other group. The widest spread of scores occurred in the 25-34 age group (163 score points) (Appendix B; B4). This suggests that adults are more similar to each other in terms of ability at the point at which they leave school and that the spread of achievement is wider among older age groups.

By comparison, the average difference across the OECD countries was 152 score points, indicating that England has a wider distribution of scores than most countries. The spread of scores does not equate to overall performance, however, it does indicate the level of equality in society. While Japan had the narrowest range (129 score point difference) and also had the highest mean score, both Australia and Finland had wider ranges than England but higher mean scores. In literacy, the average score at the 95th percentile appears to have a stronger relationship with the overall mean score than the score range, at least in literacy.

The difference between the 5th and 95th percentiles in other English speaking countries was as follows: Northern Ireland 150; Republic of Ireland 155; Australia 161; the United States 162; and Canada 163. Comparing Northern Ireland and England, there were no significant differences between the mean scores at the 5th and 95th percentiles in any domain.

Numeracy

For numeracy, the score of adults in England at the 5th percentile was 167 while the score of those at the 95th percentile was 346, a difference of 178 score points. England's scores at the 5th percentile were significantly lower than the OECD average. By comparison, the average difference across the OECD countries was 167 score points, again indicating that England has a wider distribution of scores. The difference in numeracy scores at the 5th and 95th percentiles was narrower for the youngest age group, aged 16-18 (156 score points), than for any other age group. The widest spread of scores occurred in the 25-34 age group (190 score points) (Appendix B; B5).

While the Czech Republic and Japan had the narrowest distribution of scores on the numeracy scale (142 and 143 points difference respectively) and also had higher mean scores than England for numeracy, other high performing nations had wider ranges, including Australia and Canada. The United States had the widest gap between the lowest and the highest performers (188 points) and the average score was significantly below that of England. While the relationship between range and achievement is not clear cut for numeracy, it appears that mean scores for the 95th percentile are more important, as that sets the bar higher for score ranges that do not differ significantly across countries.

Problem solving in technology-rich environments

For problem solving, the score of adults in England at the 5th percentile was 210 while the score of those at the 95th percentile was 346, neither of which were significantly different from the OECD average. England's difference of 137 score points is close to the OECD average difference of 138 score points and similar to those of the Netherlands, Finland and Denmark.

The difference in problem solving scores at the 5th and 95th percentiles was narrower for the youngest age group, aged 16-18 (109 score points), than for any other group. The widest spread of scores occurred in the 45-54 age group (139 score points) (Appendix B; B6).

As for the other domains, there is not a clear cut relationship between the spread of scores and overall achievement. While Japan had the highest mean score, it also had a wider spread of attainment than England. The Slovak Republic, with the narrowest distribution of scores (121), had a mean score of 281, the same as England.

Overall, these results show that England has a similar spread of attainment in literacy and problem solving compared with the OECD average, and a larger spread in numeracy. England's score at the 5th percentile is lower than the OECD average score, suggesting that England's attainment in numeracy would be best improved by targeting those with low numeracy skills.

2.3.2 Proficiency level distributions

The second way of examining the spread of attainment is by looking at England's performance at each of the proficiency levels. As explained previously, literacy and numeracy skills are described in terms of six levels of achievement and problem solving in four levels. Descriptions of the proficiency levels, with details of expected performance at different skills levels are presented in Tables A2 to A4 in Section A9 of Appendix A.

Table 2.7 below shows the percentage of adults at each level for literacy, numeracy and problem solving. The data in Table 2.7 includes participants who were unable to complete any part of the literacy or numeracy assessment or were unable to take part in the computer based assessment and hence, the problem solving assessment. These participants therefore have missing data.

Table 2.7 Spread of attainment – Percentage of adults at each level

		Below Level 1 (below 176)		Level 1 (from 176 to below 226)		Level 2 (from 226 to below 276)		Level 3 (from 276 to below 326)		Level 4 (from 326 to below 376)		Level 5 (at or above 376)		Missing	
Literacy	England	3.3	(0.4)	13.1	(0.7)	33.1	(1.0)	36.0*	(1.0)	12.4	(0.7)	0.8	(0.2)	1.4	(0.2)
	cumulative %	3.3		16.4		49.5		85.4		97.8		98.6		100.0	
	OECD Average	3.3	(0.1)	12.2	(0.1)	33.3	(0.2)	38.2	(0.2)	11.1	(0.1)	0.7	(0.0)	1.2	(0.0)
	cumulative %	3.3		15.5		48.8		87.0		98.1		98.8		100.0	
Numeracy	England	6.4*	(0.5)	17.8*	(0.9)	33.3	(1.0)	29.8*	(1.1)	10.4	(0.8)	0.9	(0.2)	1.4	(0.2)
	cumulative %	6.4		24.1		57.4		87.3		97.7		98.6		100.0	
	OECD Average	5.0	(0.1)	14.0	(0.1)	33.0	(0.2)	34.4	(0.2)	11.4	(0.1)	1.1	(0.0)	1.2	(0.0)
	cumulative %	5.0		19.0		52.0		86.3		97.7		98.8		100.0	

		No computer experience		Opted out of computer based assessment		Failed ICT core		Below Level 1 (below 241)		At Level 1 (241 to below 291)		At Level 2 (291 to below 341)		At Level 3 (at or above 341)		Missing	
Problem solving	England	4.1	(0.3)	4.6	(0.4)	5.8	(0.4)	15.1	(0.8)	33.8	(1.1)	29.3	(0.9)	5.7	(0.5)	1.6	(0.2)
	cumulative %	4.1		8.7		14.5		15.1		48.9		78.2		83.9		85.5	
	OECD Average	9.3	(0.1)	10.2	(0.1)	4.9	(0.1)	12.3	(0.1)	29.4	(0.2)	28.2	(0.2)	5.8	(0.1)	1.5	(0.0)
	cumulative %	9.3		19.5		24.4		12.3		41.7		69.9		75.7		77.1	

NOTE: Detail may not sum to totals because of rounding. Some apparent differences between estimates may not be statistically significant.
Source: PIAAC (2012) International Report Table 2.1, Table 2.5 and Table 2.10.A. * The difference between the England and OECD mean scores are statistically significant at the 5 per cent level. () Standard errors appear in parentheses.

In the sections that follow, only participants with scores were included in the analyses. It is possible, therefore, that some of the proportions will differ from those presented in Table 2.7.

In all three domains, England had a higher proportion of adults performing at the lowest two levels of proficiency than the OECD average. Conversely, England was below the OECD average in terms of the proportions of adults performing at the highest level for numeracy and problem solving, but slightly higher than the OECD average for literacy at the highest level.

Full information relating to the proportions of adults at each level for literacy, numeracy and problem solving in all comparison countries is presented in Appendix B; B7, B8 and B9. In all participating countries, there were some adults at or below Level 1 for literacy, numeracy and problem solving[50] and some performing at the highest levels as well.

Literacy

In England, 16 per cent of adults achieved Level 1 or below for literacy, the same as the OECD average.

Fifteen of the comparison countries had fewer adults with literacy Levels 1 or below than England and only eight countries had a higher proportion of adults at these levels of literacy. England's proportion of adults at lower levels for literacy does not compare well with the highest scoring countries. In Japan, for example, only five per cent of adults were at Level 1 and below and in Finland only 11 per cent. England had similar proportions of adults at Level 1 or below to most other English speaking countries (Australia 13 per cent, Canada 16 per cent, Northern Ireland 17 per cent, the Republic of Ireland 17 per cent, and the United States 18 per cent).

Looking at the higher achieving adults (those with literacy Levels 4/5), England had 13 per cent of adults who achieved Level 4 and above for literacy, which was higher than the OECD average of 12 per cent. However, the numbers of adults scoring at these high levels do not compare well with some of the highest-scoring countries. Japan had 23 per cent of adults at Level 4 or above and Finland had 22 per cent of adults in the two top levels. The Netherlands, Australia and Sweden also had high proportions of adults scoring Level 4 and above for literacy.

In all countries, a small proportion of adults achieved the highest level (Level 5) for literacy, including 0.8 per cent in England, similar to the OECD average of 0.7 per cent. Finland had the highest proportion of adults at Level 5 (2 per cent) (see Appendix B; B7).

[50] France, Italy, Spain and Cyprus did not take part in problem solving.

Numeracy

For numeracy, almost a quarter (24 per cent) of adults in England scored Level 1 or below, a much higher proportion than the OECD average of 19 per cent. Most countries had a lower proportion of adults at the lowest two numeracy levels than England and only six countries had a higher proportion (Northern Ireland, the Republic of Ireland, France, the United States, Spain and Italy). Again, England's high proportions at the lower levels does not compare well with the highest-scoring countries. In Japan, for example, only eight per cent of adults were at Level 1 and below and in Finland the proportion was 13 per cent.

At the higher levels, we find that England had 11 per cent of adults who achieved Level 4 and above for numeracy, compared with an OECD average of 12 per cent. However, in the highest-scoring countries (Finland and Japan), the percentage of adults at Level 4 and above for numeracy was 19 per cent.

Internationally, for numeracy, all countries had some adults who achieved Level 5. In England the proportion was 0.9 per cent which was below the OECD average of 1.1 per cent. Finland, again, had the largest proportion of high achievers for numeracy (2.2 per cent) followed by other Scandinavian countries (Sweden, Norway and Denmark) and Flanders (Belgium).

Problem solving in technology-rich environments

In terms of problem solving, the results of adults in England were just below the OECD average.

It must be borne in mind that not all adults in the sample took part in the problem solving assessments. This is discussed in Chapter 1 and illustrated in Figure 1.1. In England, around 15 per cent of adults did not participate in the computer based assessment and therefore have no problem solving score. This compares with the OECD average of 24 per cent. This was a smaller percentage than most other countries. Only four countries had lower proportions of adults who did not take part in the problem solving assessments (Sweden, the Netherlands, Denmark and Norway). In Poland, almost half of adults did not take part as they had no ICT experience, failed the ICT core assessment or opted out of the computer based assessment (49 per cent). Seven countries had over a quarter of adults who did not take part in problem solving. These were Japan (38 per cent), the Slovak Republic (37 per cent) the Republic of Ireland (33 per cent), Korea and Estonia (30 per cent each), Austria (27 per cent) and the Czech Republic (25 per cent). (See Appendix B; B9) The figures presented in the following sections should be interpreted in this light as it is likely that those adults who did not take the computer based assessment would have had low proficiency in the problem solving assessment.

In terms of the proportion of adults who actually took the problem solving assessment, the differences between the average scores for England and the OECD were not significant in the age categories below 35 years. However, compared with many other participating countries and the OECD average, England had a significantly lower proportion of adults over 35 years who had no computer experience. For the 55-65 age bracket, 20 per cent of adults had no experience of computers or failed the core assessment compared with an OECD average of 28 per cent for this age bracket. (See Appendix B; B18)

Fifteen per cent of adults in England scored below Level 1 compared with the OECD average of 12 per cent. Only two of the comparison countries had a higher proportion of adults than England below Level 1 for problem solving (Northern Ireland and the United States), while Japan had the lowest proportion of low achievers at eight per cent.

In England, six per cent of adults achieved the highest level for problem solving (Level 3), which was the same as the OECD average. In the highest-scoring countries – Sweden, Finland and Japan – nine, eight and eight per cent of adults, respectively, achieved the top level for problem solving.

Overview of the spread of high and low achievement

Table 2.7 shows that skills levels among English adults were found to be broadly similar to the OECD averages, with around two thirds of the population functioning at the middle levels (Levels 2 and 3) for literacy (69 per cent) and numeracy (63 per cent).

However, 24 per cent of adults in England demonstrated low proficiency (Level 1 or below) in numeracy which was significantly higher than the OECD average of 19 per cent. For literacy, 16 per cent of adults fell into the low proficiency bracket while the OECD average was also 16 per cent.

The proportions of adults with low proficiency in numeracy and in literacy are always a cause for concern. Adults operating at this level can regularly complete tasks that involve very few steps, limited amounts of information presented in familiar contexts with little distracting information present, and which involve basic cognitive operations, such as locating a single piece of information in a text or basic arithmetic operations. More complex tasks would cause difficulty for adults with this low level of proficiency in numeracy and literacy.

At the other extreme, high proficiency levels (Levels 4 or 5) were demonstrated by 13 per cent of adults for literacy compared with the OECD average of 12 per cent. For numeracy, however, the proportion of adults performing at the highest levels of proficiency was 11 per cent, compared with the OECD average of 13 per cent.

For problem solving, England had higher proportions of adults at the lower levels (15 per cent below Level 1) than the OECD average of 12 per cent. However, a higher proportion of adults in England took part in problem solving than the OECD average. In England and the OECD on average, six per cent of all adults, including those who did not complete the assessment, achieved the highest level for problem solving.

Overall, adults in England performed similarly to the OECD averages for literacy, but below these averages for numeracy and problem solving.

2.4 Adult skills and gender

Distributions of skills in the three domains (literacy, numeracy and problem solving in technology-rich environments) were examined and split by gender.

The results for England are presented below, alongside the OECD averages and some comparisons with other participating countries. Full details for all countries can be found in Appendix B; B10 to B15.

2.4.1 Literacy

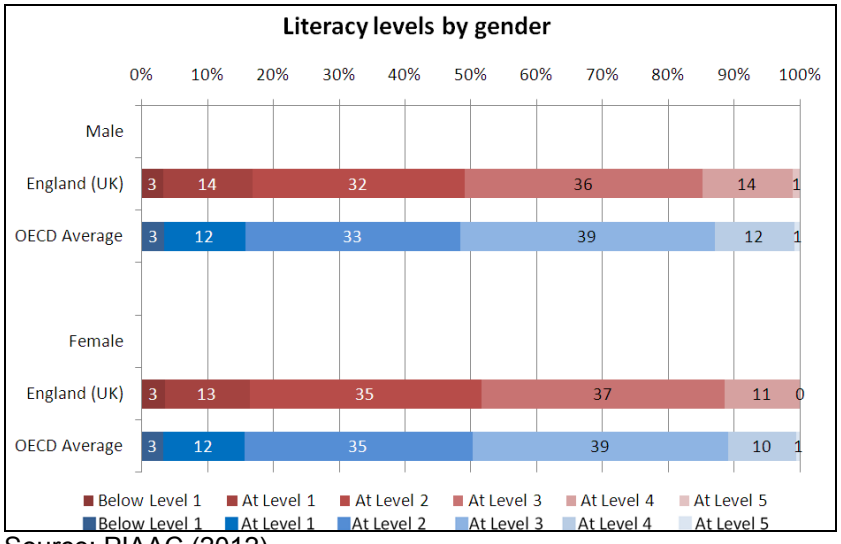
In England, male participants scored on average 2.8 score points more than female participants, but this difference was not significant[51]. The OECD averages did indicate a significant difference between the mean scores of men and women for literacy, with men scoring on average 1.9 score points more [52].

Internationally, men tended to score higher than women for literacy, and the difference was significant in 10 countries. Only one country, Poland, showed a significant difference in favour of women. (See Appendix B; B10)

The greatest discrepancies between the mean literacy scores of men and women were found in Poland (6.4 score points in favour of women) and in Korea and Northern Ireland (6.3 score points in favour of men).

Figure 2.1 shows the level distributions of men and women in England in literacy skills alongside the OECD averages.

Figure 2.1 Literacy levels by gender (England/OECD)



Source: PIAAC (2012)

[51] Statistical significances are calculated at the 5 per cent level

[52] Although the difference between men and women in England may appear to be greater than the OECD average, it is not significant because of the smaller sample size and, therefore, greater standard error.

2.4.2 Numeracy

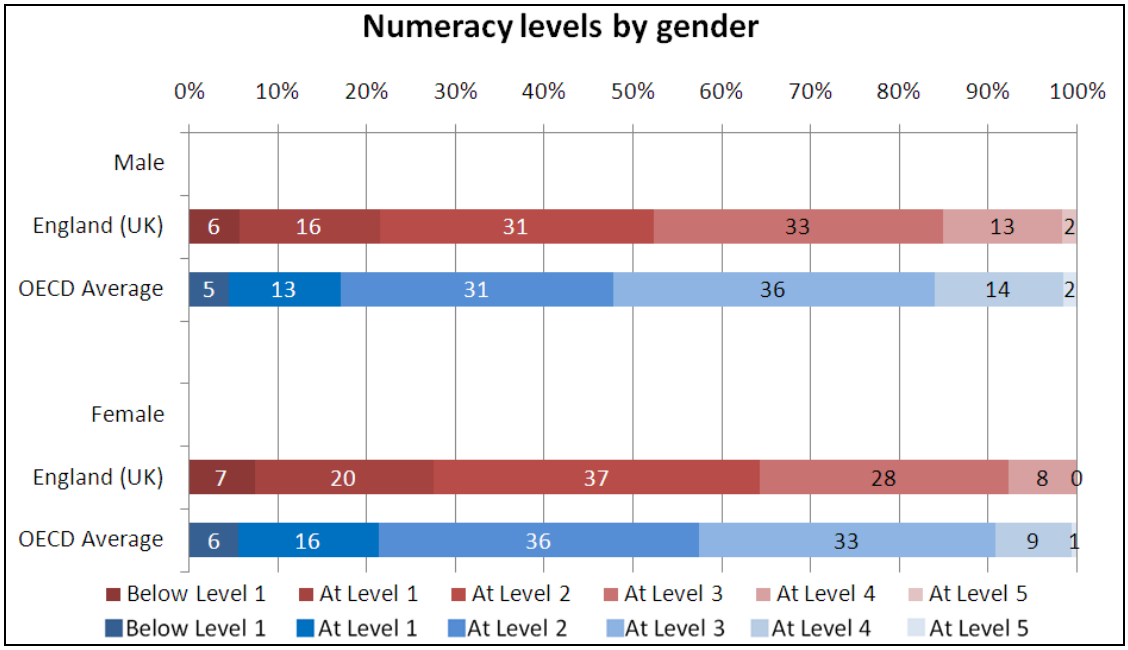
In England, male participants achieved an average of 14.3 score points more than female participants for numeracy and the difference was statistically significant[53]. The OECD average was a significant difference in favour of men of 11.7 score points.

Internationally, in all the participating countries, men had a higher mean score than women for numeracy and the difference was significant in all but two countries (Poland and the Slovak Republic). (See Appendix B; B11)

Five countries had a greater discrepancy between men and women for numeracy than England. These were Canada, Norway, Flanders (Belgium), the Netherlands and Germany. The greatest difference between men and women was found in Germany where men scored, on average, 17.3 score points more than women for numeracy.

Figure 2.2 shows the level distributions of men and women in England in numeracy skills alongside the OECD averages.

Figure 2.2 Numeracy levels by gender (England/OECD)



Source: PIAAC (2012)

2.4.3 Problem solving in technology-rich environments

In England, male participants scored an average of 9.2 score points more than female participants. The OECD average was 5.9 score points in favour of men. Only two countries, Austria (9.3) and Northern Ireland (11.4), had a greater discrepancy between

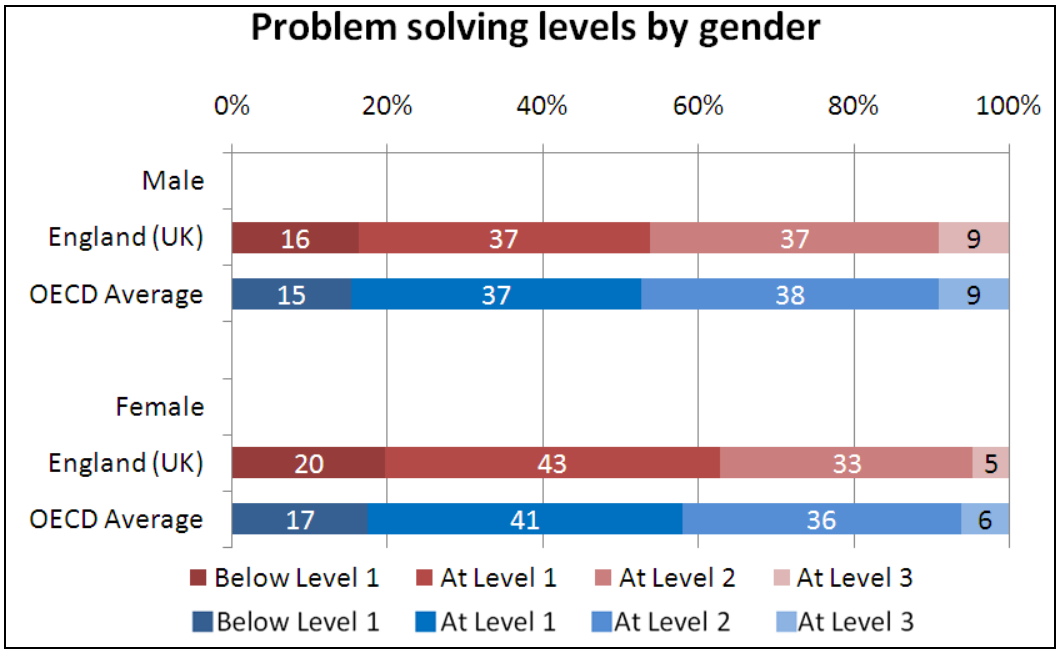
[53] Statistical significances are calculated at the 5 per cent level

men and women for problem solving than England. These were all significant differences[54].

Of all the participating countries[55], 18 had a statistically significant difference in gender performance on the problem solving scale, favouring men (see Appendix B; B12). The Slovak Republic had the smallest difference (1.6 score points) between the problem solving scores of men and women, and this difference was not significant.

Figure 2.3 shows the level distributions of men and women in England in problem solving skills alongside the OECD averages.

Figure 2.3 Problem solving levels by gender (England/OECD)



Source: PIAAC (2012)

2.5 Adult skills and age

Distributions of skills in the three domains (literacy, numeracy and problem solving in technology-rich environments) were examined and split according to different age groups. In the analyses reported in this section, the youngest age group, 16-24 year olds, was split into 16-18 year olds and 19-24 year olds. Tables 2.8 to 2.11 show results according to this split. Specific comparisons were made between the oldest age group and the youngest age group in each country.

The results for England are presented in Table 2.8 below, alongside the OECD averages and comparisons with other participating countries in Tables 2.9 to 2.11.

[54] Statistical significances are calculated at the 5 per cent level
[55] Australia and Cyprus are not included in this analysis as significances were calculated in the IDB analyzer.

Results for all countries, by 10-year age bands, can be found in Appendix B; B16 to B18a-e.

2.5.1 Literacy

Table 2.8 shows that around 70 per cent of adults in England, at all age levels, performed at Levels 2 and 3. The highest achievers were adults aged between 25-34 years, while those between 19-24 years and those between 55-65 years had higher proportions below Level 1.

In England, the youngest adults (aged 16-18) scored an average of 6.1 score points less than the oldest (aged 55-65) but the difference was not significant (see Table 2.9).

Internationally, the youngest adults performed significantly better than the oldest for literacy in every country except England, Northern Ireland and Norway, with most countries showing a difference of 15 score points or more in favour of the younger age groups. Table 2.9 shows these differences when comparing 16-18 year olds with 55-65 year olds, while Appendix B; B16 shows these differences by 10-year age bands.

The international average difference was 19.4 score points in favour of the youngest age group (16-18) compared with England's difference of 6.1 in favour of the oldest group (55-65 year olds).

The widest range of scores between the youngest and oldest age bands was found in Korea where the mean for the youngest adults was 291 score points compared with 244 for the oldest age band. The smallest differences between the literacy scores of the oldest and youngest groups were found in Norway (favouring 16-18 year olds) and England (favouring 55-65 year olds). All age groups in between performed better than either the oldest or the youngest in both of these countries.

Table 2.8 Spread of attainment – Percentage of adults at each level by age

		Below Level 1 (below 176)		At Level 1 (from 176 to below 226)		At Level 2 (from 226 to below 276)		At Level 3 (from 276 to below 326)		At Level 4 (from 326 to below 376)		At Level 5 (at or above 376)	
Literacy	Aged 16-18	3.6	(2.0)	19.3	(4.1)	40.3	(5.1)	31.9	(4.7)	4.6	(2.3)	#	†
	Aged 19-24	4.0	(1.3)	13.0	(2.5)	35.6	(3.7)	37.2	(3.7)	9.8	(1.8)	#	†
	Aged 25-34	3.1	(0.7)	11.2	(1.4)	29.5	(2.2)	38.3	(1.9)	16.6	(1.4)	1.3	(0.7)
	Aged 35-44	2.7	(0.6)	11.3	(1.4)	30.2	(1.7)	38.4	(2.1)	16.3	(1.6)	1.0	(0.4)
	Aged 45-54	3.2	(0.7)	14.5	(1.6)	33.5	(2.0)	36.2	(2.2)	11.9	(1.3)	0.7	(0.4)
	Aged 55-65	4.1	(0.8)	14.5	(1.4)	38.4	(2.0)	33.5	(2.2)	9.0	(1.4)	#	†
	England mean overall	**3.3**	**(0.4)**	**13.3**	**(0.7)**	**33.6**	**(1.0)**	**36.5**	**(1.0)**	**12.6**	**(0.7)**	**0.8**	**(0.2)**
Numeracy	Aged 16-18	5.8	(2.8)	22.8	(3.7)	42.1	(4.7)	24.4	(4.5)	4.7	(2.3)	#	†
	Aged 19-24	5.7	(1.3)	18.9	(2.8)	36.3	(3.8)	30.0	(3.5)	8.7	(1.9)	#	†
	Aged 25-34	6.9	(1.3)	15.6	(1.7)	30.0	(2.4)	33.3	(2.4)	12.7	(1.5)	1.4	(0.6)
	Aged 35-44	5.5	(0.9)	15.3	(1.3)	32.2	(1.8)	32.1	(1.7)	13.6	(1.6)	1.3	(0.5)
	Aged 45-54	6.9	(1.0)	20.3	(2.0)	32.4	(2.3)	29.9	(2.1)	9.5	(1.4)	1.0	(0.4)
	Aged 55-65	7.1	(1.0)	19.0	(1.6)	36.9	(2.0)	27.4	(1.9)	9.0	(1.3)	0.6	(0.3)
	England mean overall	**6.5**	**0.5**	**18.0**	**0.9**	**33.8**	**1.1**	**30.3**	**1.1**	**10.6**	**0.8**	**0.9**	**0.2**

		Below Level 1 (below 241)		At Level 1 (from 241 to below 291)		At Level 2 (from 291 to below 341)		At Level 3 (at or above 341)	
Problem solving	Aged 16-18	8.7	(2.8)	50.9	(5.8)	36.2	(5.1)	4.2	(2.2)
	Aged19-24	11.7	(2.0)	39.3	(3.1)	40.3	(3.0)	8.7	(1.9)
	Aged 25-34	11.2	(1.3)	35.5	(2.0)	42.1	(2.3)	11.2	(1.7)
	Aged 35-44	16.7	(1.6)	38.9	(2.7)	36.8	(1.9)	7.6	(1.1)
	Aged 45-54	24.5	(2.0)	40.5	(2.3)	30.6	(2.0)	4.3	(0.9)
	Aged 55-65	29.6	(2.4)	45.1	(3.1)	23.0	(2.4)	2.4	(0.9)
	England mean overall	**18.0**	**(1.0)**	**40.3**	**(1.2)**	**34.9**	**(1.1)**	**6.8**	**(0.6)**

Source PIAAC (2012)

† Not applicable

Figure is larger than zero but less than 0.5

If we examine England's rank order in terms of age bands, we see a clear pattern. The literacy rankings for England decrease directly with age bands, whereby the oldest age group (55-65) come third in international rankings while the youngest age group (16-18) come eighteenth.[56]

This is not a common pattern in other countries. In Korea and in France, the rankings improve steadily as we move towards younger age bands. Most countries fluctuate by less than ten places in the rankings. Japan, for example, ranks consistently highly across age bands while the rankings for Spain are consistently low (see Table 2.9).

Only in England is the mean score of the youngest age group (16-18 years) lower than that of the oldest age group (55-65 years) for literacy. Although Table 2.9 indicates that seven additional countries[57] have higher rankings in the oldest age group than the youngest age group, when the mean scores of these groups are studied, it can be seen that the youngest age groups are still scoring more highly than the oldest. The rankings should therefore be interpreted with this in mind; in the Czech Republic, for example, 16-18 year olds have a mean score of 274 which ranks them eighth, while 55-65 year olds rank fifth, with a mean score of 262 – despite ranking higher, they are scoring 12 points below the youngest age group.

England's reversed pattern of performance by age might suggest that while adult literacy levels are improving over time, or remaining stable, in many other countries, England's comparative standing may be deteriorating. An alternative explanation could be that adult literacy is improving at a faster rate in other countries. This possibility is supported by the analysis of trends in performance outlined in Chapter 6, which indicates that, although the mean scores of the youngest age group (16-25 years) appears to have declined slightly in England since IALS[58], the difference is not statistically significant.

Table 2.9 tabulates each country's mean scores by age, along with their standard errors and international ranking for literacy[59]. However, it is difficult to make judgments about performance based on rankings as four countries do not have data available for the youngest age band, 16-18 year olds (Austria, Canada, Germany and the United States). This means that rankings for this age band are not directly comparable to rankings for all other age bands. For example, in literacy, Spain's youngest age group rank seventeenth while all other age groups rank twenty-first or twenty-second. Taken at face value, this data may suggest that the youngest age group is performing better than the others, when in fact seventeenth is second from last as there were only 18 countries with data for this age group. Rankings can also be difficult to interpret as they do not reflect the mean scores. For example, literacy rankings in the Slovak Republic are seven ranks higher for the oldest age group than for the youngest, which may suggest that older adults are performing better. However, when mean scores are considered, it is apparent that the youngest age

[56] Only 18 countries provided data in this age band.
[57] Canada, Czech Republic, Norway, Slovak Republic, Sweden, United States and Northern Ireland.
[58] International Adult Literacy Survey (IALS) - 1996

[59] Tables 2.10 and 2.11 show the equivalent for numeracy and problem solving.

group has a significantly higher mean, but as internationally means are higher for this age band, its ranking is lower than for the oldest adults. An increase in ranking does not relate to an increase in mean scores – it only shows a country's relative international positioning.

Table 2.9 Literacy scores by age and international rankings[60]

	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65			Diff. in mean of youngest and oldest	Diff. in international rankings of youngest and oldest
	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank		
Austria	m	m	m	278	(1.5)	13	280	(1.5)	14	275	(1.7)	15	266	(1.4)	11	250	(1.6)	17	-28*	4
Belgium	277	(2.6)	7	290	(2.0)	6	291	(1.8)	4	282	(1.6)	6	272	(1.6)	6	255	(1.6)	13	-22*	6
Canada	m	m	m	276	(1.3)	17	285	(1.3)	10	279	(1.4)	8	268	(1.3)	10	260	(1.1)	10	-15*	-7
Czech Republic	274	(3.0)	8	283	(2.5)	8	287	(1.8)	8	275	(2.0)	14	266	(1.7)	13	262	(2.0)	5	-12*	-3
Denmark	270	(2.2)	11	280	(2.0)	10	282	(1.7)	11	281	(1.6)	7	266	(1.4)	14	252	(1.1)	15	-17*	4
Estonia	280	(2.0)	6	290	(1.5)	5	286	(1.7)	9	278	(1.2)	11	269	(1.4)	9	261	(1.5)	9	-19*	3
Finland	288	(2.1)	3	302	(2.6)	2	309	(1.7)	2	299	(2.1)	2	284	(1.8)	2	260	(1.4)	11	-29*	8
France	271	(1.8)	10	277	(1.8)	15	278	(1.4)	16	267	(1.3)	20	254	(1.2)	20	242	(1.3)	20	-29*	10
Germany	m	m	m	279	(1.6)	12	281	(1.8)	12	275	(1.6)	13	264	(1.7)	15	254	(1.7)	14	-25*	2
Republic of Ireland	266	(3.3)	15	274	(2.4)	18	276	(1.5)	19	271	(1.8)	18	259	(2.1)	17	251	(1.8)	16	-15*	1
Italy	267	(3.6)	14	256	(3.4)	22	260	(2.2)	22	253	(1.9)	22	249	(1.8)	21	233	(2.2)	21	-33*	7
Japan	295	(2.5)	1	302	(2.1)	1	309	(1.7)	1	307	(1.0)	1	297	(1.5)	1	273	(1.6)	1	-21*	0
Korea	291	(2.1)	2	294	(2.2)	4	290	(1.2)	6	278	(1.2)	12	259	(1.4)	19	244	(1.4)	19	-47*	17
Netherlands	286	(2.4)	4	299	(2.1)	3	298	(2.0)	3	294	(1.8)	3	277	(1.7)	4	261	(1.6)	8	-25*	4
Norway	268	(2.6)	13	280	(1.9)	11	289	(1.8)	7	288	(1.6)	4	277	(1.5)	3	262	(1.5)	7	-6	-6
Poland	281	(2.7)	5	282	(1.0)	9	277	(1.5)	18	268	(1.9)	19	259	(1.7)	18	249	(1.7)	18	-32*	13
Slovak Republic	273	(2.7)	9	278	(1.8)	14	278	(1.4)	15	278	(1.4)	10	270	(1.3)	8	266	(1.3)	2	-7*	-7
Spain	259	(2.5)	17	266	(1.9)	21	263	(1.5)	21	260	(1.3)	21	248	(1.5)	22	227	(1.9)	22	-33*	5
Sweden	270	(3.4)	12	289	(2.0)	7	290	(1.9)	5	287	(1.8)	5	276	(1.7)	5	262	(1.3)	6	-7*	-6

[60] Australia and Cyprus not included in this analysis as significances were calculated in the IDB analyzer.

	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65			Diff. in mean of youngest and oldest	Diff. in international rankings of youngest and oldest
	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank		
United States	m	m	m	272	(2.0)	19	275	(2.0)	20	273	(1.8)	17	266	(1.7)	12	263	(1.5)	4	-9*	-15
England	259	(3.9)	18	269	(3.0)	20	280	(2.1)	13	279	(1.6)	9	271	(1.8)	7	265	(2.0)	3	6	-15
N. Ireland	263	(3.5)	16	277	(3.2)	16	278	(2.9)	17	274	(2.3)	16	262	(2.6)	16	255	(3.2)	12	-8	-4
OECD average	274	(0.7)		281	(0.5)		284	(0.4)		278	(0.4)		267	(0.4)		255	(0.4)		-19*	
England's difference from OECD Average	-15.1			-12.8			-3.6			+1.0			+4.0			+10.5				

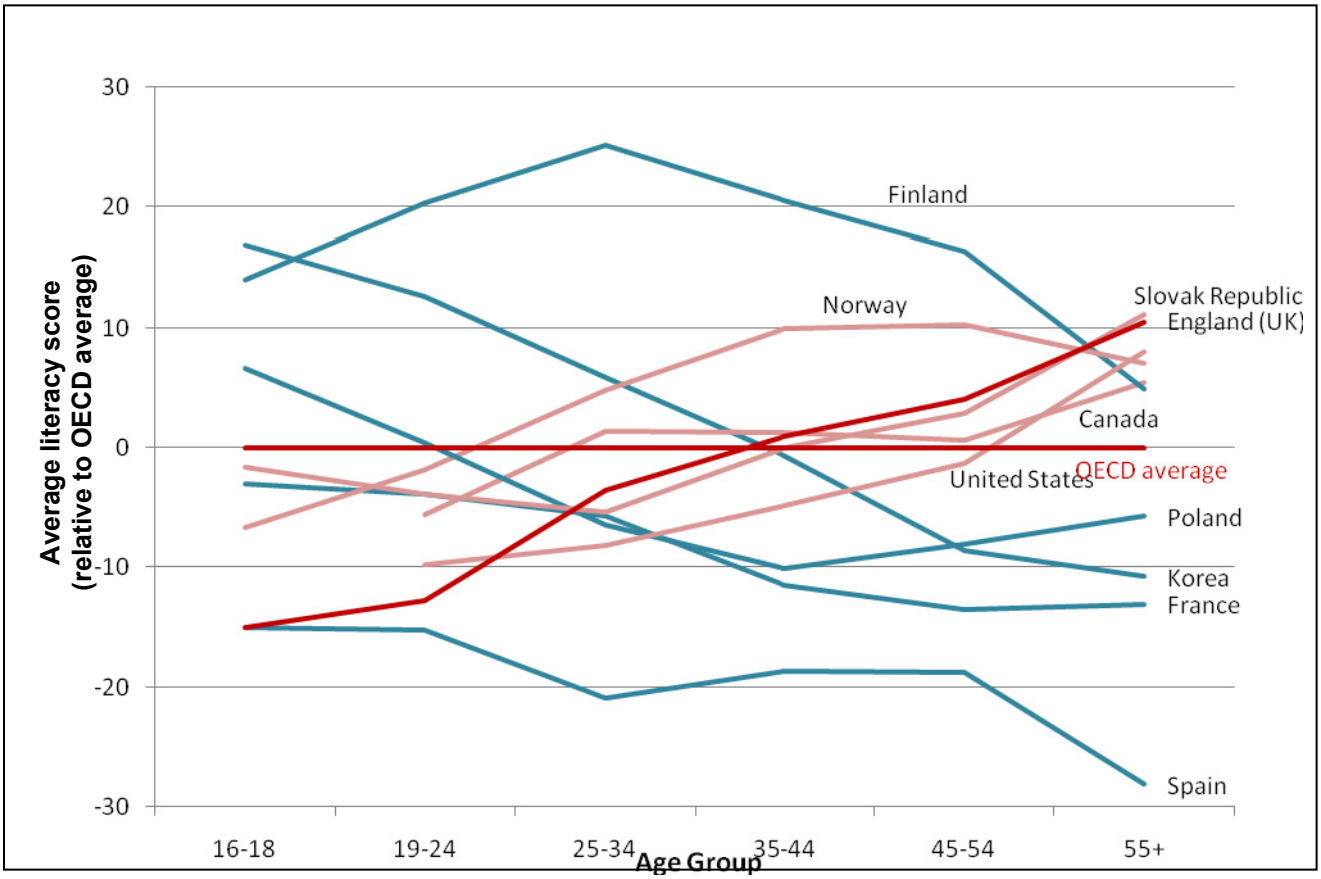
* Statistically significant at the 5 per cent level / m missing value
() Standard errors appear in parentheses

By considering rankings alone, the magnitude of differences between countries is disguised. For example, in the 19-24 age group for literacy, Japan and Finland are ranked first and second respectively, but their mean scores are both 302 (so the difference is less than one scale point), while the Netherlands and Korea are ranked third and fourth respectively and the difference between their scores is almost 5 points.

In order to see how countries' performance varies relative to each other (and relative to the average), each country's difference from the OECD average was plotted, separately for each of the three domains (see Figures 2.4 to 2.6). These figures show the extent to which adults within different age bands differ from the OECD mean. Many countries' performance is similar to the average, so only the more extreme patterns of performance are illustrated in the figures. Countries with blue lines indicate a decrease in mean scores with increasing age. Pink lines show the mean scores for countries which increase as age increases. The line for England is shown in red. (For details of all countries please refer to the Table 2.9.)

Looking at Figure 2.4 for literacy, Korea's 16-18 year olds have the highest score above the OECD average for that age band, and in each progressive age band, scores move closer to, and then become lower than, the OECD average. So over time, with younger generations, Koreans' scores are increasing while the older generations are below the OECD average. This pattern also occurs in Poland. Conversely, England's 16-18 year olds have the lowest score relative to the OECD average, and in each subsequent age band, scores move closer to and then become higher than the OECD average. So over time, with younger generations, England's scores are decreasing relative to the OECD average. This pattern is also apparent in the Slovak Republic, Canada and the United States and to a lesser extent in Norway, which had a significantly higher mean literacy score than England. In Finland, France and Spain the youngest adults perform better than the oldest but, whilst in Finland all age groups are consistently above the OECD mean, in France and Spain they are all consistently below it.

Figure 2.4 Literacy performance by age, relative to the OECD average



Source: PIAAC (2012)

2.5.2 Numeracy

Table 2.8 shows that in numeracy, around two thirds of adults in England performed at Levels 2 and 3. As with literacy, the highest achieving age groups, at Levels 4 and 5, were 25-34 year olds and 35-44 year olds. Those below 24 years and above 45 years had the highest proportions at Level 1 and below.

In England, the youngest adults (aged 16-18) scored an average of 6.0 score points less than the oldest (aged 55-65) but the difference was not statistically significant (see Table 2.10). The international average was 12.6 score points in favour of the youngest age group (16-18).

Internationally, the youngest adults performed significantly better than the oldest for numeracy in most countries. The differences in mean scores between youngest and oldest were not significant in the Czech Republic, Denmark, Japan, Norway, Sweden, England, Northern Ireland and the United States. All other countries showed a significant difference in favour of the younger age group. Most of these significant differences were of 15 score points or more, as shown in Table 2.10.

However, Table 2.10 shows that 16-18 year olds performed below 19-24 year olds in all countries (where this data was available) except Italy. When looking at the 10-year age bands, where 16-18 and 19-24 year olds' scores are combined, most countries

show a significant difference of 15 score points or more in favour of the younger age group (see Appendix B; B17).

The widest difference in numeracy scores between the youngest and oldest age bands was again found in Korea (47.5 score points), suggesting a significant improvement in adult numeracy skills over time.

The smallest difference between the numeracy scores of the oldest (55-65 years) and youngest (16-24 years) groups was found in Japan (2.4 score points), in favour of the youngest age group. This difference was not significant. All age groups in between performed better than both the oldest and the youngest in this country.

Table 2.10 Numeracy scores by age and international rankings[61]

	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65			Diff. in mean of youngest and oldest	Diff. in int. rankings of youngest and oldest
	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank		
Austria	m	m	m	279	(1.6)	10	282	(1.7)	10	281	(2.0)	9	274	(1.7)	9	257	(1.7)	11	-22*	1
Belgium	275	(3.2)	6	287	(2.1)	3	295	(1.9)	3	289	(1.8)	4	280	(1.9)	2	260	(1.6)	9	-15*	3
Canada	m	m	m	268	(1.5)	16	276	(1.4)	14	272	(1.5)	13	260	(1.4)	13	251	(1.4)	14	-17*	-2
Czech Republic	266	(3.2)	8	283	(1.9)	6	288	(1.8)	5	277	(1.8)	11	272	(2.2)	10	263	(2.0)	6	-3	-2
Denmark	263	(2.5)	11	280	(2.2)	9	287	(1.9)	7	290	(1.6)	3	277	(1.6)	6	265	(1.2)	3	3	-8
Estonia	269	(2.2)	7	283	(1.6)	7	284	(1.7)	9	275	(1.1)	12	269	(1.4)	11	259	(1.3)	10	-9*	3
Finland	276	(3.0)	4	290	(2.4)	1	302	(2.1)	1	292	(2.2)	2	279	(2.0)	4	260	(1.3)	8	-16*	4
France	259	(2.1)	13	266	(2.0)	17	269	(1.5)	16	262	(1.6)	17	246	(1.4)	20	234	(1.5)	19	-25*	6
Germany	m	m	m	275	(1.8)	13	282	(1.8)	11	279	(2.0)	10	268	(1.9)	12	256	(1.9)	13	-19*	0
Republic of Ireland	252	(3.2)	16	261	(3.1)	18	266	(1.7)	19	260	(1.7)	19	250	(2.1)	19	238	(2.3)	18	-14*	2
Italy	258	(3.8)	14	245	(3.4)	22	262	(2.3)	20	251	(1.9)	22	244	(2.0)	21	229	(2.2)	21	-29*	7
Japan	276	(3.6)	5	287	(2.6)	4	297	(1.6)	2	297	(1.3)	1	291	(1.7)	1	273	(1.6)	1	-2	-4
Korea	279	(2.5)	1	282	(2.3)	8	281	(1.4)	12	271	(1.5)	14	251	(1.4)	17	232	(1.7)	20	-47*	19
Netherlands	279	(2.5)	2	289	(2.3)	2	293	(1.8)	4	287	(2.1)	6	277	(1.7)	5	262	(1.7)	7	-17*	5
Norway	262	(3.1)	12	276	(2.4)	12	285	(2.0)	8	289	(1.9)	5	280	(1.7)	3	265	(1.7)	5	3	-7
Poland	264	(2.9)	9	271	(1.1)	14	270	(1.5)	15	262	(2.2)	18	254	(2.1)	15	244	(1.9)	17	-20*	8
Slovak Republic	276	(3.2)	3	279	(1.9)	11	279	(1.6)	13	281	(1.7)	8	275	(1.6)	8	265	(1.6)	4	-11*	1
Spain	250	(2.7)	18	258	(2.0)	20	257	(1.3)	22	255	(1.3)	21	242	(1.6)	22	221	(1.7)	22	-29*	4
Sweden	263	(3.6)	10	285	(2.2)	5	288	(2.0)	6	286	(2.0)	7	276	(2.3)	7	268	(1.7)	2	5	-8

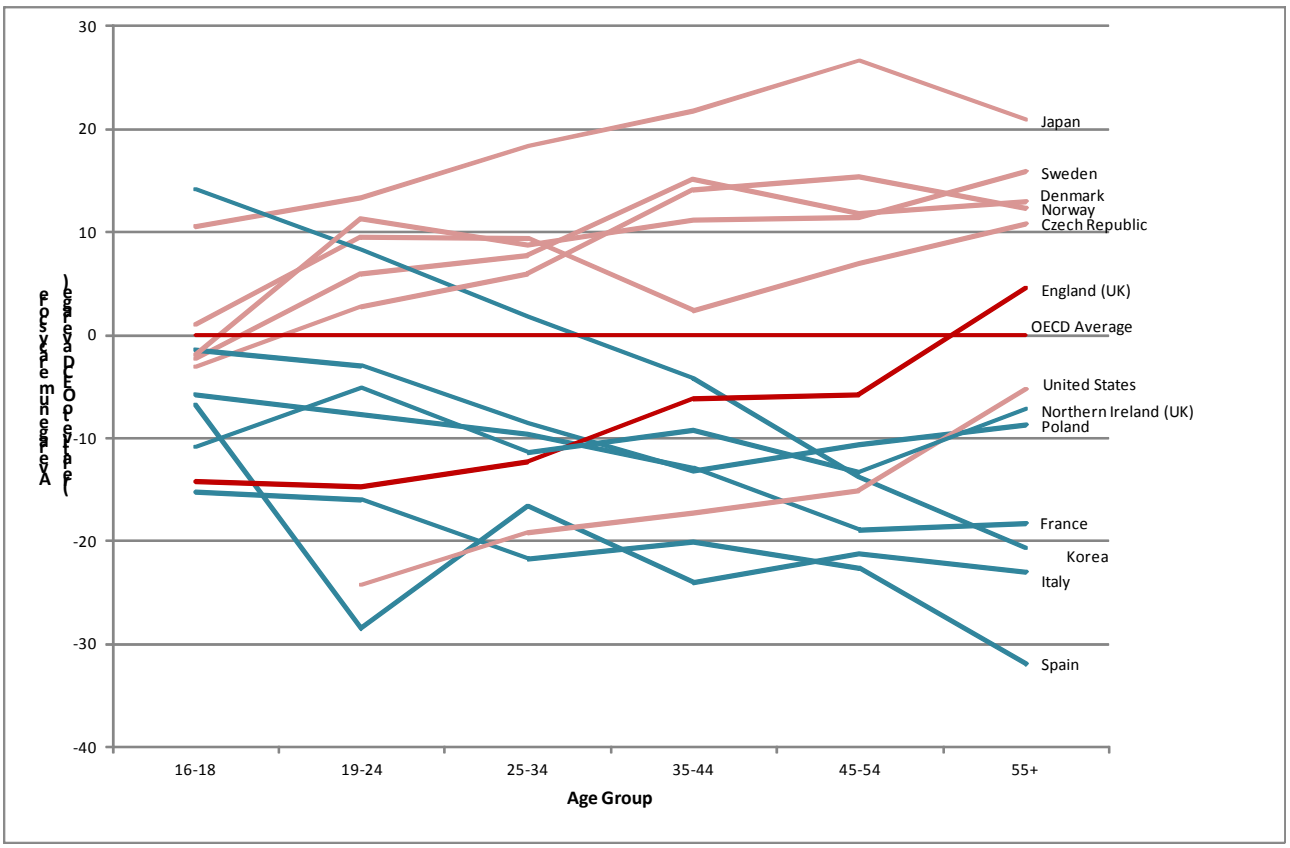
[61] Australia and Cyprus are not included in this analysis as significances were calculated in the IDB analyzer.

	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65			Diff. in mean of youngest and oldest	Diff. in int. rankings of youngest and oldest
	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank		
United States	m	m	m	249	(2.2)	21	260	(2.2)	21	258	(1.9)	20	250	(2.1)	18	247	(1.8)	15	-2	-6
England	251	(4.4)	17	259	(3.3)	19	267	(2.2)	18	269	(1.9)	15	259	(1.9)	14	257	(1.9)	12	6	-5
N. Ireland	254	(4.3)	15	269	(3.9)	15	268	(2.9)	17	266	(2.4)	16	252	(2.1)	16	245	(3.1)	16	-9	1
OECD Average	265	(0.7)		274	(0.5)		279	(0.4)		275	(0.4)		265	(0.4)		252	(0.4)		-13*	
England's difference from OECD Average	-14.2			-14.8			-12.3			-6.1			-5.8			+4.5				

* Statistically significant at the 5 per cent level / m missing value
() Standard errors appear in parentheses

Figure 2.5 shows the countries with the most extreme patterns of performance for numeracy, relative to the OECD average. As for literacy, Korea shows a clear increase in numeracy scores with each younger age group. The youngest age group perform above the OECD average and this decreases steadily with the three oldest age groups performing increasingly below the OECD average. Therefore, although Korea's average score in numeracy is not significantly different from England's, it is the younger generations that have comparatively strong scores whereas it is the adults approaching retirement that have the comparatively stronger scores in England. The pattern seen in Korea is also apparent to a lesser extent in France and Spain, although in both of these countries adults of all ages perform below the OECD average (although younger adults perform closer to the average than older adults).

Figure 2.5 Numeracy performance by age, relative to the OECD average



Source: PIAAC (2012)

England's numeracy results follow the same pattern as for literacy, whereby the youngest adults perform below the OECD average and scores increase with age. In contrast to literacy, only the oldest age group actually perform better than the OECD average. This indicates that younger adults are falling behind the OECD average. This pattern of older adults performing better than younger adults also occurred in Sweden, Denmark and Norway but in these countries only the youngest age group were below the OECD average and these countries all scored significantly higher than England overall. Japan and the United States also show decreasing numeracy levels in the younger age groups. In Japan, adults of all ages scored above the OECD mean, while all adults in the United States scored below the OECD average.

The pattern of decreasing numeracy skills in younger adults is therefore occurring in high scoring countries as well as in England, but these other countries are not falling so far below the OECD average as England. This may highlight a point of concern, as if this pattern continues in England, mean scores may fall further below the OECD average.

2.5.3 Problem solving in technology-rich environments

As discussed above, it must be borne in mind that not all adults in the sample took part in the problem solving assessments (see Appendix B; B9) and the figures presented in the following sections should be interpreted in this light.

Among those who took part in the problem solving assessments, the patterns across different age groups in England were different from those seen in literacy and numeracy. Table 2.8 shows that around three quarters of adults in England, at most age levels, performed at Levels 1 and 2, with 87 per cent of the youngest adults and 68 per cent of the oldest adults showing these mid-level problem solving skills.

A much higher proportion of adults aged 55-65 years scored Below Level 1 for problem solving than in other age groups, particularly the youngest group (16-18 years) who had the smallest proportion of participants Below Level 1. The oldest age group (55-65) had the smallest proportion of adults at Level 3, while adults aged 25-34 had the highest proportion at Level 3 (see Appendix B; B18).

In England, the youngest adults (aged 16-18) scored an average of 21.5 score points more than the oldest (aged 55-65); this was a significant difference (see Table 2.11).

Internationally, the youngest adults performed significantly better than the oldest for problem solving in every country. The smallest difference (16 points) was found in the Slovak Republic, and the biggest, in Poland (47 points).

Table 2.11 Problem solving scores by age and international rankings[62]

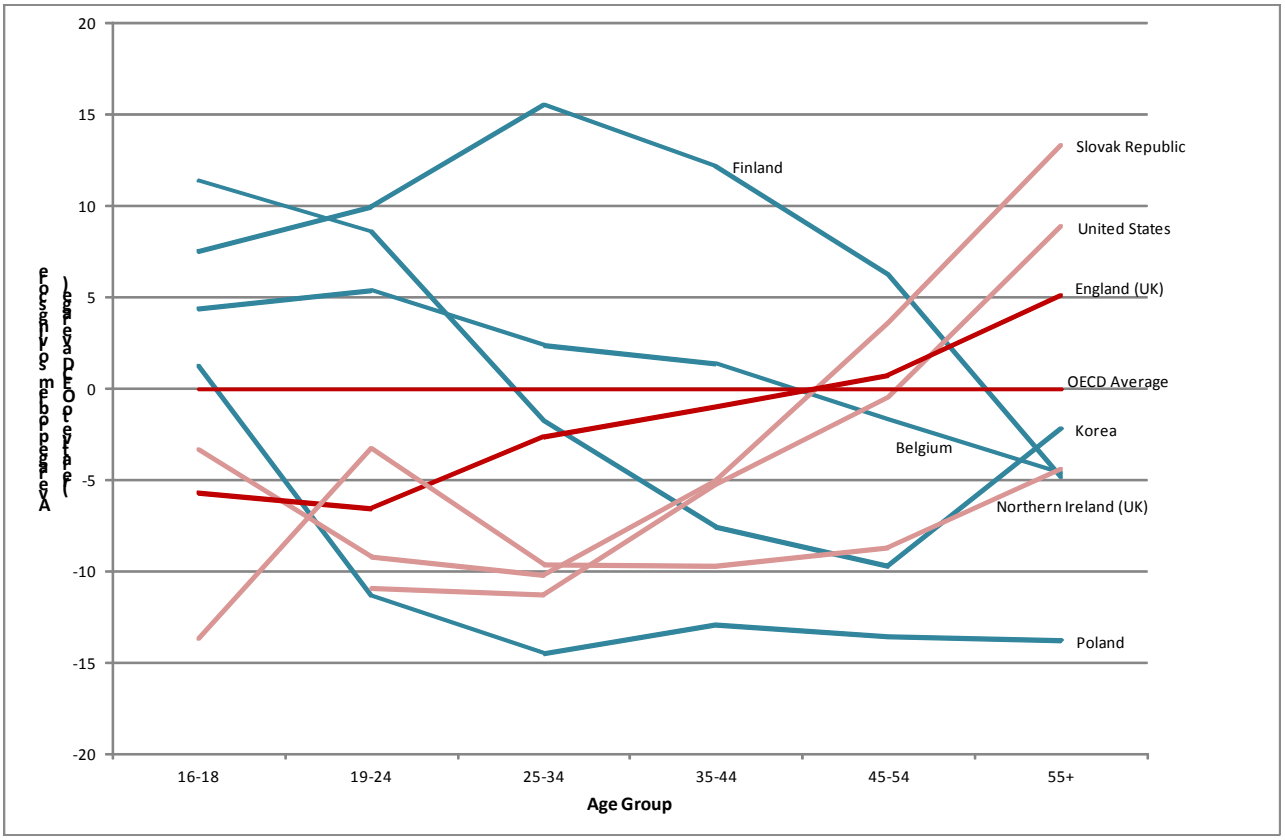
	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65plus			Diff. in mean of youngest and oldest	Diff. in int. rankings of youngest and oldest
	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank	Mean		Rank		
Austria	m	m	m	294	(1.4)	12	296	(1.6)	9	285	(1.6)	10	274	(1.5)	8	260	(1.8)	9	-35*	-3
Belgium	295	(2.4)	4	301	(2.0)	5	297	(1.6)	8	286	(1.6)	8	270	(1.6)	14	253	(2.1)	15	-41*	11
Canada	m	m	m	294	(1.4)	13	292	(1.5)	13	287	(1.4)	7	274	(1.3)	9	261	(1.4)	6	-33*	-7
Czech Republic	294	(4.3)	5	298	(2.2)	8	297	(1.7)	7	277	(2.5)	15	270	(2.6)	13	263	(2.8)	4	-31*	-1
Denmark	288	(2.2)	10	297	(2.0)	9	303	(1.5)	4	291	(1.3)	6	275	(1.6)	7	254	(1.4)	13	-33*	3
Estonia	288	(2.1)	9	296	(2.0)	10	289	(1.6)	14	275	(1.3)	17	259	(1.8)	18	249	(1.9)	18	-39*	9
Finland	298	(2.7)	3	306	(2.2)	2	310	(1.8)	1	296	(1.7)	2	277	(1.5)	4	253	(1.6)	16	-45*	13
Germany	m	m	m	295	(1.8)	11	296	(2.0)	10	285	(1.8)	9	273	(1.7)	10	260	(2.4)	8	-35*	-3
Republic of Ireland	282	(3.1)	14	288	(2.2)	16	285	(1.6)	16	275	(1.6)	16	266	(2.1)	15	251	(2.3)	17	-30*	3
Japan	298	(3.4)	2	301	(2.8)	6	310	(1.9)	2	302	(1.7)	1	282	(2.3)	1	262	(3.0)	5	-36*	3
Korea	302	(2.6)	1	305	(2.1)	3	293	(1.6)	11	277	(1.3)	14	261	(1.8)	17	256	(2.8)	12	-46*	11
Netherlands	294	(2.7)	6	303	(2.0)	4	301	(1.9)	6	293	(1.7)	4	278	(1.6)	3	261	(1.7)	7	-33*	1
Norway	287	(2.4)	11	301	(1.7)	7	302	(1.5)	5	293	(1.2)	5	277	(1.3)	5	259	(1.8)	11	-28*	0
Poland	291	(3.1)	7	285	(1.4)	19	280	(2.3)	19	271	(3.1)	19	258	(3.3)	19	244	(4.1)	19	-47*	12
Slovak Republic	287	(2.2)	12	287	(2.0)	17	284	(1.7)	17	279	(2.1)	12	275	(2.4)	6	271	(2.5)	1	-16*	-11
Sweden	289	(3.4)	8	308	(2.0)	1	305	(1.5)	3	294	(1.7)	3	278	(1.6)	2	259	(1.5)	10	-30*	2
United States	m	m	m	285	(2.2)	18	283	(2.0)	18	279	(2.2)	13	271	(1.7)	12	267	(2.5)	2	-18*	-16
England	285	(3.5)	13	289	(2.3)	15	292	(1.8)	12	283	(1.5)	11	272	(1.8)	11	263	(2.0)	3	-22*	-10

[62] Australia and Cyprus are not included in this analysis as significances were calculated in the IDB analyzer.

	Aged 16-18			Aged 19-24			Aged 25-34			Aged 35-44			Aged 45-54			Aged 55-65plus			Diff. in mean of youngest and oldest	Diff. in int. rankings of youngest and oldest
		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		
N. Ireland	277	(3.9)	15	293	(3.3)	14	285	(2.5)	15	275	(2.4)	18	263	(2.8)	16	253	(2.9)	14	-23*	-1
OECD Average	290	(0.8)		296	(0.5)		295	(0.4)		284	(0.4)		271	(0.5)		258	(0.5)		-32*	
England's difference from OECD Average	-5.7			-6.6			-2.6			-1.0			+0.7			+5.1				

* Statistically significant at the 5 per cent level
m Missing value
() Standard errors appear in parentheses

Figure 2.6 Problem solving performance by age, relative to the OECD average



Source: PIAAC (2012)

Figure 2.6 shows the most extreme patterns of performance for problem solving, split by age band.

Finland is one of the top scoring countries for problem solving (see Table 2.4). As shown in Figure 2.6, the pattern of performance in Finland is that, overall, scores are higher in the younger age groups than amongst older adults, with a peak at the 25-34 age band. The country with the biggest difference between the performance of youngest and all other age bands is Poland. All age groups perform below the OECD average with little variation, the exception being 16-18 year olds, whose problem solving scores exceed the OECD average. Although Poland had the lowest overall score on problem solving, Figure 2.6 suggests that problem solving skills are improving amongst younger generations.

England's performance, as in literacy and numeracy, is characterised by low scoring younger adults (the youngest four age bands scored below the OECD average) and higher scoring older adults, with the oldest groups (45 and over) performing above the OECD average. This pattern occurs in other countries, although at a less steady rate. For example, adults in the Slovak Republic score below the OECD mean at the youngest age group. Performance then dips further down for the next age group before making a marked progression to over ten points above the OECD mean for the oldest age group. In Northern Ireland, adults of all ages score below the OECD average with a peak in performance by 19-24 year olds, but showing an overall decline in scores as age decreases. In England, there is only a small difference in the performance of the two youngest age groups.

2.6 Adult skills and educational attainment

In order to compare the skills of adults who have similar qualifications in England with other participating countries, all qualifications are coded to the International Standard Classification of Education (ISCED)[63]. ISCED maps country-level qualifications onto ISCED levels based on information such as entry requirements, entry age and duration of the course in consultation with experts from each country.

Tables 2.12 and 2.13 compare the skill level of adults in England with the OECD average, by highest level of educational attainment. Due to the small percentages of adults achieving the highest levels, Levels 4 and 5 for literacy and for numeracy have been collapsed into one group.

Qualifications are split into three broad categories: 'below upper secondary', 'upper secondary' and 'tertiary'. Examples of adults in the below upper secondary group include those with no formal qualifications and those with lower level qualifications such as Entry Level qualifications, Basic Skills qualifications or fewer than five GCSEs. Adults with upper secondary qualifications include those with five or more GCSEs, BTEC level 2 or 3 qualifications, and A levels. Adults with tertiary level qualifications include those with a degree or BTEC level 4 or higher.

As expected, higher level qualifications are associated with better literacy, numeracy and problem solving performance. Almost one quarter of adults with a tertiary level qualification achieved Level 4 or 5 in literacy, compared with 11 per cent of adults with an upper secondary highest qualification and less than two per cent of those with lower than upper secondary qualifications. The pattern is similar for numeracy and problem solving.

The literacy performance of adults in England is generally similar to the OECD average for those qualified to upper secondary or tertiary levels of education. The group of adults with qualifications lower than upper secondary level tended to be less likely to achieve Level 3 or above in literacy compared with the OECD average (19 per cent of this group achieved Level 3 or above in England compared with 29 per cent across the OECD). There was a similar pattern, compared with literacy, in achievement for numeracy and problem solving among those adults with qualifications at levels lower than upper secondary education and also for numeracy amongst those adults with a tertiary level qualification.

The literacy skills of adults in England compared with those with similar highest qualification levels in other participating countries are shown in Appendix B; B19a to B21c.

[63] UNESCO (2012). *ISCED 1997 Mappings* [online]. Available: http://www.uis.unesco.org/Education/ISCEDMappings/Pages/default.aspx [25 September, 2013].

Table 2.12 Literacy and numeracy skill level by highest level of educational attainment

			Below Level 1 Per cent		At Level 1 Per cent		At Level 2 Per cent		At Level 3 Per cent		At Level 4/5 Per cent	
Literacy	**England**	Lower than upper secondary	8.6	(1.1)	24.9	(1.6)	41.6	(2.0)	17.4	(1.5)	1.9	(0.5)
		Upper secondary	2.1	(0.5)	11.7	(1.1)	35.9	(1.7)	39.8	(1.6)	10.5	(1.0)
		Tertiary	0.6	(0.3)	6.3	(0.8)	24.1	(1.3)	44.8	(1.8)	24.1	(1.6)
	OECD Average	Lower than upper secondary	8.7	(0.2)	23.0	(0.4)	39.6	(0.4)	24.9	(0.4)	3.5	(0.2)
		Upper secondary	2.1	(0.1)	11.7	(0.2)	37.9	(0.3)	39.7	(0.3)	8.6	(0.2)
		Tertiary	0.7	(0.1)	4.1	(0.1)	22.4	(0.3)	49.4	(0.4)	23.4	(0.3)
Numeracy	**England**	Lower than upper secondary	15.1	(1.5)	30.7	(1.9)	34.2	(1.7)	12.6	(1.4)	1.8	(0.6)
		Upper secondary	4.6	(0.6)	17.1	(1.2)	38.1	(1.7)	31.7	(1.8)	8.6	(1.1)
		Tertiary	1.9	(0.5)	9.5	(1.2)	27.5	(1.7)	40.0	(1.7)	21.1	(1.4)
	OECD Average	Lower than upper secondary	13.2	(0.3)	25.5	(0.4)	37.2	(0.4)	20.7	(0.3)	3.2	(0.2)
		Upper secondary	3.2	(0.1)	13.9	(0.2)	37.8	(0.3)	35.7	(0.3)	9.2	(0.2)
		Tertiary	1.0	(0.1)	5.2	(0.2)	23.5	(0.3)	45.1	(0.4)	25.2	(0.3)

Table 2.13 Problem solving skill level by highest level of educational attainment

			No experience/ failed core Per cent		Below Level 1 Per cent		Level 1 Per cent		Level 2 Per cent		Level 3 Per cent	
Problem solving	**England**	Lower than upper secondary	21.0	(1.3)	24.4	(1.7)	30.5	(1.8)	9.3	(1.1)	0.8	(0.4)
		Upper secondary	8.0	(0.7)	15.5	(1.3)	38.6	(1.5)	30.1	(1.5)	4.0	(0.8)
		Tertiary	4.1	(0.6)	8.0	(0.9)	31.0	(1.6)	42.5	(1.7)	11.0	(1.0)
	OECD Average	Lower than upper secondary	27.4	(0.3)	15.7	(0.3)	24.8	(0.4)	16.9	(0.3)	2.2	(0.2)
		Upper secondary	12.3	(0.2)	13.9	(0.2)	32.0	(0.3)	26.1	(0.3)	4.4	(0.1)
		Tertiary	4.2	(0.1)	7.7	(0.2)	30.0	(0.4)	41.0	(0.4)	10.8	(0.3)

Source: PIAAC (2012) International table: Table 3.10 (L, N, PS)
Notes: Lower than upper secondary includes ISCED 1, 2 and 3C short. Upper secondary education includes ISCED 3A, 3B, 3C long and 4. Tertiary includes ISCED 5A, 5B and 6. Where possible, foreign qualifications are included as per their closest correspondence to the respective national education systems.
() Standard errors appear in parentheses
Differences between England and the OECD average have not been tested for statistical significance.

2.7 Adult skills and employment status

The skills of adults in England were examined according to employment status. The comparisons below (Tables 2.14 to 2.16) are based on participants' self-allocation to categories which they thought best described their current employment status and show the proportion of adults at each proficiency level for literacy, numeracy and problem solving.

The adults in full-time employment were most likely to perform at the highest literacy levels (Levels 4 and 5); pupils and students, and adults in full-time employment were the top performers in the OECD, on average. This is unsurprising, as high levels of literacy are likely to be associated with higher levels of qualification which are in turn associated with finding employment. In England, the distributions across the levels of literacy of adults who are employed part-time, students or in training, and retired are similar – over half of these adults' literacy levels were Level 3 or above (between 54 per cent and 59 per cent), with between ten and 12 per cent achieving Level 4 or 5. This compares with 30 per cent of adults in the unemployed group achieving Level 3 or above and seven per cent achieving Level 4 or above. In terms of achievement, the group of adults who were fulfilling domestic tasks, such as looking after children or family, fall somewhere between the unemployed group and those who are studying, retired or in employment.

The distribution of proficiency levels for the group of adults who said that they would describe their current status in another way ('other') suggests that they are not a homogeneous group – a similar proportion performed at the highest levels (Level 4/5) compared with those who were in part-time employment, students or in training, and retired, but the distribution across the lower levels of literacy was higher compared with these groups. This is also the case to some extent for those who described themselves as permanently disabled, although very few of this group achieved the highest levels (one per cent achieved Level 4 or above).

Three groups had an average score that was significantly different from the OECD average. Two groups' average scores were significantly below the OECD average; these were those who were unemployed and those who were pupils or students. Most pupils and students will be young adults and therefore this is consistent with the low performance of the youngest adults, discussed in section 2.5. Those in retirement or early retirement had a higher average score compared with the OECD average; again this is consistent with the results discussed in section 2.5 for adults in the highest age band.

Table 2.14 Literacy levels by current employment status

	Mean		Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5	
Full-time employed (self-employed, employee)	281	(1.3)	2.2	(0.4)	10.3	(0.9)	30.8	(1.3)	39.7	(1.5)	15.8	(1.1)	1.1	(0.3)
OECD average	279	(0.2)	2.2	(0.1)	10.1	(0.2)	31.9	(0.3)	41.7	(0.3)	13.3	(0.2)	0.8	(0.1)
Part-time employed (self-employed, employee)	274	(1.9)	2.1	(0.8)	12.0	(1.6)	36.0	(2.3)	38.0	(2.3)	11.1	(1.5)	0.7	(0.4)
OECD average	272	(0.5)	2.9	(0.2)	12.5	(0.4)	35.5	(0.6)	38.5	(0.6)	10.0	(0.4)	0.6	(0.1)
Unemployed	251*	(3.1)	7.1	(2.0)	22.6	(3.2)	39.9	(4.1)	23.1	(2.6)	7.1	(1.8)	#	†
OECD average	258	(0.7)	6.0	(0.4)	18.6	(0.6)	38.0	(0.8)	30.3	(0.7)	6.8	(0.4)	0.4	(0.1)
Pupil, student	272*	(4.0)	2.8	(1.6)	14.9	(3.3)	32.0	(3.9)	38.8	(4.6)	10.9	(2.7)	0.6	(0.5)
OECD average	287	(0.5)	1.2	(0.1)	6.6	(0.3)	28.0	(0.6)	47.8	(0.6)	15.5	(0.5)	0.9	(0.1)
Apprentice, internship	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	266	(2.3)	1.9	(0.9)	16.5	(2.3)	39.7	(2.8)	33.3	(2.6)	8.3	(1.5)	0.4	(0.3)
In retirement or early retirement	272*	(3.0)	2.1	(0.8)	11.6	(2.5)	38.0	(3.6)	38.2	(4.1)	9.8	(2.1)	#	†
OECD average	253	(0.7)	5.6	(0.4)	19.7	(0.7)	41.8	(0.9)	28.5	(0.8)	4.2	(0.4)	0.1	(0.0)
Permanently disabled	225	(4.4)	18.0	(3.6)	30.7	(4.9)	34.5	(4.4)	15.4	(3.8)	1.2	(1.2)	#	†
OECD average	232	(1.2)	15.4	(0.9)	26.5	(1.2)	37.6	(1.3)	18.6	(1.0)	1.8	(0.3)	0.1	(0.1)
In compulsory military or community service	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	267	(3.0)	3.7	(1.5)	14.5	(2.8)	34.7	(3.7)	40.1	(3.8)	6.9	(2.2)	0.1	(0.2)
Fulfilling domestic tasks or looking after children/family	257	(3.4)	6.2	(1.6)	18.9	(3.0)	37.1	(3.4)	29.6	(2.9)	8.1	(2.2)	#	†
OECD average	259	(0.9)	7.2	(0.5)	17.4	(0.8)	35.7	(0.9)	31.2	(0.8)	8.0	(0.5)	0.6	(0.1)
Other	261	(6.1)	5.8	(2.7)	20.1	(6.3)	33.9	(7.3)	28.2	(6.1)	11.6	(4.3)	#	†
OECD average	264	(1.3)	5.3	(0.6)	15.9	(1.1)	36.6	(1.5)	32.6	(1.4)	8.9	(0.8)	0.7	(0.3)
Don't know	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	—	†	—	†	—	†	—	†	—	†	—	†	—	†

Source: PIAAC (2012) () Standard errors appear in parentheses

*The difference between England and OECD mean scores is statistically significant at the 5 per cent level. Differences between proportions at each level have not been tested for statistical significance.

Table 2.15 Numeracy levels by current employment status

	Mean		Below Level 1		Level 1		Level 2		Level 3		Level 4		Level 5	
Full-time employed (self-employed, employee)	273*	(1.4)	3.7	(0.5)	14.4	(1.1)	32.0	(1.6)	34.8	(1.6)	13.6	(1.2)	1.4	(0.3)
OECD average	278	(0.2)	3.0	(0.1)	11.1	(0.2)	31.4	(0.3)	38.4	(0.3)	14.6	(0.2)	1.5	(0.1)
Part-time employed (self-employed, employee)	261	(2.0)	4.7	(1.1)	17.6	(1.8)	38.5	(2.2)	30.5	(2.0)	8.2	(1.1)	#	†
OECD average	265	(0.5)	4.7	(0.3)	15.3	(0.5)	36.9	(0.7)	33.6	(0.6)	8.8	(0.3)	0.7	(0.1)
Unemployed	235*	(3.2)	14.5	(2.2)	28.2	(2.9)	33.3	(3.0)	18.6	(2.8)	5.1	(1.4)	#	†
OECD average	249	(0.8)	9.7	(0.5)	21.2	(0.7)	36.7	(0.8)	25.7	(0.7)	6.3	(0.4)	0.4	(0.1)
Pupil, student	264*	(4.2)	4.5	(2.0)	18.4	(3.2)	34.1	(5.0)	32.2	(5.2)	9.9	(2.5)	0.8	(0.9)
OECD average	279	(0.5)	2.4	(0.2)	10.1	(0.4)	31.4	(0.6)	41.1	(0.6)	13.9	(0.4)	1.1	(0.1)
Apprentice, internship	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	260	(2.6)	3.9	(1.2)	20.6	(2.4)	37.3	(3.0)	29.4	(2.7)	7.9	(1.4)	0.8	(0.5)
In retirement or early retirement	264*	(3.6)	4.8	(1.3)	17.8	(3.0)	36.3	(3.2)	29.0	(3.2)	11.3	(2.4)	0.8	(0.7)
OECD average	252	(0.8)	7.4	(0.4)	20.3	(0.7)	39.0	(0.8)	27.3	(0.8)	5.7	(0.4)	0.3	(0.1)
Permanently disabled	206*	(4.8)	30.0	(4.3)	31.4	(4.6)	27.5	(5.1)	10.4	(3.2)	0.6	(1.2)	#	†
OECD average	221	(1.3)	21.5	(1.0)	27.0	(1.2)	34.3	(1.3)	15.4	(1.0)	1.8	(0.4)	0.0	(0.1)
In compulsory military or community service	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	261	(3.8)	9.0	(2.3)	15.0	(3.0)	32.0	(3.6)	35.5	(3.9)	8.3	(2.3)	0.3	(0.5)
Fulfilling domestic tasks or looking after children/family	233*	(3.8)	16.5	(3.0)	25.2	(3.3)	35.8	(3.2)	18.0	(3.1)	4.6	(1.6)	#	†
OECD average	247	(1.0)	11.4	(0.6)	21.0	(0.8)	34.7	(0.9)	25.9	(0.9)	6.4	(0.5)	0.5	(0.1)
Other	246	(6.7)	10.8	(5.0)	28.1	(8.0)	29.6	(6.9)	22.5	(5.6)	8.4	(3.7)	#	†
OECD average	256	(1.4)	8.0	(0.7)	18.5	(1.2)	36.2	(1.5)	28.8	(1.3)	7.8	(0.8)	0.6	(0.2)
Don't know	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	—	†	—	†	—	†	—	†	—	†	—	†	—	†

Source PIAAC (2012)

— Not available
† Not applicable
# Figure is larger than zero but less than 0.5
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
() Standard errors appear in parentheses
*The difference between England and OECD mean scores is statistically significant at the 5 per cent level. Differences between proportions at each level have not been tested for statistical significance.

The pattern of performance in numeracy for each employment status group was similar to that of literacy, although for all groups there is much more clustering at the lower levels (below Level 3) of achievement than for literacy.

The pattern of performance was very different for problem solving. Table 2.16 below shows problem solving levels by current employment status.

Table 2.16 Problem solving levels by current employment status

	Mean		Below Level 1		Level 1		Level 2		Level 3	
Full-time employed (self-employed, employee)	286	(1.2)	15.1	(1.3)	37.4	(1.5)	38.5	(1.4)	9.0	(0.9)
OECD average	285	(0.3)	15.0	(0.2)	38.4	(0.3)	38.3	(0.3)	8.2	(0.2)
Part-time employed (self-employed, employee)	277	(1.9)	18.0	(1.8)	44.2	(2.6)	33.1	(2.8)	4.7	(1.3)
OECD average	279	(0.7)	18.6	(0.6)	41.4	(0.8)	33.9	(0.8)	6.1	(0.5)
Unemployed	267	(3.2)	26.1	(3.5)	45.7	(4.1)	25.1	(3.4)	3.2	(1.4)
OECD average	273	(0.9)	22.6	(0.9)	42.4	(1.1)	30.3	(1.1)	4.7	(0.5)
Pupil, student	293*	(3.1)	8.2	(2.7)	40.0	(4.9)	43.0	(4.2)	8.9	(2.5)
OECD average	301	(0.5)	5.8	(0.3)	31.9	(0.7)	49.8	(0.7)	12.5	(0.5)
Apprentice, internship	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	283	(2.7)	12.4	(2.4)	45.1	(3.5)	35.9	(3.2)	6.6	(1.8)
In retirement or early retirement	261	(3.3)	30.5	(4.5)	46.2	(4.4)	21.3	(2.9)	2.0	(1.8)
OECD average	254	(1.0)	36.6	(1.2)	45.6	(1.3)	16.8	(0.9)	1.0	(0.2)
Permanently disabled	245	(6.4)	51.9	(7.6)	33.1	(6.8)	14.4	(5.8)	0.5	(1.0)
OECD average	247	(1.9)	44.6	(2.4)	41.6	(2.5)	12.8	(1.6)	1.0	(0.4)
In compulsory military or community service	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	277	(4.1)	18.2	(4.9)	44.8	(6.3)	33.9	(5.3)	3.1	(1.9)
Fulfilling domestic tasks or looking after children/family	263*	(3.2)	29.3	(3.6)	46.8	(3.5)	22.9	(3.0)	1.0	(0.7)
OECD average	274	(1.0)	22.3	(1.0)	41.9	(1.2)	30.7	(1.1)	5.1	(0.5)
Other	278	(5.5)	22.6	(5.4)	34.8	(9.1)	36.4	(7.5)	6.3	(3.5)
OECD average	275	(1.5)	21.8	(1.5)	41.1	(2.0)	31.0	(1.9)	6.1	(0.9)
Don't know	‡	†	‡	†	‡	†	‡	†	‡	†
OECD average	—	†	—	†	—	†	—	†	—	†

Source: PIAAC (2012)
— Not available
† Not applicable
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
() Standard errors appear in parentheses
*The difference between England and OECD mean scores is statistically significant at the 5 per cent level. Differences between proportions at each level have not been tested for statistical significance.

In England, the strongest performers, both in terms of average score and the proportion of adults at Levels 2 and 3, on the problem solving assessment were adults still in some form of education or training (pupil, student), followed by those in full-time employment,

however, the average score of pupils and students was significantly below the OECD average. Those who classified themselves as 'other' were also strong performers, again suggesting that this is a diverse group of adults. The groups with the weakest problem solving skills were those who were permanently disabled, followed by those who were retired and those fulfilling domestic tasks or looking after children or family (this last group's average score was significantly below the OECD average). As discussed in section 2.5, performance in problem solving is related to age and it is therefore not surprising that retired people performed less well on this assessment.

2.8 Adult skills by self reported disability

To further explore adult skills in literacy, numeracy and problem solving in relation to disability, average scores by self reported disability were compared. All adults were asked whether their day-to-day activities were limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months. The question did not ask about specifics of the disability or illness. Seventeen per cent of adults answered *Yes* to this question; seven per cent said their activities were *limited a lot* and a further ten per cent said that their activities were *limited a little*.

Table 2.17 Average scores in literacy, numeracy and problem solving by self reported disability

	Literacy	Numeracy	Problem solving
Yes, limited a lot	242 (3.2)	224 (3.6)	257 (4.0)
Yes, limited a little	271 (2.9)	261 (3.0)	277 (3.6)
No	275 (1.2)	265 (1.2)	282 (0.9)

Source: PIAAC (2012)

() Standard errors appear in parentheses

In all three domains, the difference in mean scores between those who said they had a problem that *limited them a little* and those who had no problem was not large. Those who had a health problem or disability that *limited them a lot* had much lower scores in literacy and numeracy and lower scores in problem solving, although not so marked.

This question was asked only to participants in the UK and so international comparisons are not possible.

2.9 Adult skills, country of birth and language first spoken as a child

The international report identifies England and Northern Ireland combined as the UK as one of the countries with the highest mean scores for those not born in the country of testing. (The 'country of testing' for interviews carried out in England referred to England, Wales, Scotland and Northern Ireland.) Fifteen per cent of adults in England (equivalent to around five million adults aged 16-65) were born outside the UK and of those, five per cent have lived in the UK for less than five years. This is the sixth highest proportion of the population of participating countries and is similar to Sweden (18 per cent), Austria (16 per

cent), the United States (14 per cent), Germany (14 per cent), Spain (13 per cent) and Norway (13 per cent). England has the third highest proportion of foreign-born adults that have lived in the UK for less than five years with only Ireland and Canada having larger proportions of recent immigrants. (Data is missing for Australia which is likely to have a greater proportion then England.) (See Appendix B23 for further details for participating countries.)

Table 2.18 below presents the average scores of adults born in the UK and elsewhere for each of the domains.

Table 2.18 Average scores in literacy, numeracy and problem solving by place of birth (whether born in UK or not)

Born in country	Literacy		Numeracy		Problem solving	
Yes	276	(1.0)	266*	(1.0)	282*	(1.1)
OECD Average	276	(0.2)	272	(0.2)	285	(0.2)
No	255*	(3.4)	238	(3.6)	273	(2.9)
OECD Average	247	(0.7)	243	(0.8)	269	(0.9)

Source: PIAAC (2012)
() Standard errors appear in parentheses
* The difference between England and OECD mean scores is statistically significant at the 5 per cent level.

In common with the OECD average, adults born outside the country of testing (UK) had significantly lower scores than those born in the country of testing in all three domains, on average. However, as mentioned above, adults in England who were born outside the UK scored significantly above the OECD average in literacy and were not significantly different from the OECD average in numeracy and problem solving. Adults born in the UK scored significantly below the OECD average in numeracy and problem solving.

Table 2.19 Literacy levels in England by place of birth (whether born in UK or not)

Born in country	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
Yes	2.2 (0.3)	12.0 (0.7)	34.0 (1.1)	37.7 (1.1)	13.3 (0.8)	0.8 (0.2)
OECD Average	2.2 (0.1)	11.2 (0.1)	33.7 (0.2)	40.2 (0.2)	11.9 (0.1)	0.7 (0.0)
No	9.4 (1.7)	20.4 (2.2)	31.0 (2.8)	29.6 (2.7)	8.6 (1.7)	0.9 (0.4)
OECD Average	11.9 (0.4)	20.8 (0.6)	34.2 (0.8)	26.5 (0.7)	6.2 (0.4)	0.4 (0.1)

Source: PIAAC (2012)
() Standard errors appear in parentheses

Table 2.19 shows the proportions of adults born in the UK and those born elsewhere who achieved each literacy level. (See Appendix B24 for information on all participating

countries.) In England, a smaller proportion of adults who were not born in the UK tended to perform at the higher levels (and more performed at the lower levels) compared with adults born in the UK.

As well as country of birth, the language first spoken as a child is also an important indicator of achievement and adds more to the picture than country of birth alone. For instance, an adult who comes to the UK from another English speaking country will have a different experience compared with an adult who comes to the UK with little language proficiency or grows up in a household where English is not spoken.

Table 2.20 below presents the average scores of adults with English as a first language and those who first spoke another language compared with adults with similar backgrounds in OECD countries.

Table 2.20 Average scores in literacy, numeracy and problem solving by whether language first spoken as a child is the same as the language of the survey

Test language same as native language	Literacy		Numeracy		Problem solving	
Yes	276	(1.1)	265*	(1.1)	281*	(1.0)
OECD Average	276	(0.2)	272	(0.2)	285	(0.2)
No	248	(4.2	233	(4.4)	271	(3.0)
OECD Average	246	(0.8)	241	(1.0)	269	(1.1)

Source: PIAAC (2012)

() Standard errors appear in parentheses
*The difference between England and OECD mean scores is statistically significant at the 5 per cent level

In England, those who learned English first as a child had significantly higher scores than those who learned another language first. However, those who learned another language first performed similarly to adults with a similar background in other OECD countries.

Table 2.21 Average scores in literacy, numeracy and problem solving by whether language first spoken as a child is the same as the language of the survey

Test language same as native language	Below Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
Yes	2.4 (0.4)	12.3 (0.7)	33.6 (1.1)	37.6 (1.1)	13.3 (0.7)	0.8 (0.2)
OECD Average	2.3 (0.1)	11.3 (0.1)	33.7 (0.2)	40.1 (0.2)	11.9 (0.1)	0.7 (0.0)
No	11.4 (2.3)	20.8 (3.1)	33.6 (3.8)	26.9 (3.2)	6.7 (1.6)	0.6 (0.5)
OECD Average	12.3 (0.5)	21.0 (0.7)	34.4 (0.9)	26.0 (0.9)	6.1 (0.5)	0.3 (0.1)

Source: PIAAC (2012)
() Standard errors appear in parentheses

In addition, the interactions between the average scores for adults who were born in or outside the country of testing and who learned to speak the language of testing at home or another language at home are compared in Table 2.22 below.

Table 2.22 Average scores in literacy, numeracy and problem solving by interaction of country of birth and language first spoken as a child

		Literacy		Numeracy		Problem solving	
Native-born and native language	**England**	276	(1.1)	266*	(1.0)	282*	(1.1)
	OECD Average	276	(0.2)	272	(0.2)	285	(0.2)
Native-born and foreign language	**England**	265	(7.0)	250	(8.2)	280	(6.7)
	OECD Average	263	(1.3)	257	(1.5)	278	(1.5)
Foreign-born and native language	**England**	269	(4.2)	251*	(4.9)	277	(4.0)
	OECD Average	267	(1.1)	263	(1.2)	280	(1.2)
Foreign-born and foreign language	**England**	245	(4.4)	230	(1.1)	269	(3.5)
	OECD Average	240	(0.9)	237	(4.7)	263	(1.2)

Source: PIAAC (2012)

() Standard errors appear in parentheses
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level.

In England, only the literacy and problem solving scores of adults who were foreign born and learned a language other than English as a child were significantly lower than all other groups. This was different from the pattern found in the OECD on average in all domains, where all groups had significantly lower scores than those who were born in the country of testing and learned the language of the survey as a child. Adults in England matched this international pattern for numeracy.

The interactions in Table 2.23 show the distribution for each group in the literacy proficiency levels (see Appendix B25a to B25d for details of other participating countries).

Table 2.23 Interaction of country of birth and language first spoken as a child on literacy levels in England

		Below Level 1		At Level 1		At Level 2		At Level 3		At Level 4/5	
Native-born and native language	**England**	2.2	(0.3)	11.9	(0.7)	33.8	(1.2)	37.9	(1.1)	14.1	(0.8)
	OECD Average	2.2	(0.1)	11.1	(0.1)	33.6	(0.2)	40.4	(0.2)	12.7	(0.1)
Native-born and foreign language	**England**	c	(c)	c	(c)	c	(c)	c	(c)	c	(c)
	OECD Average	5.2	(0.7)	13.1	(1.2)	35.6	(1.9)	36.0	(1.8)	10.0	(1.0)
Foreign-born and native language	**England**	4.3	(1.8)	18.0	(3.0)	29.8	(3.4)	33.8	(3.4)	14.1	(3.2)
	OECD Average	5.0	(0.5)	15.9	(0.9)	34.8	(1.1)	34.0	(1.1)	10.3	(0.7)
Foreign-born and foreign language	**England**	12.8	(2.5)	21.9	(3.4)	32.0	(4.1)	26.8	(3.5)	6.6	(1.7)
	OECD Average	16.3	(0.6)	25.3	(0.8)	32.9	(0.8)	21.0	(0.7)	4.5	(0.3)

Source: PIAAC (2012) International Table: Table 3.16 (L)
c There are too few observations or no observation to provide reliable estimates (i.e. there are fewer than 30 individuals).
() Standard errors appear in parentheses.

2.10 Adult skills by ethnicity

The mean scores for each of the proficiency domains by ethnic group are shown in Table 2.24 below.

Table 2.24 Average scores in literacy, numeracy and problem solving by

Test language same as native language	Literacy		Numeracy		Problem solving	
White	276	(1.0)	266	(1.1)	282	(1.0)
Mixed race	277	(7.0)	251*	(7.5)	274	(7.8)
Asian or Asian British	244*	(4.6)	232*	(4.6)	273*	(3.4)
Black or Black British	242*	(5.0)	223*	(4.6)	260*	(5.0)
Other ethnic group	254*	(8.7)	238*	(8.6)	‡	†

Source: PIAAC (2012)
† Not applicable
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made) () Standard errors appear in parentheses
* The difference in average score compared with the average score for adults with White ethnicity is statistically significant at the 5 per cent level

Table 2.25 shows the distribution by proficiency level of adults' skills in literacy for each ethnic group.

Table 2.25 Literacy skills by ethnicity

Ethnicity	Below Level 1 (%)		Level 1 (%)		Level 2 (%)		Level 3 (%)		Level 4 (%)		Level 5 (%)	
White	2	(0.3)	12	(0.7)	33	(1.0)	38	(1.1)	14	(0.8)	1	(0.2)
Mixed race	3	(2.8)	10	(4.8)	35	(7.5)	37	(8.8)	14	(5.0)	2	(1.9)
Asian or Asian British	11	(2.6)	23	(3.3)	37	(3.8)	24	(3.2)	5	(1.5)	#	†
Black or Black British	9	(3.4)	28	(4.3)	39	(5.0)	20	(4.3)	3	(1.6)	1	(1.0)
Other ethnic group	6	(4.5)	23	(8.0)	36	(8.4)	29	(7.5)	5	(3.4)	#	†

Source: PIAAC (2012)
† Not applicable
# Figure is larger than zero but less than 0.5
() Standard errors appear in parentheses

In literacy and problem solving, adults with White or Mixed race ethnicity performed similarly. The groups Black/Black British or Asian/Asian British performed similarly to each other but are more clustered in the lower levels of literacy skills. This pattern is also evident when comparing numeracy skills (see Appendix B26), although those with Mixed race ethnicity were less likely to achieve the higher levels of numeracy compared with those with White ethnicity; and Asian/Asian British tend to outperform Black/Black British at the higher levels. The general performance for all groups is less strong in numeracy compared with literacy. A similar proportion of the Mixed race ethnic group achieved the highest levels in literacy and numeracy (Levels 4 or 5) but the proportions performing at the lower levels were not similar for this group.

The story for problem solving is different. Very small proportions of all group achieved Level 3. Those with Black/Black British ethnicity were least likely to achieve Level 2 or above whereas those with Asian/Asian British ethnicity were more comparable with the other ethnic groups. The distribution of problem solving skills by ethnicity is shown in Table 2.26 below.

Table 2.26 Problem solving skills by ethnicity

Ethnicity	Below Level 1 (%)		Level 1 (%)		Level 2 (%)		Level 3 (%)	
Asian or Asian British	24	(3.6)	40	(4.4)	31	(3.7)	5	(1.9)
Black or Black British	30	(5.6)	51	(6.2)	16	(4.6)	3	(1.9)
Mixed race	24	(7.2)	41	(7.7)	28	(6.3)	7	(4.0)
Other ethnic group	‡	†	‡	†	‡	†	‡	†
White	17	(1.1)	40	(1.4)	36	(1.2)	7	(0.6)

Source: PIAAC (2012)
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
† Not applicable
() Standard errors appear in parentheses

The demographic characteristics of adults have been considered in turn in this chapter. However, many characteristics are likely to be interrelated, for instance educational attainment and employment status. Chapter 5 explores the characteristics which predict low proficiency in literacy, numeracy and problem solving when other characteristics are considered simultaneously.

3. Adult skills and work in England

Key findings

Adult skills and industry

In England, adults who worked in the industry sector of information and communication had the highest average scores in literacy, numeracy and problem solving in the International Survey of Adult Skills. At the other end of the spectrum, adults working in transportation and storage had the lowest scores in all three domains.

The rank order of industry sector by each proficiency domain was fairly similar, with some small differences. For instance, comparatively, adults working in the manufacturing sector had slightly stronger skills on average in numeracy and problem solving than in literacy.

Adult skills and occupation

On average, adults working in professional occupations had the highest literacy, numeracy and problem solving skills – a similar pattern emerged for the OECD as a whole. This group includes science and engineering professionals, health professionals and teaching professionals, amongst others. This compares with adults working in elementary occupations who, on average, had the lowest scores in literacy and numeracy and low scores in problem solving.

Compared to the OECD averages, the literacy and problem solving performance of all occupational groups was similar to or above the OECD average for each occupational group. However, numeracy performance was significantly below the OECD average for four occupational groups and not significantly different for the remaining four. In all occupational groups, the distribution of performance by each level was similar or better in literacy compared with numeracy.

Adult skills and salary

There is a clear relationship between salary and skills in each proficiency domain, except for those adults earning the very lowest salaries. This pattern was found internationally and is likely to be due to this group containing over half of part-time workers.

Skills use in the workplace

The relationships between the skills that adults utilise as part of their job and the three proficiency domains were also considered. These skills were: influencing; cooperating; planning and organising; problem solving; ICT; literacy and numeracy; and learning at work.

For all these, more frequent use of skills was associated with higher average scores in literacy, numeracy and problem solving compared with adults using these skills infrequently, matching the OECD average pattern. This provides strong evidence on the importance of developing and assisting workers to build and utilise their skills in the workplace.

3.1 Introduction

This chapter looks in depth at the relationship between employment and literacy, numeracy and problem solving skills in England. The results reported in this chapter are based only on those adults who were in paid work (full and part-time) at the time of interview. As discussed in Chapter 2, adults in full-time employment were most likely to have higher literacy and numeracy skills. Adults in part-time employment also had better literacy and numeracy skills than their counterparts not in employment. The relationship between employment and problem solving was less straightforward, partly due to a strong inverse relationship between age and problem solving skills.

3.2 Adult skills and industry

Participants were asked about the industry they worked in. These responses were coded to national industry codes and then converted to the International Standard Industrial Classification of All Economic Activities (ISIC)[64]. The type of industry that people work in may determine the skill sets required and, as the proportion of employment by each industry sector changes over time, so the proportion of adults with specific skill sets will change. The literacy, numeracy and problem solving assessments in the International Survey of Adult Skills aim to reflect the types of skills required by countries at a time of decline in traditional manufacturing industries and increased use of technology at work.[65]

Table 3.1 shows the average scores in the three domains for each industry sector in England, compared with the OECD average.

Adults who worked in information and communication had the highest average scores in literacy, numeracy and problem solving. The rank order of industry sector by numeracy and problem solving was fairly similar to literacy, with some small variations. For instance, compared with adults working in other industries, adults working in the manufacturing sector have slightly stronger skills on average in numeracy and problem solving compared with literacy. These differences have not been tested for significance.

Adults working in transportation and storage had the lowest scores in literacy, numeracy and problem solving. Compared with the OECD average, respondents working in this area in England (six per cent of working adults), and those working in the wholesale and retail trade and in the repair of motor vehicles and motorcycles (13 per cent of working adults) scored significantly lower in literacy, numeracy and problem solving.

Apart from two exceptions, the performance of adults working in industries not mentioned above was not significantly different from the OECD average and, therefore, matched the profile of performance internationally. The exceptions were adults working in education, who had significantly lower average numeracy scores compared with the OECD average,

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[64] United Nations (2013). *International Standard Industrial Classification of All Economic Activities, Rev.4: Detailed Structure and Explanatory Notes* [online]. Available: http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27 [25 September, 2013].

[65] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

and adults working in financial and insurance industries, who had significantly higher problem solving skills compared with the OECD average.

Table 3.1 Average literacy, numeracy and problem solving scores by industry sector

		Literacy				Numeracy				Problem solving			
		Mean score		OECD average		Mean score		OECD average		Mean score		OECD average	
A	Agriculture, forestry and fishing	‡	†	260	(1.3)	‡	†	259	(1.5)	‡	†	268	(1.9)
B	Mining and quarrying	‡	†	283	(2.8)	‡	†	285	(3.4)	‡	†	294	(3.0)
C	Manufacturing	274	(3.6)	273	(0.5)	268	(3.8)	274	(0.6)	283	(2.9)	283	(0.6)
D	Electricity, gas, steam and air conditioning supply	‡	†	294	(7.1)	‡	†	295	(8.1)	‡	†	294	(8.4)
E	Water supply; sewerage, waste management and remediation activities	‡	†	279	(7.9)	‡	†	279	(8.8)	‡	†	276	(8.2)
F	Construction	272	(3.9)	265	(0.7)	269	(4.2)	268	(0.7)	279	(4.1)	273	(0.8)
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	269*	(2.4)	274	(0.5)	257*	(2.8)	272	(0.5)	276*	(2.6)	282	(0.6)
H	Transportation and storage	258*	(4.7)	270	(0.8)	250*	(5.1)	269	(0.9)	264*	(4.3)	276	(0.9)
I	Accommodation and food service activities	266	(4.9)	266	(1.0)	251	(4.7)	259	(1.0)	278	(4.2)	280	(1.1)
J	Information and communication	308	(4.2)	303	(0.9)	304	(4.8)	304	(1.0)	313	(4.1)	309	(1.0)
K	Financial and insurance activities	301	(4.1)	298	(0.9)	296	(5.2)	298	(1.0)	309*	(3.9)	298	(1.1)
L	Real estate activities	‡	†	279	(2.8)	‡	†	275	(2.9)	‡	†	280	(2.9)
M	Professional, scientific and technical activities	298	(3.5)	300	(0.7)	294	(3.8)	301	(0.8)	300	(3.5)	302	(0.9)
N	Administrative and support service activities	267	(4.9)	267	(1.0)	255	(6.0)	261	(1.1)	282	(4.6)	280	(1.3)
O	Public administration and defence; compulsory social security	293	(3.0)	290	(0.6)	281	(3.3)	287	(0.7)	295	(3.3)	291	(0.8)
P	Education	295	(3.1)	294	(0.6)	283*	(3.2)	290	(0.7)	291	(2.4)	291	(0.7)
Q	Human health and social work activities	276	(2.9)	276	(0.6)	263	(3.1)	269	(0.7)	272	(2.7)	277	(0.8)
R	Arts, entertainment and recreation	281	(5.7)	289	(1.6)	271	(6.5)	282	(1.7)	291	(4.9)	290	(1.6)
S	Other service activities	271	(7.4)	271	(1.2)	259	(7.1)	266	(1.3)	281	(5.0)	280	(1.5)
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	‡	†	235	(3.5)	‡	†	224	(4.0)	‡	†	269	(7.5)

Source: PIAAC (2012)
† Not applicable
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.3 Adult skills and occupation

Participants' occupations were coded to national occupation codes and then recoded to the International Standard Classification of Occupations (ISCO)[66], revised in 2008. ISCO is a hierarchical framework for coding of occupation and classifies jobs based on the skill level and skill specialisation required for jobs. Consequently, the entry qualifications for occupations further up the hierarchy are generally higher than for occupations with a lower classification. For the purposes of comparison, occupation is compared using the major groups as defined by the classification system in Tables 3.2 to 3.4 below; these show the average scores and distribution of proficiency levels by occupation for each domain, both for England and the OECD average.

On average, adults working in professional occupations had the highest literacy, numeracy and problem solving skills, and these scores were significantly above the OECD average for literacy and problem solving. This group includes science and engineering professionals, health professionals and teaching professionals, among others. Eighty per cent of adults in this group achieved Level 3 or above in literacy; almost three-quarters Level 3 or above in numeracy; and 70 per cent Level 2 or above in problem solving. This contrasts with those adults working in elementary occupations who, on average, had the lowest scores in literacy and numeracy and low scores in problem solving. In numeracy, their mean score was significantly below the OECD average. Three-quarters of adults in this group achieved Level 2 or below in literacy; 80 per cent Level 2 or below in numeracy; and more than three-quarters Level 1 or below in problem solving. The numeracy scores for plant and machine operators and assemblers, a similarly low scoring group, were also significantly lower than the OECD average.

Compared with the OECD averages, the literacy performance of each occupational group was similar to or above the OECD average (professionals and craft and related trades workers had significantly higher scores in England compared with the OECD average). The numeracy performance of four occupational groups (clerks; service workers and shop and market sales workers; plant and machine operators and assemblers; elementary occupations) were significantly below the OECD averages and all other occupations were not significantly different. In all occupational groups, the distribution of performance by each level was similar or better in literacy compared with numeracy. Problem solving skills were similar to the OECD average, except for professionals, whose problem solving skills were significantly above the OECD average.

The overall pattern of performance between occupations in England was similar to the profile of performance internationally. Therefore, on average, the skills of adults in England fit the structure of the ISCO framework similarly to other OECD countries.

[66] International Labour Organization (2012). *International Standard Classification of Occupations: ISCO-08.*, Geneva: ILO [online]. Available: http://www.ilo.org/public/english/bureau/stat/isco/isco08/ [27 September, 2013].

Table 3.2 Average literacy score and distribution of proficiency levels by occupation

	Below Level 1 (%)		Level 1 (%)		Level 2 (%)		Level 3 (%)		Level 4 (%)		Level 5 (%)		Mean score		OECD average	
Armed forces	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	307	(16.7)
Legislators, senior officials and managers	1	(1.6)	6	(1.6)	21	(2.6)	48	(3.3)	22	(2.6)	2	(1.0)	296	(2.8)	293	(0.7)
Professionals	#	†	3	(0.9)	17	(2.0)	47	(2.8)	30	(2.8)	3	(1.0)	307*	(2.2)	301	(0.4)
Technicians and associate professionals	1	(0.8)	5	(1.6)	28	(3.1)	46	(2.9)	20	(2.8)	1	(0.8)	291	(2.4)	288	(0.4)
Clerks	#	†	8	(1.7)	32	(3.3)	47	(3.3)	12	(2.4)	1	(0.5)	283	(2.5)	282	(0.6)
Service workers and shop and market sales workers	3	(1.0)	15	(2.0)	39	(2.5)	34	(2.4)	9	(1.6)	#	†	266	(2.4)	269	(0.4)
Skilled agricultural and fishery workers	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	‡	†	260	(1.4)
Craft and related trades workers	1	(0.8)	11	(2.9)	41	(4.4)	37	(4.3)	9	(2.3)	1	(0.5)	272*	(3.1)	263	(0.5)
Plant and machine operators and assemblers	6	(2.3)	19	(3.8)	44	(4.8)	28	(4.4)	4	(1.8)	#	†	253	(3.5)	257	(0.7)
Elementary occupations	7	(2.0)	24	(3.4)	44	(4.1)	22	(2.8)	3	(1.4)	#	†	245	(3.1)	249	(0.8)

Source: PIAAC (2012)
† Not applicable
# Figure is larger than zero but less than 0.5
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Table 3.3 Average numeracy score and distribution of proficiency levels by occupation

	Below Level 1 (%)	Level 1 (%)	Level 2 (%)	Level 3 (%)	Level 4 (%)	Level 5 (%)	Mean score	OECD average
Armed forces	‡ †	‡ †	‡ †	‡ †	‡ †	‡ †	‡ †	308 (18.6)
Legislators, senior officials and managers	2 (1.0)	8 (2.0)	24 (2.5)	43 (3.2)	20 (2.6)	2 (1.0)	290 (3.1)	296 (0.7)
Professionals	1 (0.5)	4 (1.2)	21 (2.5)	45 (3.1)	26 (2.9)	3 (1.0)	302 (2.3)	301 (0.4)
Technicians and associate professionals	1 (0.6)	10 (1.9)	30 (3.2)	41 (3.2)	15 (2.6)	2 (1.2)	283 (3.0)	287 (0.5)
Clerks	1 (0.8)	13 (2.9)	42 (3.6)	34 (3.2)	9 (1.8)	1 (0.6)	271* (2.6)	277 (0.6)
Service workers and shop and market sales workers	6 (1.2)	23 (2.2)	40 (2.7)	25 (2.7)	6 (1.4)	# †	252* (2.7)	262 (0.5)
Skilled agricultural and fishery workers	‡ †	‡ †	‡ †	‡ †	‡ †	‡ †	‡ †	258 (1.5)
Craft and related trades workers	2 (0.9)	14 (3.6)	41 (5.2)	33 (5.0)	10 (2.7)	1 (0.7)	270 (3.0)	264 (0.6)
Plant and machine operators and assemblers	9 (2.5)	25 (25.3)	38 (4.3)	24 (4.0)	4 (2.7)	1 (0.6)	246* (4.1)	256 (0.8)
Elementary occupations	14 (2.8)	31 (43.1)	35 (3.9)	18 (2.8)	3 (1.4)	# †	231* (3.7)	241 (0.8)

Source: PIAAC (2012)
† Not applicable
# Figure is larger than zero but less than 0.5
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Table 3.4 Average problem solving score and distribution of proficiency levels by occupation

	Below Level 1 (%)		Level 1 (%)		Level 2 (%)		Level 3 (%)		Mean score		OECD average	
Armed forces	‡	†	‡	†	‡	†	‡	†	‡	†	—	†
Legislators, senior officials and managers	9	(1.9)	30	(3.1)	49	(3.0)	13	(2.4)	299	(2.7)	294	(0.8)
Professionals	5	(1.1)	26	(2.4)	54	(2.7)	16	(2.2)	306*	(2.0)	300	(0.5)
Technicians and associate professionals	11	(2.1)	34	(3.6)	43	(3.8)	12	(2.4)	294	(2.5)	291	(0.5)
Clerks	10	(2.0)	44	(3.2)	40	(3.3)	6	(1.9)	286	(2.4)	285	(0.7)
Service workers and shop and market sales workers	22	(2.6)	46	(2.7)	29	(2.3)	3	(0.9)	272	(2.2)	275	(0.5)
Skilled agricultural and fishery workers	‡	†	‡	†	‡	†	‡	†	‡	†	263	(2.5)
Craft and related trades workers	20	(4.1)	45	(4.1)	30	(4.7)	5	(2.3)	275	(3.7)	272	(0.7)
Plant and machine operators and assemblers	30	(5.7)	52	(5.8)	18	(4.6)	1	(0.9)	259	(4.1)	266	(0.9)
Elementary occupations	31	(4.0)	46	(4.4)	22	(3.3)	1	(1.1)	260	(3.2)	265	(1.0)

Source: PIAAC (2012)
† Not applicable
# Figure is larger than zero but less than 0.5
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.4 Adult skills and salary

The background questionnaire collected information about participants' salaries. Sensitive questions such as this often have poor response rates as adults choose not to answer. To try and overcome this problem, the question was asked in two ways: firstly respondents were asked for their actual salary by day, week, month or year; if a participant was not happy to give this information, a follow up question asked if they would be happy to give an indication of the salary band they fell into. The response rate to questions about earnings for England and Northern Ireland together met the international standard of 85 per cent.

Table 3.5 shows the average proficiency in each domain by salary band deciles in England compared with the OECD average. The deciles were constructed at a national level so that comparisons could be made between countries with different average earnings. Consequently, the actual salaries that the deciles equate to will be different for each participating country.

Table 3.5 Average literacy, numeracy and problem solving scores by monthly salary in deciles

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
1st (highest) decile	311* (2.9)	301 (0.6)	308 (2.8)	306 (0.6)	312* (2.5)	300 (0.6)
2nd decile	298 (3.3)	295 (0.5)	293 (3.6)	298 (0.6)	296 (2.9)	295 (0.6)
3rd decile	288 (3.2)	288 (0.6)	283 (3.5)	289 (0.6)	290 (3.5)	290 (0.7)
4th decile	285 (3.2)	284 (0.6)	277* (3.1)	283 (0.6)	288 (3.0)	287 (0.7)
5th decile	278 (3.4)	279 (0.6)	270* (3.1)	277 (0.6)	280 (3.1)	283 (0.7)
6th decile	271 (3.2)	274 (0.6)	264 (3.7)	270 (0.6)	278 (3.1)	279 (0.7)
7th decile	265 (3.0)	269 (0.6)	255* (3.2)	263 (0.6)	273 (3.1)	276 (0.8)
8th decile	256* (3.7)	265 (0.6)	239* (4.2)	258 (0.7)	270 (3.3)	273 (0.8)
9th decile	270 (2.8)	267 (0.6)	253 (3.2)	259 (0.7)	276 (2.7)	274 (0.8)
10th (lowest) decile	270 (3.3)	272 (0.7)	258* (4.3)	267 (0.7)	279 (3.1)	284 (0.8)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Between the first and eighth deciles, there is a clear relationship between salary and literacy, numeracy and problem solving skills, with the most highly skilled adults in literacy, numeracy and problem solving seemingly rewarded with the highest rates of pay. However, in England adults with the lowest monthly salaries (9th and 10th deciles) on average perform more similarly to those in the 6th decile in all domains. The OECD average follows a similar pattern. This may be due to the effect of part-time workers (56 per cent of part-time workers are in the 9th and 10th deciles), a proportion of whom may also be working part-time whilst in education. Questions about earnings were not asked of adults who were no longer part of the labour force or who had never had paid work.

Very few scores were significantly different from the OECD average. The exceptions were the highest earners, whose scores in literacy and problem solving were significantly higher than the OECD average. The lowest performing group (the eighth decile) also scored significantly lower than the OECD average in literacy and numeracy. In numeracy, the 4th, 5th, 7th and lowest deciles were also all significantly below the OECD averages.

3.5 Skills use in the workplace

Jobs in different industry sectors and with different levels of responsibility may nevertheless require the same skills. This section explores some of the skills that adults use at work, depending on their job. The skills explored are influencing; cooperating; planning and organising; problem solving; ICT; literacy and numeracy; and learning at work. Aspects of literacy, numeracy and ICT skills that adults may use in their everyday lives are explored in more detail in Chapter 4.

Participants were asked how often they carried out elements of each skill at work. Where responses from more than one question were combined with related questions, indices were produced. Each skill index provides a measure of how often the tasks making up the index were carried out by a participant. Respondents who answered 'Never' to all questions in the index appear in an 'All zero response' category. The remaining respondents' answers to the questions were analysed using Item Response Theory (IRT) to produce the index. Internationally, these participants were grouped into quintiles which give an indication of how often they perform these tasks. For instance, participants who fall in the lowest 20 per cent on the index internationally will tend to perform some or all of the tasks infrequently, whereas participants who fall in the 'more than 80 per cent' group will frequently perform many of the tasks. Further details about how the indices are created are described in Chapter 4 of the international report[67], volume II of the international report[68] and Chapter 20 of the international technical report[69].

3.5.1 Influencing skills

The index of use of influencing skills at work comprises responses to questions about how often respondents' jobs involved instructing, training or teaching people; making presentations or giving speeches in front of at least five people; advising people; planning activities of others; persuading or influencing people; and negotiating with people. Influencing skills are, therefore, required for a wide range of occupations including, for example, teachers, sales personnel, social workers or chief executives of organisations.

Table 3.6 shows average literacy, numeracy and problem solving scores by how often adults reported using influencing skills at work, compared with the OECD average.

On average, the more time participants reported using influencing skills, the higher their literacy, numeracy and problem solving scores. This was the case for England and also internationally.

In numeracy, the mean scores of participants in all but one of the six ranges of frequency of using influencing skills were significantly lower than the OECD average. Numeracy skills in England were, therefore, in general lower than the OECD average regardless of how often influencing skills were used. In addition, these results highlight England's overall poor performance in numeracy compared with OECD countries on average.

[67] OECD (2013a, forthcoming). OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1). Paris: OECD Publishing.

[68] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing.

[69] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing.

Table 3.6 Average literacy, numeracy and problem solving scores by how often influencing skills are used at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
All zero response	246 (3.8)	253 (0.7)	230* (4.6)	246 (0.7)	266 (3.4)	272 (0.8)
Lowest to 20%	262 (2.7)	265 (0.4)	253* (3.1)	261 (0.5)	272 (2.8)	276 (0.6)
More than 20% to 40%	277 (2.5)	277 (0.4)	270 (2.7)	275 (0.5)	280 (2.5)	284 (0.5)
More than 40% to 60%	277* (2.3)	282 (0.4)	268* (2.4)	280 (0.4)	282* (2.3)	287 (0.5)
More than 60% to 80%	288 (2.2)	288 (0.4)	280* (2.3)	287 (0.4)	291 (2.3)	291 (0.5)
More than 80%	291 (1.9)	289 (0.4)	282* (2.5)	289 (0.5)	293 (2.6)	290 (0.5)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.5.2 Cooperating skills

Adults were asked about the amount of time they spent cooperating or collaborating with colleagues. The proportion of time spent cooperating as part of a job will depend very much on whether an adult is expected to work independently or as part of a team. Table 3.7 shows the mean literacy, numeracy and problem solving scores in England by the proportion of time adults spend cooperating as part of their job, compared with the OECD average.

The relationship between time spent cooperating and average skill score is the same across the three domains – there is a general increase in mean score as the proportion of time spent cooperating at work increases, up to those who report spending more than half of their time using this skill. However, this is not true for those who report that they cooperate all of the time – mean scores here are consistently lower than those who cooperate less frequently (with the exception of those who never use cooperation skills). This is also found internationally and may be because when an adult feels that they cooperate all of the time in their job, they are receiving constant direction from other colleagues and have less autonomy. That is, a job in which someone is expected to cooperate all of their time may be very prescriptive and, therefore, tend to fall in the lower classification occupation levels as described in section 3.3 above.

Similar to the index for influencing skills at work, numeracy scores were below the OECD average for three of the five groups, reflecting England's lower scores in numeracy overall.

Table 3.7 Average literacy, numeracy and problem scores by the proportion of time spent cooperating at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
None of the time	258 (4.9)	263 (0.7)	246* (6.0)	259 (0.7)	267 (4.3)	274 (0.8)
Up to a quarter of the time	282 (2.2)	285 (0.4)	275* (2.4)	285 (0.4)	289 (2.1)	290 (0.5)
Up to half of the time	286 (2.8)	285 (0.5)	275* (3.1)	283 (0.6)	290 (2.5)	291 (0.6)
More than half of the time	293* (2.1)	286 (0.5)	284 (2.1)	284 (0.5)	297 (1.7)	292* (0.5)
All of the time	271 (1.6)	268 (0.3)	261 (1.7)	263 (0.4)	278 (1.9)	277 (0.4)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.5.3 Planning and organising skills

The index of planning and organisational skills comprised questions asking how often respondents' jobs involved planning their own activities, planning the activities of others and organising their own time. Table 3.8 shows the average literacy, numeracy and problem solving scores by how often adults reported using planning and organising skills at work, compared with the OECD average. The pattern for all three skills areas is similar to that for cooperating at work (section 3.5.4) – there is a positive relationship between increased use of planning and organisation skills and scale scores in each domain, except for the group which carries out these tasks the most. This is similar to the pattern found internationally. Numeracy scores continue to be significantly lower than the OECD average in most groups.

Table 3.8 Average literacy, numeracy and problem scores by how often planning and organising skills are used at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
All zero response	250 (3.2)	256 (0.6)	237* (4.0)	250 (0.7)	266* (2.8)	273 (0.8)
Lowest to 20%	265 (2.6)	270 (0.5)	255* (2.8)	265 (0.5)	275 (2.6)	280 (0.6)
More than 20% to 40%	278 (2.7)	279 (0.4)	269* (2.8)	276 (0.5)	285 (2.9)	286 (0.5)
More than 40% to 60%	279 (2.1)	275 (0.4)	268* (2.5)	273 (0.5)	281 (2.3)	281 (0.5)
More than 60% to 80%	297* (2.2)	292 (0.4)	289 (2.3)	291 (0.5)	299* (2.0)	295 (0.5)
More than 80%	285 (2.0)	282 (0.5)	277* (2.2)	282 (0.5)	287 (2.3)	284 (0.6)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.5.4 Problem solving skills

Participants were asked how often they were required to deal with simple or complex problem solving tasks at work. Table 3.9 shows the average scores for each domain by the frequency with which adults reported solving these types of problems, compared with the OECD average. A simple problem solving task was defined as one that could be solved in five minutes. A complex problem solving task was defined as one for which a solution takes more than 30 minutes to find, but not necessarily acted upon in that time. The more often participants reported solving simple problems at work, the higher their mean literacy, numeracy and problem solving in technology-rich environments scores. This was also the case across the OECD countries. Similarly, adults who reported solving complex problems less than once a month or never had lower scores in each domain than those who solved complex problems more often. However, compared with the frequency of solving simple problems at work, there was less difference between adults who solved complex problems at least once a month and those who solved complex problems more frequently.

Table 3.9 Average literacy, numeracy and problem solving scores by how often simple and complex problems are solved at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
Simple problem solving skills						
Every day	286 (1.5)	285 (0.3)	278* (1.6)	284 (0.3)	289 (1.3)	289 (0.3)
At least once a week but not every day	280 (2.2)	281 (0.3)	271* (2.2)	278 (0.4)	284 (2.1)	287 (0.4)
Less than once a week but at least once a month	274 (3.2)	272 (0.6)	264 (3.6)	270 (0.6)	280 (3.0)	281 (0.7)
Less than once a month	256 (3.2)	262 (0.6)	244* (3.7)	258 (0.6)	269 (3.2)	271 (0.7)
Never	243 (4.6)	248 (0.8)	228* (5.1)	242 (0.9)	265 (4.2)	266 (0.9)
Complex problem solving skills						
Every day	288 (2.6)	285 (0.6)	282 (2.7)	285 (0.7)	289 (2.6)	292 (0.7)
At least once a week but not every day	290 (1.8)	289 (0.3)	281* (1.8)	288 (0.4)	293 (1.6)	292 (0.4)
Less than once a week but at least once a month	284 (2.1)	285 (0.4)	276* (2.3)	284 (0.4)	292 (2.2)	290 (0.5)
Less than once a month	273 (2.5)	274 (0.4)	265* (2.6)	271 (0.4)	275 (2.5)	279 (0.5)
Never	253* (2.4)	258 (0.4)	239* (2.6)	252 (0.4)	266* (2.2)	272 (0.5)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.5.5 ICT skills

In order to find out about familiarity with ICT, adults were asked about ICT usage at work. They were asked how often they used email, used the internet for work-related purposes, conducted transactions on the internet, used spreadsheets, used a word processor, and used the internet to take part in real-time discussions. These questions were combined to give an index of ICT skills. Table 3.10 shows the average scores in each domain by ICT skill use at work compared with the OECD average. Chapter 4 includes an analysis of ICT skills that adults use in their everyday lives.

On average, the more participants reported using ICT at work, the higher their scores in problem solving. Increased familiarity with the applications used in the problem solving assessment appears to be a good indicator of success in this domain, although this relationship plateaus between the groups that use ICT skills the most frequently. This pattern was also the case for literacy and numeracy, except for those who said that they used ICT the most at work. Similar patterns were also found in other OECD countries.

Comparing differences between mean scores in England with the OECD average, adults who used computers the least frequently at work (either never, or who were in the lowest 20 per cent of use internationally) had significantly lower scores in literacy and numeracy. This was not the case for problem solving, although as discussed in Chapter 2, only adults with computer experience had scores for the problem solving assessment. (Adults with little or no computer experience had scores for only literacy and numeracy.)

Table 3.10 Average literacy, numeracy and problem solving scores by ICT use at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
All zero response	253* (4.9)	264 (0.8)	240* (4.8)	259 (0.9)	261 (4.7)	271 (1.0)
Lowest to 20%	265* (2.3)	273 (0.5)	258* (2.4)	270 (0.5)	270 (2.7)	275 (0.6)
More than 20% to 40%	282 (2.2)	282 (0.5)	273* (2.7)	280 (0.5)	280 (2.2)	282 (0.5)
More than 40% to 60%	293 (2.4)	292 (0.4)	285* (2.6)	291 (0.5)	292 (2.1)	292 (0.5)
More than 60% to 80%	302 (2.3)	298 (0.4)	294 (2.5)	298 (0.5)	303 (2.1)	300 (0.5)
More than 80%	298 (2.5)	299 (0.5)	291* (2.4)	300 (0.5)	305 (2.7)	302 (0.5)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

3.5.6 Literacy and numeracy skills

Participants were asked about the literacy and numeracy skills they used at work and the frequency with which they used these skills. Questions asking how often respondents had to read directions or instructions; read letters, memos or emails; read articles in newspapers, magazines or newsletters; read articles in professional journals or scholarly publications; read books; read manuals or reference materials; read bills, invoices, bank statements or other financial statements; and read diagrams, maps or schematics were combined to give an index of reading skills use at work. Questions asking how often respondents had to calculate prices, costs or budgets; use or calculate fractions, decimals or percentages; use a calculator; prepare charts, graphs or tables; use simple algebra or formulas; and use advanced maths or statistics were combined to give an index of numeracy at work skills.

Table 3.11 shows the average scores in each domain for the index of reading skills use at work. Table 3.12 shows the average scores in each domain for the index of numeracy skill use at work. Both tables allow comparisons with the OECD average.

Table 3.11 Average literacy, numeracy and problem solving scores by reading skills use at work (prose and document texts)

	Literacy				Numeracy				Problem solving			
	Mean score		OECD average		Mean score		OECD average		Mean score		OECD average	
All zero response	238	(4.8)	246	(0.9)	219*	(6.1)	238	(1.0)	269	(5.0)	268	(1.1)
Lowest to 20%	257	(2.6)	260	(0.4)	246*	(2.8)	255	(0.5)	268*	(2.4)	274	(0.5)
More than 20% to 40%	270	(2.1)	273	(0.4)	258*	(2.3)	269	(0.4)	277	(2.3)	279	(0.5)
More than 40% to 60%	285	(2.0)	283	(0.4)	276*	(2.1)	281	(0.4)	288	(2.0)	287	(0.5)
More than 60% to 80%	291	(2.2)	290	(0.4)	284*	(2.5)	290	(0.4)	291	(2.1)	292	(0.4)
More than 80%	292	(3.5)	292	(0.4)	286*	(2.4)	292	(0.4)	296	(2.0)	292	(0.5)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

In England, the more frequently participants reported using literacy skills at work, the higher their scores in each domain. This was also the general pattern in other OECD countries, on average. The mean numeracy scores for each literacy skills use group were significantly below the OECD averages, reflecting England's poor overall performance in numeracy.

Table 3.12 Average literacy, numeracy and problem solving scores by numeracy skills use at work (basic and advanced)

	Literacy				Numeracy				Problem solving			
	Mean score		OECD average		Mean score		OECD average		Mean score		OECD average	
All zero response	250*	(2.4)	256	(0.4)	237*	(2.4)	248	(0.5)	263*	(2.5)	269	(0.6)
Lowest to 20%	275	(2.4)	273	(0.4)	265	(2.4)	267	(0.5)	278	(2.2)	278	(0.5)
More than 20% to 40%	280	(2.6)	276	(0.4)	269	(3.0)	272	(0.5)	283	(2.9)	281	(0.5)
More than 40% to 60%	285	(2.3)	285	(0.4)	277*	(2.3)	283	(0.4)	289	(2.3)	288	(0.5)
More than 60% to 80%	292	(2.1)	288	(0.4)	284*	(2.1)	289	(0.5)	293	(1.9)	292	(0.5)
More than 80%	295	(2.3)	296	(0.4)	291*	(2.5)	300	(0.4)	297	(2.7)	299	(0.5)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

As with the literacy scale, increased frequency of numeracy skills use at work was associated with higher proficiency in literacy, numeracy and problem solving. Respondents who reported never using numeracy skills at work had significantly lower scores compared with the OECD average for all three domains.

3.5.7 Learning at work

Adults continue to learn throughout their lives. This offers some explanation for the increase in scores in literacy and numeracy that adults in their twenties show compared with younger adults. Occupations will offer different opportunities to learn at work, whether formal or on-the-job training. Respondents were asked how often they learned new things at work from colleagues or supervisors; how often their job involved learning-by-doing; and how often their job involved keeping up to date with new products or services. The responses to these questions were combined to give an index of learning at work.

Table 3.13 shows the average scores in each domain for the learning at work index, compared with the OECD average.

Table 3.13 Average literacy, numeracy and problem solving scores by learning at work

	Literacy		Numeracy		Problem solving	
	Mean score	OECD average	Mean score	OECD average	Mean score	OECD average
All zero response	237 (7.2)	244 (1.4)	220* (8.4)	237 (1.5)	‡ †	259 (3.2)
Lowest to 20%	274 (2.7)	270 (0.5)	266 (2.8)	267 (0.5)	280 (2.4)	277 (0.6)
More than 20% to 40%	284 (2.3)	281 (0.4)	276 (2.6)	279 (0.5)	287 (2.5)	286 (0.5)
More than 40% to 60%	283 (2.3)	283 (0.4)	272* (2.4)	281 (0.5)	289 (2.4)	289 (0.5)
More than 60% to 80%	285 (2.3)	283 (0.4)	277 (2.5)	280 (0.5)	287 (2.2)	289 (0.5)
More than 80%	278 (2.4)	276 (0.5)	268 (2.8)	273 (0.5)	286 (3.0)	283 (0.6)

Source: PIAAC (2012)
† Not applicable
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

In general, scores in England (and on average in other OECD countries) increased as participants report increased learning at work, with the exception of those who report the most learning at work. However, compared with those who reported little learning at work, those who reported a lot of learning at work scored significantly better.

4. Adult skills in everyday life

Key findings

The extent to which adults use literacy, numeracy and ICT in their everyday lives is reflected in their average scores in the three assessed domains of literacy, numeracy and problem solving in technology-rich environments. For each of the rating scales – frequency of reading, frequency of writing, frequency of using number skills and frequency of using ICT – average scores in all three domains increased as frequency increased, regardless of the specific context of the scale. For example, those who reported more frequent reading also had higher scores in numeracy and problem solving in technology-rich environments. This suggests that the skills are interrelated although the direction of causality cannot be inferred from this analysis.

The international results from the International Survey of Adult Skills point to a correlation between frequency of reading and higher literacy scores; this is supported by results in England. This is similar to findings in other research. For instance, an increase in time spent reading was found to be associated with an increase in scores in PISA 2009, which had a focus on reading. However, although adults in this country read more frequently than the OECD average, the mean literacy proficiency score places England at the mid-point, indicating that there are other factors affecting proficiency in literacy. More frequent use of numeracy and ICT in everyday life in England similarly correlate with higher scores in these skills. In addition, more frequent ICT use is also closely associated with higher literacy scores, as was also found internationally.

4.1 Introduction

The previous chapter looked at the relationship between employment and literacy, numeracy and problem solving in technology-rich environments in England. It also examined the relationship between the extent of skills usage in the workplace and proficiency levels.

The focus of this chapter is on how adults in England use the skills of literacy, numeracy and problem solving in technology-rich environments in their everyday lives. The ability to apply skills in an everyday context is important. For example, people need to read and understand signs, transport timetables, medicine labels, instructions, utility bills and so on.

In particular, this chapter presents information on participants' literacy practices when not in the workplace, such as reading books and newspapers or magazines, writing emails or letters, filling in forms, etc., and looks at the relationship between these practices and literacy levels. It also examines respondents' everyday numeracy practices, such as calculating prices or using a calculator and their use of ICT, for example, for internet banking or using a word processor.

4.2 Everyday literacy practices

Respondents were asked about the extent to which they used their reading and writing skills outside of work, in everyday life.

4.2.1 Reading outside of work

Table 4.1 presents the everyday reading practices of adults in England and Figure 4.1 presents a comparison with the average practices in OECD countries, split by different text types.

Overall, adults in England reported more frequent reading frequent of almost all the different text types, except professional journals and scholarly publications, than adults across the OECD as a whole.

The most frequent use of reading skills outside of work in England was to read letters, memos or emails. Almost two thirds of respondents reported doing this daily and nearly a quarter said they did so at least once a week, placing England well above the OECD average.

Reading newspapers, magazines or newsletters was the second most frequent form of reading in England, with over 80 per cent of respondents reading these types of material at least weekly. This is the most regular form of reading across OECD countries, with letters, memos or emails in second place.

Nearly 60 per cent of respondents in England reported that they read bills, invoices, bank statements or other financial statements at least weekly, with 16 per cent doing so daily. As with the previous categories, this was above the OECD average.

A higher proportion of adults in England (53 per cent) read books (fiction and non-fiction) at least weekly, compared with the OECD average of 40 per cent. Frequency of reading books is often regarded as a good indicator of literacy skills. For instance, the Programme for International Student Assessment (PISA) 2009 survey, which had a focus on reading, found that pupils who spent more time reading tended to have higher attainment in reading, both in England and internationally[70], so that pupils who read more at home were likely to have higher reading scores than those who read less. However, this is not reflected in the International Survey of Adult Skills international rankings for literacy (reported in Chapter 2), as the scores of adults in England are average, despite the reported higher frequency of reading.

Reading instructions or directions happens at least weekly for half the adult population in England, whereas manuals or reference materials are read much less frequently, with over 60 per cent of respondents reporting that they read them less than once a month or never.

[70] Bradshaw, J., Ager, R., Burge, B. and Wheater, R. (2010). *PISA 2009: Achievement of 15-Year-Olds in Northern Ireland*. Slough: NFER [online]. Available: https://www.nfer.ac.uk/nfer/publications/NPDZ01/NPDZ01.pdf [30 September, 2013].

Thirty-eight per cent of respondents said they never read diagrams, maps or schematics, and just over half never read articles in professional journals and scholarly publications. Although only a small proportion of respondents in England reported reading each of these two categories more than once a month, this was broadly in line with international patterns.

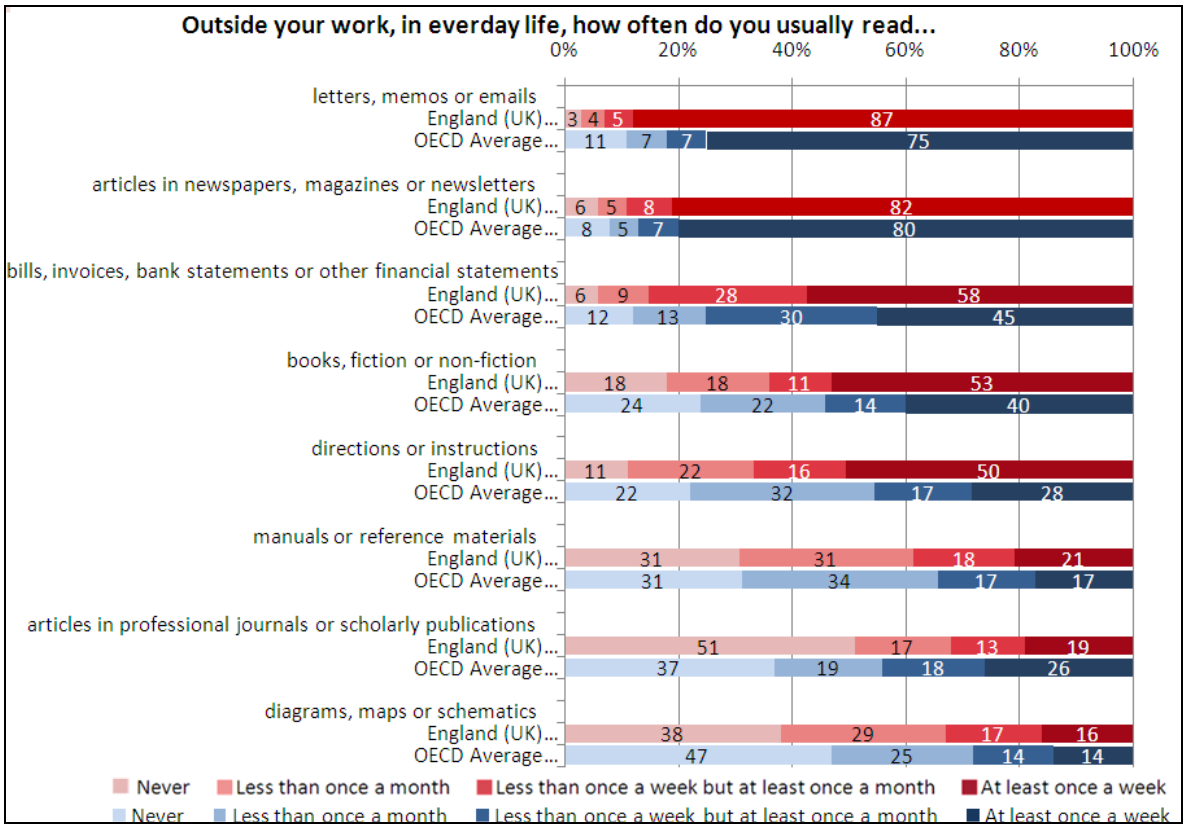
Table 4.1 Everyday reading practices of adults in England

Outside your work, in everyday life, how often do you usually read...	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
	%	%	%	%	%
letters, memos or emails	3	4	5	23	64
articles in newspapers, magazines or newsletters	6	5	8	33	49
bills, invoices, bank statements or other financial statements	6	9	28	42	16
books, fiction or non-fiction	18	18	11	22	31
directions or instructions	11	22	16	27	23
manuals or reference materials	31	31	18	16	5
articles in professional journals or scholarly publications	51	17	13	14	5
diagrams, maps or schematics	38	29	17	13	3

Source: PIAAC (2012)

Totals may not sum to 100 per cent due to rounding

Figure 4.1 Frequency of everyday reading of different text types (England/OECD)



Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding

Rather than looking at each category as a separate and discrete activity, responses to each of the above questions were amalgamated to form a single ‘Reading at home’ index. This provides a measure of the overall frequency of reading a range of text types. For this index, and similar indices reported in this chapter, respondents who answered ‘Never’ to all questions in the index appear in the ‘All zero response’ category. The remaining respondents’ answers to the questions were analysed using Item Response Theory (IRT) to produce an index. Internationally, these participants were grouped into quintiles which give an indication of how often they perform these tasks. For instance, participants who fall in the group called ‘lowest to 20 per cent’ on the index internationally will tend to perform some or all of the tasks infrequently, whereas participants who fall in the ‘more than 80 per cent’ group will frequently perform many of the tasks. Further details about indices are

described in Chapter 4 of the international report[71], volume II of the international report[72] and Chapter 20 of the international technical report[73].

Table 4.2 shows how the frequency of 'reading at home' relates to average scores for literacy, numeracy and problem solving in technology-rich environments. Adults who reported more frequent reading of a range of different text types achieved higher scores for literacy, on average. There was a significant increase in mean scores for each increase in use of reading skills, both for England and for the OECD average. This suggests an association between reading at home and achievement in all three domains, but the direction of causality cannot be inferred from these results.

Table 4.2 Everyday use of reading skills by scores in each domain

Domain	Country	All zero response		Lowest to 20%		More than 20% to 40%		More than 40% to 60%		More than 60% to 80%		More than 80%	
		Mean (standard error)											
Literacy	England	‡	†	238*	(2.4)	263*	(1.7)	276	(2.2)	283	(1.7)	290	(1.6)
	OECD average	210	(2.1)	243	(0.4)	267	(0.3)	280	(0.3)	286	(0.3)	290	(0.4)
Numeracy	England	‡	†	222*	(2.8)	249*	(1.8)	266*	(2.2)	274*	(1.8)	283*	(1.9)
	OECD average	200	(2.4)	235	(0.5)	262	(0.4)	277	(0.4)	284	(0.4)	288	(0.4)
Problem solving	England	‡	†	254*	(2.3)	270*	(1.8)	281*	(1.8)	286*	(1.5)	294	(1.6)
	OECD average	—	†	259	(0.6)	274	(0.4)	285	(0.4)	290	(0.4)	294	(0.4)

Source: PIAAC (2012)
— Not available
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
† Not applicable
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Literacy scores in England move closer to the OECD average the more frequently reading is undertaken. Infrequent readers have scores significantly below the OECD average,

[71] OECD (2013a, forthcoming). *OECD Skills Outlook: First Results from the Survey of Adult Skills (PIAAC) (Volume 1).* Paris: OECD Publishing.

[72] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing.

[73] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing.

while adults in England in the top three bands of reading skill use have scores that are not significantly different from the OECD average. England's numeracy scores are significantly lower than OECD averages regardless of the amount of reading reported. However, the difference generally decreases as higher frequency of reading is reported. A similar pattern of significantly lower mean scores is seen in problem solving for all but the most frequent readers.

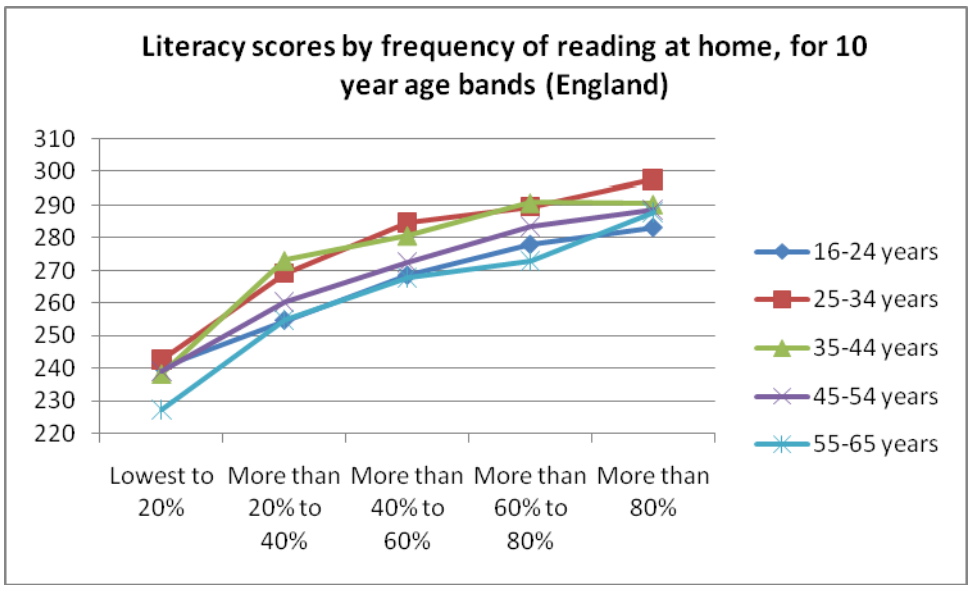
Comparisons were made between England and the other participating countries in terms of the proportions of adults at each level of reading frequency and the mean literacy scores. England had significantly higher proportions of adults in the top two reading frequency groups compared with the OECD average. England also had significantly higher proportions of adults at the highest level of reading frequency (i.e. those in the 'more than 80 per cent' category) than 17 of the participating countries, and significantly higher proportions of adults than 13 of the participating countries in the second most frequent readers group. Countries that had higher proportions of adults than England in these top two groups were Australia, Finland, Germany, Norway, Sweden and the United States.

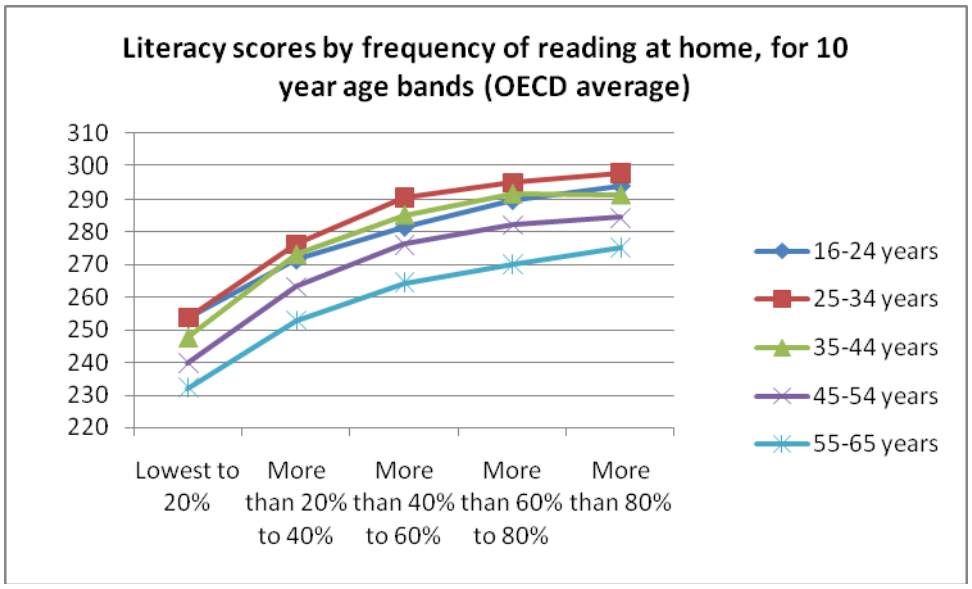
In spite of having high proportions of adults in the highest two groups of reading frequency, mean literacy scores for England were only significantly higher than six countries at the top level and five countries at the second highest level of reading frequency. Consequently, although adults in England who read more have higher literacy scores than those who read less, they do not, on average, have the high literacy scores that are seen in many other countries.

At the other end of the scale, where there was a significantly lower proportion of respondents at the lowest levels of reading frequency, a slightly different pattern emerges when compared with the OECD average. The mean scores of those respondents in England who were in the lowest 20 per cent of the index were significantly lower than the OECD average and nine other countries, but were not significantly different from 11 other countries. Only three countries – France, Spain and Germany – had significantly lower mean literacy scores than England for this group of respondents.

The relationship between reading frequency practices and age – in 10-year age bands – was investigated to explore effects on literacy scores (see Appendix C; C1 and Figure 4.2). At each age band there were similar patterns of performance; that is, literacy scores generally increased as frequency of reading increased. Both in England, and across the OECD as a whole, the steepest improvements in literacy scores occurred between those who never read any of the text types (all zero response) and those who fell into the lowest to 20 per cent category of reading frequency. This was the case for all age bands, with the youngest group (16-24 years) showing the least marked improvement. Apart from the youngest age group, the general trend was that literacy scores, at each level of frequency of reading, decreased as age increased. This follows the expected pattern of attainment amongst the youngest age group discussed in Chapter 2.

Figure 4.2 Frequency of everyday reading by age bands (England/OECD)





Source: PIAAC (2012)

To summarise, a higher proportion of adults in England read frequently compared with many other countries, but this is not reflected in England's mean literacy scores. In terms of international comparisons, the mean literacy scores for adults in England were significantly higher than seven other countries across all levels of the reading frequency index. These countries were Cyprus, France, Germany, Italy, the Republic of Ireland, Spain and the United States. When comparing the relationship between reading frequency and literacy scores across 10-year age bands, a similar pattern of improvement occurs as seen in the total population. However the increases in mean literacy scores are less marked for adults in the youngest age group (16-24 years).

4.2.2 Writing outside of work

In general, adults in England reported that they did much less writing in everyday life than reading. Table 4.3 presents the everyday writing practices of adults in England and Figure 4.3 presents a comparison with the average practices in OECD countries, split by different text types.

Table 4.3 Everyday writing practices of adults in England

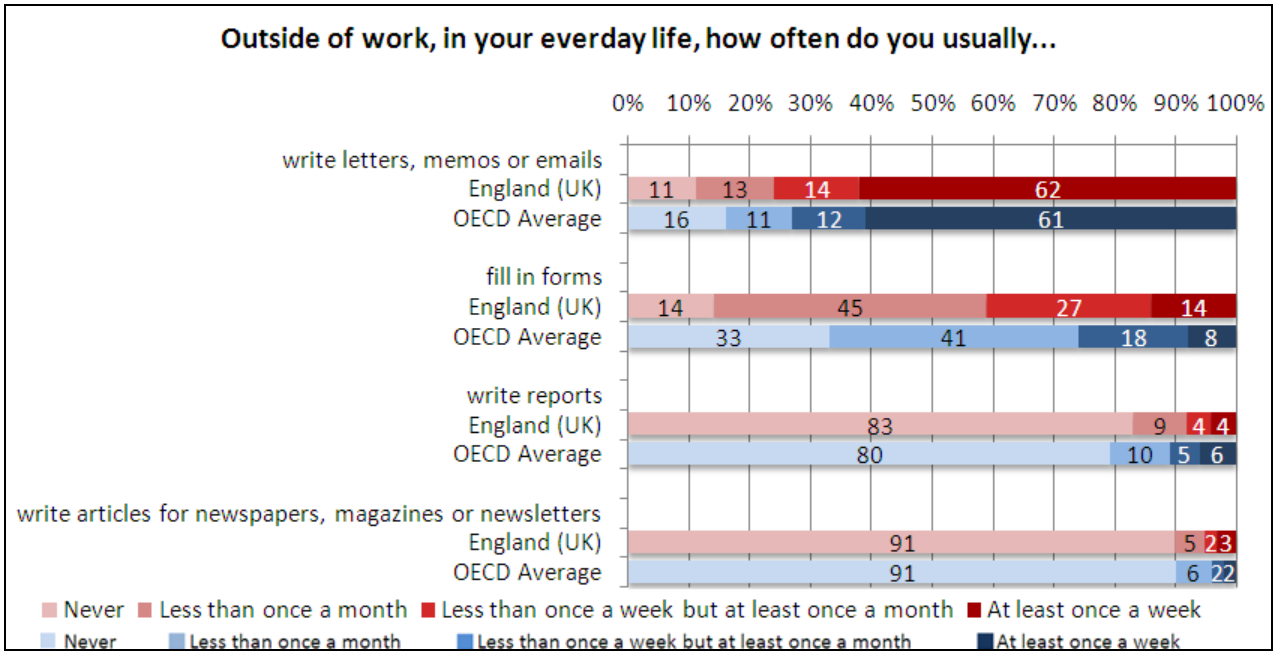
Outside your work, in everyday life, how often do you usually...	Never	Less than once a month	Less than once a week but at least once a month	At least once a week but not every day	Every day
	%	%	%	%	%
write letters, memos or emails	11	13	14	33	29
fill in forms	14	45	27	13	1
write reports	83	9	4	3	1
write articles for newspapers, magazines or newsletters	91	5	2	2	1

Source: PIAAC (2012)
Totals may not sum to 100 due to rounding

The most common use of writing skills outside of work was to write letters, memos or emails. Sixty two per cent of respondents reported doing this at least once a week and only 11 per cent said they never did so. These percentages are close to the OECD average presented in Figure 4.2. Many respondents (41 per cent) also reported filling in forms at least once a month; this compares with the OECD average of 26 per cent.

Apart from these activities, writing in everyday life was a relatively rare occurrence. Very few respondents wrote articles for newspapers, magazines or newsletters or wrote reports outside of work. Overall, the results for adults in England were broadly similar to those across the OECD, following the pattern of being far more likely to write letters, etc. and fill in forms than to write reports or articles.

Figure 4.3 Frequency of everyday writing of different text types (England/OECD)



Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding

Responses to each of the above questions were amalgamated to form a single 'Writing at home' index which indicates the overall frequency of writing activities. As for the 'Reading at home index' described in section 4.2.1, respondents who answered 'Never' to all questions in the index appear in the 'All zero response' category. Participants who fall in the lowest 20 per cent of the index internationally will tend to perform some or all of the tasks infrequently, whereas participants who fall in the more than 80 per cent group will frequently perform many of the tasks.

Table 4.4 Everyday use of writing skills by scores in each domain

Domain	Country	All zero response	Lowest to 20%	More than 20% to 40%	More than 40% to 60%	More than 60% to 80%	More than 80%
		Mean (standard error)					
Literacy	England	223 (3.9)	249* (1.8)	266 (2.3)	280* (1.7)	285 (2.0)	287 (2.0)
	OECD average	230 (0.7)	256 (0.4)	270 (0.5)	284 (0.3)	286 (0.4)	287 (0.4)
Numeracy	England	206* (4.5)	237* (2.4)	256* (2.4)	271* (1.7)	275* (2.1)	276* (2.4)
	OECD average	222 (0.8)	251 (0.4)	267 (0.4)	281 (0.4)	283 (0.4)	284 (0.4)
Problem solving	England	250 (4.7)	256* (2.0)	274 (2.2)	282* (1.3)	289 (1.7)	294 (2.0)
	OECD average	246 (1.0)	263 (0.5)	277 (0.4)	288 (0.4)	291 (0.4)	293 (0.4)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Table 4.4 shows how the frequency of 'writing at home' relates to average scores for literacy, numeracy and problem solving in technology-rich environments. As with day-to-day reading, adults who reported writing more frequently in their everyday lives also tended to gain higher scores for literacy, numeracy and problem solving, with those who write the most frequently having significantly higher scores than those who write least frequently. The same pattern can be seen in the OECD averages, suggesting an association between writing at home and achievement in the three domains. However, no direct causal relationship can be inferred from this particular analysis.

Those adults in England whose frequency of writing fell into the 'lowest to 20 per cent' group and the 40-60 per cent group had literacy scores below the OECD average. For other groups, scores were not significantly different from the OECD average. Scores for problem solving showed the same pattern as literacy. For numeracy, the scores in England were significantly below the OECD average, regardless of the frequency of writing outside of work that was reported.

4.3 Everyday numeracy practices

As with literacy skills, respondents were asked to indicate the extent to which they used their numeracy skills outside of work, in everyday life. Table 4.5 presents the everyday numeracy practices of adults in England and Figure 4.4 presents a comparison with the average practices in OECD countries.

Table 4.5 Everyday numeracy practices of adults in England

Outside your work, in everyday life, how often do you usually...	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
	%	%	%	%	%
calculate prices, costs or budgets	15	16	18	34	17
use a calculator – either hand-held or computer based	24	23	21	25	7
use or calculate fractions, decimals or percentages	43	21	14	16	6
use simple algebra[74] or formulas	77	11	5	5	2
use more advanced maths or statistics such as calculus, complex algebra, trigonometry or use of regression techniques	91	5	2	2	1
prepare charts, graphs or tables	78	13	5	3	0

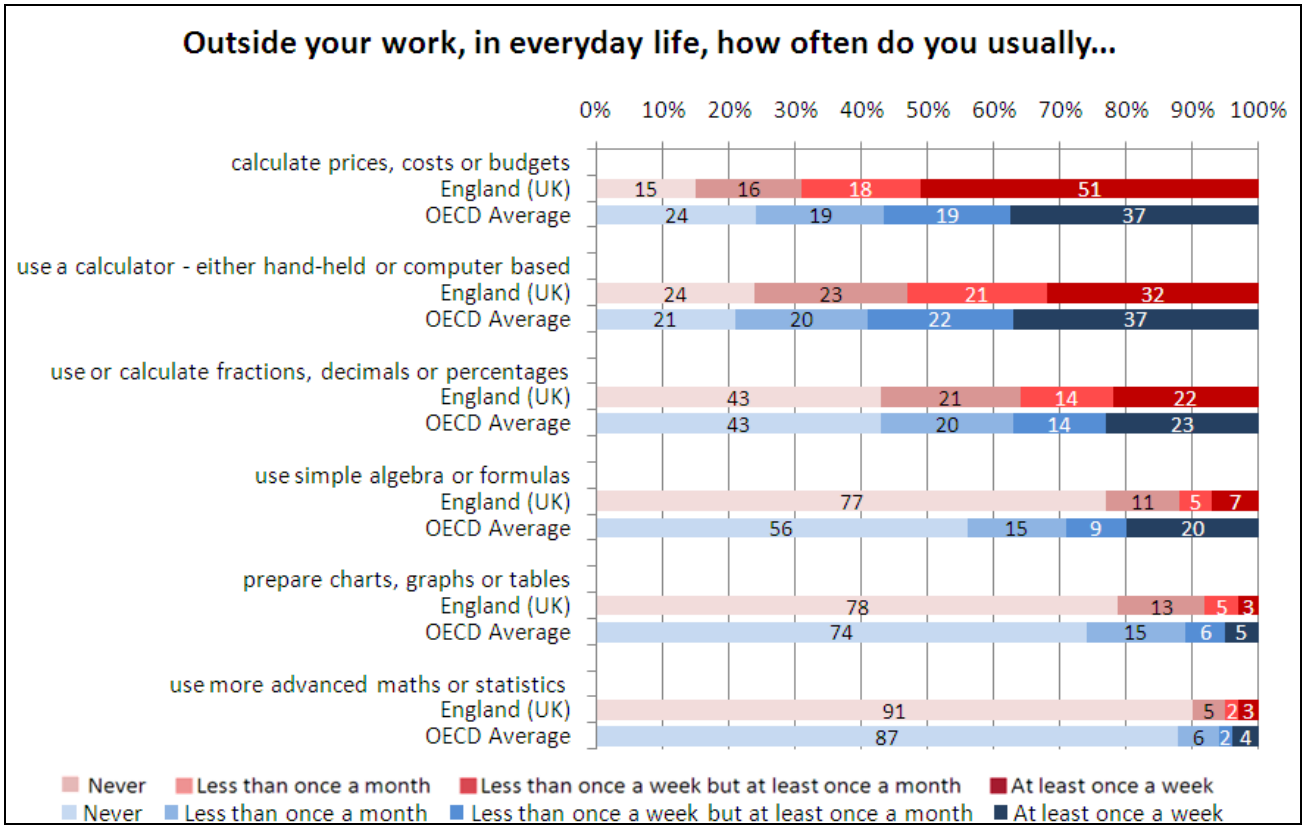
Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding
() Standard errors appear in parentheses

As indicated in Table 4.5, around half the adult population reported using numeracy skills to calculate prices, costs or budgets at least once a week. This is almost 20 per cent higher than the OECD average. Around one third said they used a calculator on at least a weekly basis; this is similar to the average practice in OECD countries.

Very few respondents reported preparing charts, graphs or tables outside of work, or using simple algebra or formulas. More than 90 per cent of the sample said that they never used more advanced mathematics or statistics such as calculus, complex algebra, trigonometry or use of regression techniques. The pattern was similar across the OECD where this was also the least used numeracy practice, as shown in Figure 4.3.

[74] By simple algebra or formula, we mean a mathematical rule that enables us to find an unknown number or quantity. For example, a rule for finding an area when length and width are known, or for working out how much more time is needed to travel a certain distance if speed is reduced.

Figure 4.4 Frequency of everyday use of numeracy (England/OECD)



Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding

Responses to each of the above questions were amalgamated to form a single 'Using numeracy skills at home' index which indicates how often respondents said they used their numeracy skills outside of work.

Table 4.6 Everyday use of numeracy skills by scores in each domain

Domain	Country	All zero response		Lowest to 20%		More than 20% to 40%		More than 40% to 60%		More than 60% to 80%		More than 80%	
		Mean (standard error)											
Literacy	England	235	(3.3)	257	(1.7)	272*	(1.8)	285*	(2.0)	286	(2.0)	288	(2.5)
	OECD average	240	(0.7)	255	(0.4)	268	(0.4)	279	(0.4)	286	(0.4)	292	(0.4)
Numeracy	England	218*	(3.6)	243*	(2.0)	258*	(1.8)	275	(2.0)	280	(2.4)	287	(3.0)
	OECD average	233	(0.8)	248	(0.4)	262	(0.4)	275	(0.4)	284	(0.4)	292	(0.4)
Problem solving	England	255	(3.6)	265	(1.7)	277	(1.7)	287	(2.1)	291	(1.9)	298	(2.3)
	OECD average	259	(0.9)	267	(0.5)	275	(0.5)	284	(0.4)	291	(0.4)	299	(0.4)

Source: PIAAC (2012)
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Table 4.6 shows how the frequency of 'using numeracy skills at home' relates to mean scores for literacy, numeracy and problem solving. As with reading and writing skills, with each increase in use of numeracy skills, literacy, numeracy and problem solving scores increased both in England and across the OECD as a whole. In England, the scores in all three domains for adults who fell into the lowest frequency group were significantly different from the scores of those using numeracy skills most frequently. The largest difference in scores was between adults who do not use numeracy skills at all in everyday life and those who use these skills infrequently (lowest 20 per cent).

The literacy scores of adults in England who reported the least and the most frequent use of numeracy skills (60-80 and more than 80 per cent) were not significantly different from the OECD averages. Those who reported a mid-range frequency of using number skills at home (20-40 and 40-60 per cent) scored significantly higher in literacy compared with the OECD average (by six score points for the latter category).

For numeracy, the scores in England are significantly below the OECD average at the lowest frequencies of using number skills at home. Those who use number skills more frequently (40-60, 60-80 and more than 80 per cent) had numeracy scores that were not significantly different from OECD averages. It is noteworthy that those who reported hardly ever using numeracy skills in day-to-day life (lowest 20 per cent or never) had an extremely low average score on the numeracy assessment. However, as discussed earlier, this data analysis cannot tell us the exact mechanism or direction of causality.

For problem solving the differences between England and OECD scores vary, but are not significantly different at any level of the 'frequency of using number skills' index.

4.4 Use of ICT

In terms of ICT practices, respondents were first asked questions about their computer experience. This included mobile phones and other hand-held electronic devices that could be used to connect to the internet, check emails, etc. Four per cent of adults in England had no computer experience, a considerably lower percentage than the OECD average of nine per cent.

Those who said they had used computers were asked whether they used them in their everyday life, outside of work. Ninety per cent of respondents in England said they did. This is above the OECD average of 82 per cent.

Those who did report using a computer were asked about the extent to which they used ICT skills outside of work, in everyday life. Table 4.7 presents the everyday ICT practices of adults in England and Figure 4.5 presents a comparison with the average practices in OECD countries. The daily or weekly use of ICT skills was reported by a greater proportion of adults (of those who were computer users) than either writing or numeracy skills.

Fifty-nine per cent of the adults who used computers outside of work used email every day, with a further 26 per cent using it at least weekly. This is similar to the OECD average which shows 82 per cent of computer users using email at least once a week (Figure 4.5).

Just over two-thirds of computer users in England used the internet at least once a week to better understand issues related to such things as health, financial or environmental issues. As with email usage, this was similar to the OECD average (70 per cent). More than half said they conducted transactions on the internet, for example buying or selling products or services, or banking, at least once a week. This is significantly higher than the OECD average of 38 per cent. Compared with England, only four countries had a higher percentage of adults who reported conducting transactions at least once a week.

Around one third of adult computer users in England reported using a word processor at least once a week outside of work, and around a quarter took part in real-time discussions on the internet, for example, online conferences or chat groups. However, almost a quarter of adult computer users never used a word processor and 59 per cent never took part in online conferences or chat groups.

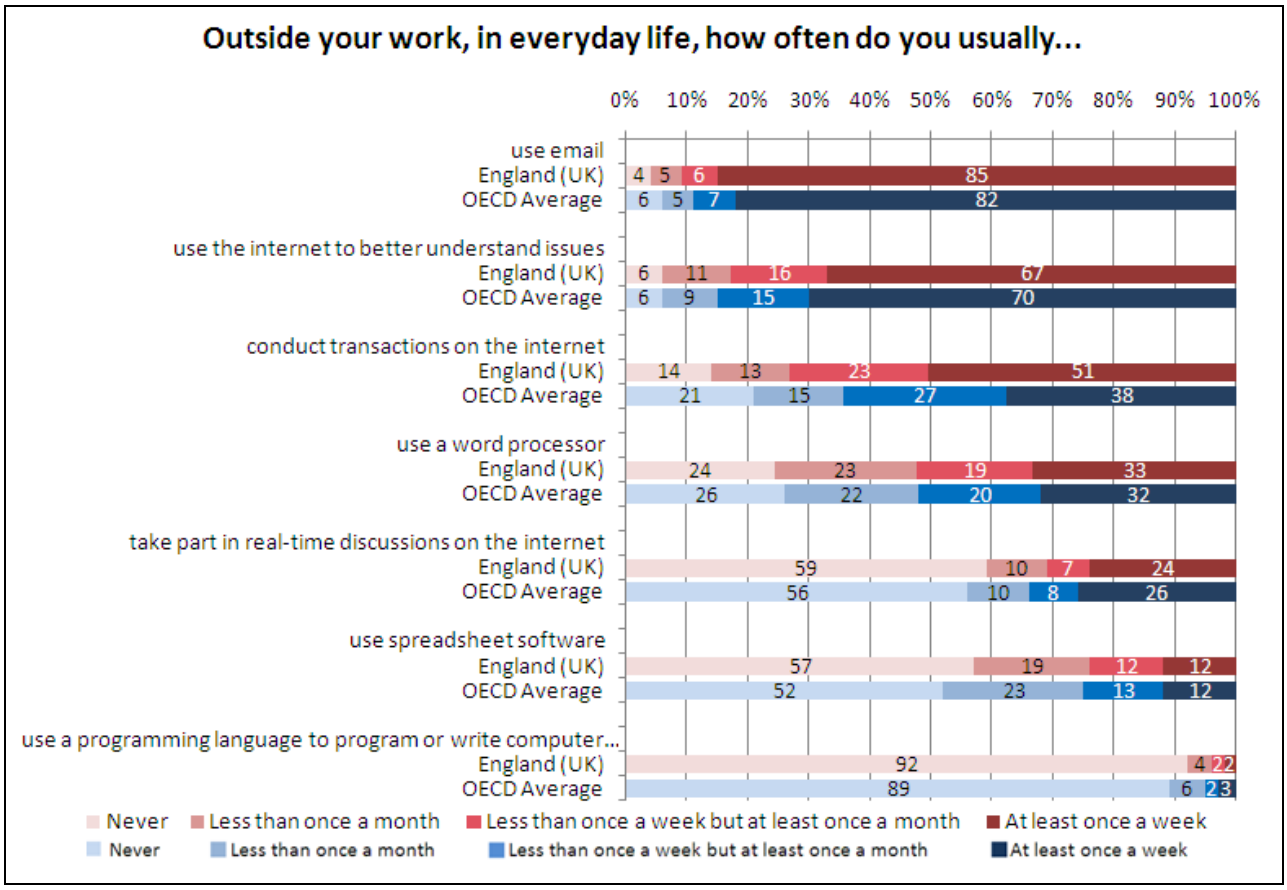
The least likely ICT activities to be carried out at home were using a programming language to program or write computer code (92 per cent of computer users never do this outside of work) and using spreadsheet software, such as Excel, which only 12 per cent of respondents did on a weekly or more frequent basis, and 57 per cent reported never doing.

Table 4.7 Everyday ICT practices of adults in England

Outside your work, in everyday life, how often do you usually...	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
	%	%	%	%	%
use email	4	5	6	26	59
use the internet in order to better understand issues related to, for example, your health or illnesses, financial matters, or environmental issues	6	11	16	33	34
conduct transactions on the internet, for example, buying or selling products or services, or banking	14	13	23	40	11
use a word processor, for example Word	24	23	19	23	10
take part in real-time discussions on the internet, for example, online conferences or chat groups	59	10	7	12	12
use spreadsheet software, for example Excel	57	19	12	9	3
use a programming language to program or write computer code	92	4	2	1	1

Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding
() Standard errors appear in parentheses

Figure 4.5 Frequency of everyday use of ICT (England/OECD)



Source: PIAAC (2012)
Totals may not sum to 100 per cent due to rounding

Responses to each of the above questions were amalgamated to form a single 'Using ICT at home' index, which indicates how often respondents said they used their ICT skills outside of work.

Table 4.8 shows how the frequency of 'using ICT skills at home' relates to average scores for literacy, numeracy and problem solving in technology-rich environments. As with use of the other skills outside of work, increased frequency of use of ICT skills is related to higher scores in all three domains of literacy, numeracy and problem solving; both in England and across the OECD. Literacy scores increased significantly as frequency of using ICT increased, except between the highest two levels of frequency, where differences were not significant. For numeracy and problem solving skills, scores increased significantly at every increased level of frequency of using ICT skills at home. As with the other skills areas, this data analysis cannot tell us the exact mechanism of causality.

Table 4.8 Everyday use of ICT skills by scores in each domain

Domain	Country	All zero response	Lowest to 20%	More than 20% to 40%	More than 40% to 60%	More than 60% to 80%	More than 80%
			Mean (standard error)				
Literacy	England	‡ †	254 (2.0)	271 (2.0)	284 (2.0)	292 (2.1)	294 (2.2)
	OECD average	248 (2.6)	257 (0.4)	274 (0.4)	285 (0.4)	291 (0.4)	295 (0.4)
Numeracy	England	‡ †	243* (2.2)	261* (2.2)	275* (2.0)	282* (2.4)	288* (2.3)
	OECD average	239 (2.8)	253 (0.4)	271 (0.4)	282 (0.4)	288 (0.4)	293 (0.4)
Problem solving	England	‡ †	257 (1.9)	275 (1.7)	286 (1.7)	296 (1.9)	304 (1.9)
	OECD average	245 (4.1)	257 (0.5)	277 (0.4)	288 (0.4)	296 (0.4)	301 (0.4)

Source: PIAAC (2012)
‡ Reporting standards not met (i.e. fewer than 60 cases in this cell therefore robust inferences cannot be made)
† Not applicable
* The differences between England and OECD mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

As the frequency of 'using ICT skills' increases, mean scores for literacy and numeracy, tend towards the OECD average. England's mean scores for numeracy were significantly lower than the OECD average at each frequency point[75]. For literacy, differences between England and OECD means were not significant.

For problem solving, the pattern for England is similar to that in the OECD average and differences in scores are not significant.

[75] where reporting standards were met

5. Characteristics of people with low proficiency in literacy, numeracy and problem solving

Key findings

Background

- For literacy and numeracy, low proficiency is defined as achieving Level 1 or below, whereas for problem solving achieving below Level 1 defines low proficiency.
- Using these definitions, 17 per cent of adults in England had low proficiency in literacy; 24 per cent had low proficiency in numeracy; and 18 per cent had low proficiency in problem solving. These proportions represent similar figures to those found on average in the OECD for literacy and problem solving, but a significantly higher proportion for numeracy.
- The statistical analysis used in this chapter, a logistic regression, allowed the identification of demographic characteristics that are associated with greater risk of having low proficiency in each domain. However, causal links cannot be inferred from this data.
- Fifteen socio-demographic characteristics were analysed, with the most frequent category in each characteristic being selected as the reference category, against which all the other categories were compared.

Key results

- Low proficiency in each domain was significantly associated with a range of characteristics that are either within the individual's power to change (e.g. own level of education, occupation) or that are beyond the individual's control (e.g. ethnicity).
- The results from this regression indicate that the characteristics most likely to be associated with low proficiency are having a low level of education, belonging to particular ethnic groups, having poorer general health, having parents who have low levels of education, not having computer experience in everyday life, and working in particular occupations.
- Numeracy had the highest number of significant associations between characteristics and risk of low proficiency, while literacy had the fewest. Many of those that were significant only in numeracy were uncontrollable characteristics, such as gender, country of birth and first language.

5.1 Introduction

This chapter explores which socio-demographic characteristics are associated with low proficiency in literacy, numeracy and problem solving in technology-rich environments.

In literacy and numeracy, low proficiency is defined as achieving Level 1 or below, whereas for problem solving achieving below Level 1 defines low proficiency. Level 1 or below was chosen for literacy and numeracy as this group was regarded as a key group for policy makers following England's participation in the International Adult Literacy Survey (IALS) and was also the level used for a similar regression in the England IALS national report[76]. Below Level 1 was chosen as the low proficiency group for problem solving as a similar proportion of the population are in this group as are in Level 1 and below in literacy and numeracy. Consequently, this creates a good comparison group. To place the International Survey of Adult Skills levels in a UK context, additional analysis to estimate the equivalence of the International Survey of Adult Skills levels with National Qualifications Framework (NQF) levels, using data from England's 2011 Skills for Life Survey[77] is included in Appendix E. Section 1.7.2 (see Chapter 1) details the types of tasks adults at Level 1 and Below Level 1 were expected to complete in the literacy, numeracy and problem solving assessments.

The proportion of adults achieving each level in the three domains is explored in Chapter 2. Table 5.1 below summarises this information and shows the proportions of adults who would be classified as having low proficiency (according to the definition above), compared with the OECD averages. In comparison, the 2011 Skills for Life Survey used the 'functional' levels referred to in the Leitch review[78] (low functionality identified as below NQF Level 1 for literacy and below Entry Level 3 for numeracy). The proportions with 'low' skills cited in the 2011 Skills for Life Survey were 15 per cent for literacy and 24 per cent for numeracy. As discussed in Appendix G, the definitions of literacy and numeracy were different for the two surveys and therefore many of the types of tasks the participants were required to complete were not the same.

[76] Carey, S., Low, S. and Hansbro, J. (1997). *Adult Literacy in Britain.* London: The Stationery Office.

[77] Department for Business, Innovation and Skills (2012a). *The 2011 Skills for Life Survey: a Survey of Literacy, Numeracy and ICT Levels in England* (Research Paper 81). London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/36000/12-p168-2011-skills-for-life-survey.pdf [30 September, 2013].

[78] HM Treasury (2006). *Leitch Review of Skills. Prosperity for All in the Global Economy - World Class Skills. Final Report.* London: HM Treasury [online]. Available: http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/d/leitch_finalreport051206.pdf [30 September, 2013].

Table 5.1 Percentage of adults at each proficiency level in each domain (England/OECD)

		Below Level 1	At Level 1	At Level 2	At Level 3	At Level 4	At Level 5	Low proficiency
Literacy	England	**3.3**	**13.3**	**33.6**	**36.5**	**12.6**	**0.8**	**16.6**
	OECD	**3.4**	**12.3**	**33.7**	**38.7**	**11.3**	**0.7**	**15.7**
Numeracy	England	**6.5**	**18.0**	**33.8**	**30.3**	**10.6**	**0.9**	**24.4***
	OECD	**5.0**	**14.2**	**33.4**	**34.8**	**11.5**	**1.1**	**19.2**

		Below Level 1	At Level 1	At Level 2	At Level 3	Low proficiency
Problem solving	England	**18.0**	**40.3**	**34.9**	**6.8**	**18.0**
	OECD	**16.4**	**38.9**	**37.1**	**7.6**	**16.4**

Source: PIAAC (2012)
* The differences between England and OECD for low proficiency is statistically significant at the 5 per cent level Totals may not sum to 100 per cent due to rounding

It is of social and economic interest to identify which characteristics are associated with low performance, in order to recognise which groups in society are most at risk of low attainment in these domains. In a job market that has a growing need for more highly-skilled workers, it is important to identify those who need assistance in achieving higher levels of proficiency in the skills that are increasingly key to a person's employability.

A logistic regression[79] was used to determine which variables are associated with low proficiency in each domain for adults in England. It is important to note, however, that these predictors cannot be considered as causal factors but can only be interpreted as having a statistically significant association with low proficiency in each of the domains assessed. For example, there may be a relationship between employment status and literacy scores. However, we do not know whether it is being in employment that could lead to higher literacy scores, or if it is higher literacy scores that could lead to being in employment, or even whether one leads to the other. There could also be some other

[79] Logistic regression is a statistical technique used to determine the relationship between one or more factors and the probability of an event occurring.

underlying factor, such as family background, which is significantly associated with both employment status and literacy scores[80].

The variables included in the analysis were:

- gender;
- age;
- level of education;
- employment status;
- English as an additional language (EAL);
- ethnicity;
- ethnicity*EAL interaction;[81]
- born in the UK or not;
- general health;
- disability status;
- mother and father's level of education;
- computer experience in everyday life;
- having children or not;
- job industry; and
- occupation.

Although not analysed separately, it is interesting to consider the effects of those variables over which the individual has no control, such as gender, age, ethnicity, first language (English as an additional language) and parental education, compared with those over which the individual can make decisions about and change, such as educational qualifications (level of education), employment status, career/job industry and everyday computer experience. Observations will be made regarding whether the predictors of low

[80] A rationale for the use of a logistic regression in this analysis is given in Appendix D; D1.

[81] English as an additional language and ethnicity have been combined to examine the interaction of each on the other, due to their naturally strong correlation.

proficiency are characteristics which the individual has the power to change or not, but not all characteristics are easy to categorise in this way, such as general health.

A logistic regression is used to predict the probability of an individual with particular sets of characteristics having low proficiency. The predicted impact on the probability of low proficiency for a difference in the individual characteristic can be deduced from the results (e.g. for the probability if an individual is male vs. the probability if an individual is female). A full set of estimated coefficients of the logistic regression are reported in Appendix D; D2. The standard error associated with each coefficient and a test of statistical significance of each coefficient is also reported. It is possible to augment the analysis with significance tests between two comparison categories (e.g. Is the difference between 'Less than secondary school' and 'Above secondary school' education level significant?), using the coefficients and standard errors as given in Appendix D; D2.

The identification of the reference categories for each characteristic was based on selecting the most frequent category in each variable. Table 5.2 shows the complete set of reference categories for each variable used in the regression (see Appendix D; D2 for the full list of categories for each characteristic).

Table 5.2 Category/Characteristic and Reference categories

Variable	Reference category
Gender	Male
Age	35-44 years
Level of education	Secondary school
Employment status	Employed or self-employed
English as an additional language (EAL)	English as a first language
Ethnicity	White
Ethnicity*English as an additional language (EAL) interaction	White*English as a first language
Born in the UK or not	Born in the UK
General health	Very good
Disability status	No disability
Mother and father's level of education	Less than secondary school
Computer experience in everyday life	Has computer experience
Having children or not	Does not have children
Job industry	Human health and social work
Occupation	Services and shop and market sales

Source: PIAAC (2012)

Table 5.3 shows the probability of a person who has all the reference category characteristics (that is, male, aged 35-44 years, employed, White, born in the UK, with no children etc.) having low proficiency in each domain. As a starting point, the reference category person has a 15.7 per cent chance of having low proficiency in literacy. The logistic regression then compares the effect of changing one characteristic at a time to calculate its association with a higher or lower likelihood of having low proficiency than the reference category person.

Table 5.3 Baseline probability for low proficiency in each domain

	Probability of having low proficiency
Literacy	15.7%
Numeracy	18.6%
Problem solving	25.2%

Source: PIAAC (2012)

Appendix D; D3 displays odds ratios and probabilities, as well as the results of a significance test, of each coefficient at the 5 per cent level. The odds ratio can be used to show the average probability of having low proficiency for an individual with the comparison characteristic (e.g. female) compared with average probability of the reference characteristic (e.g. male), while holding all other characteristics fixed at their reference characteristic. For example, an odds ratio of 2.0 for females implies that the average probability of being low proficiency for women is approximately twice as high as in the reference category (men), while an odds ratio of 0.5 for females would indicate that the average probability for women is half that of men. Asterisks indicate where a difference between a comparison category and the reference category is statistically significant at the 5 per cent level.

It must be borne in mind, however, that for some categories there may have been very low numbers in the sample. For example, in literacy, having missing data for ethnicity has a very large coefficient and zero per cent probability of low proficiency. This is unlikely to reflect the true association between this category and proficiency, but rather the fact that there were few people in the sample who did not have data for ethnicity and, of those, most did not have low proficiency. The results may therefore imply that for those with no ethnicity data there is a very low likelihood of having low proficiency, when this may not be a true effect.

5.2 Factors affecting the probability of having low proficiency in each domain

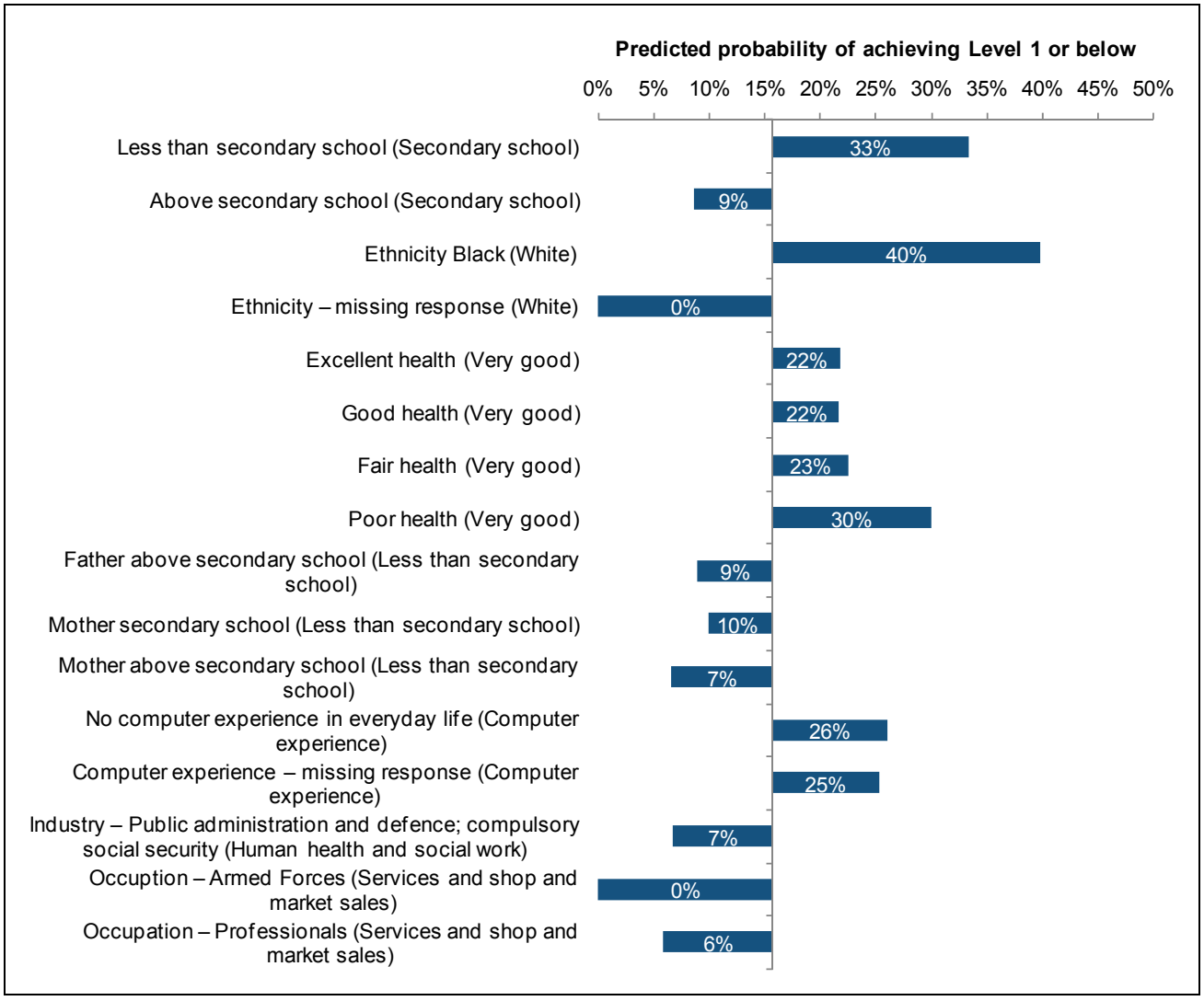
Figures 5.1, 5.2 and 5.3 show how the characteristics considered in the logistic regression are associated with low proficiency in literacy, numeracy or problem solving for adults in England. The figures only display the characteristics which have a significant association[82], however the discussion will also address characteristics that are not significant. The magnitude of the effects, as indicated by the odds ratios in Appendix D; D3, will also be discussed. (See Appendix D; D2 for the full list of categories in the logistic regression, with the coefficients and significance tests for each.)

[82] Statistically significant at the 5 per cent level.

5.2.1 Literacy

For adults in England, there are seven variables that have significant associations with low proficiency in literacy. These are level of education, ethnicity, general health, parental level of education, computer experience in everyday life, job industry and occupation.

Figure 5.1 Probability of achieving Level 1 or below in literacy, controlling for different characteristics



Source: PIAAC (2012)
Notes: Baseline probability for 'low proficiency' in literacy is 15.7 per cent

Level of education (reference category: secondary school)

Compared with those who were educated to secondary school level, adults in England who had an education level of less than secondary school were more likely to have low literacy proficiency. This was a large effect, relative to the other significant associations for literacy. Adults whose education level was above secondary school were less likely to have low proficiency in literacy; this effect was smaller but is still significant. Overall, literacy scores increased as level of education increased.

Ethnicity (reference category: White)

Black adults in England were more likely to have low proficiency in literacy than White adults. This category had the largest effect of all the significant correlations for literacy. Those who had a missing response for ethnicity were less likely to have low literacy proficiency than White adults; however, as referred to above, this may be due to the relatively small sample size of those who did not provide ethnicity data.

General health (reference category: very good)

Adults in England were more likely to have low proficiency in literacy if their health was poor, fair or good compared to adults with very good health. Those who said they had excellent health were also more likely to have low proficiency than those who had very good health, which does not follow the pattern that literacy scores increased with better levels of health. Having poor health had the largest effect of all the 'general health' comparison categories.

Mother and father's level of education (reference category: less than secondary school)

Compared with adults whose level of parental education was less than secondary school, those whose father's education was above secondary school were less likely to have low proficiency in literacy skills. Adults were also less likely to have low literacy proficiency when their mother's education was secondary school or above. This indicates that lower levels of parental education were associated with lower literacy proficiency.

Computer experience in everyday life (reference category: has computer experience)

Adults in England who had no computer experience in everyday life, or who gave a missing response to this, were more likely to have low proficiency in literacy than those who had computer experience. The effect size was similar for both categories.

Job industry (reference category: human health and social work)

Those working in human health and social work were more likely to have low literacy proficiency than adults working in public administration and defence.

Occupation (reference category: services and shop and market sales)

Professionals and adults working in the armed forces were less likely than those working in services and shop and market sales to have low proficiency in literacy skills. However, these effects may have been inflated by smaller sample sizes.

Characteristics that had no significant correlation with low proficiency in literacy

The following characteristics did not have significant associations with either an increased or decreased likelihood of achieving Level 1 or below in literacy, when compared to the reference category (given in brackets):

- gender (male);
- age (35-44 years);
- employment status (employed or self-employed);

- English as an additional language (EAL) (English as a first language);
- ethnicity*EAL interaction (White*English as a first language);
- born in the UK or not (born in the UK);
- disability (no disability); and
- having children or not (does not have children).

Of these eight characteristics that were not significantly associated with low literacy proficiency, perhaps the most surprising are having English as an additional language and age.

Analyses in Chapter 2 revealed that mean literacy scores for the youngest age group (16-18 year olds) were 20 scores points below that of 35-44 year olds, which appears to be a large difference. This group also had higher proportions at Level 1 or below, and lower proportions at Levels 4 and 5 compared to the 35-44 year olds. However, the logistic regression shows that being younger than 35-44 years is not significantly associated with low proficiency. The seeming contrast in these results may be for two main reasons.

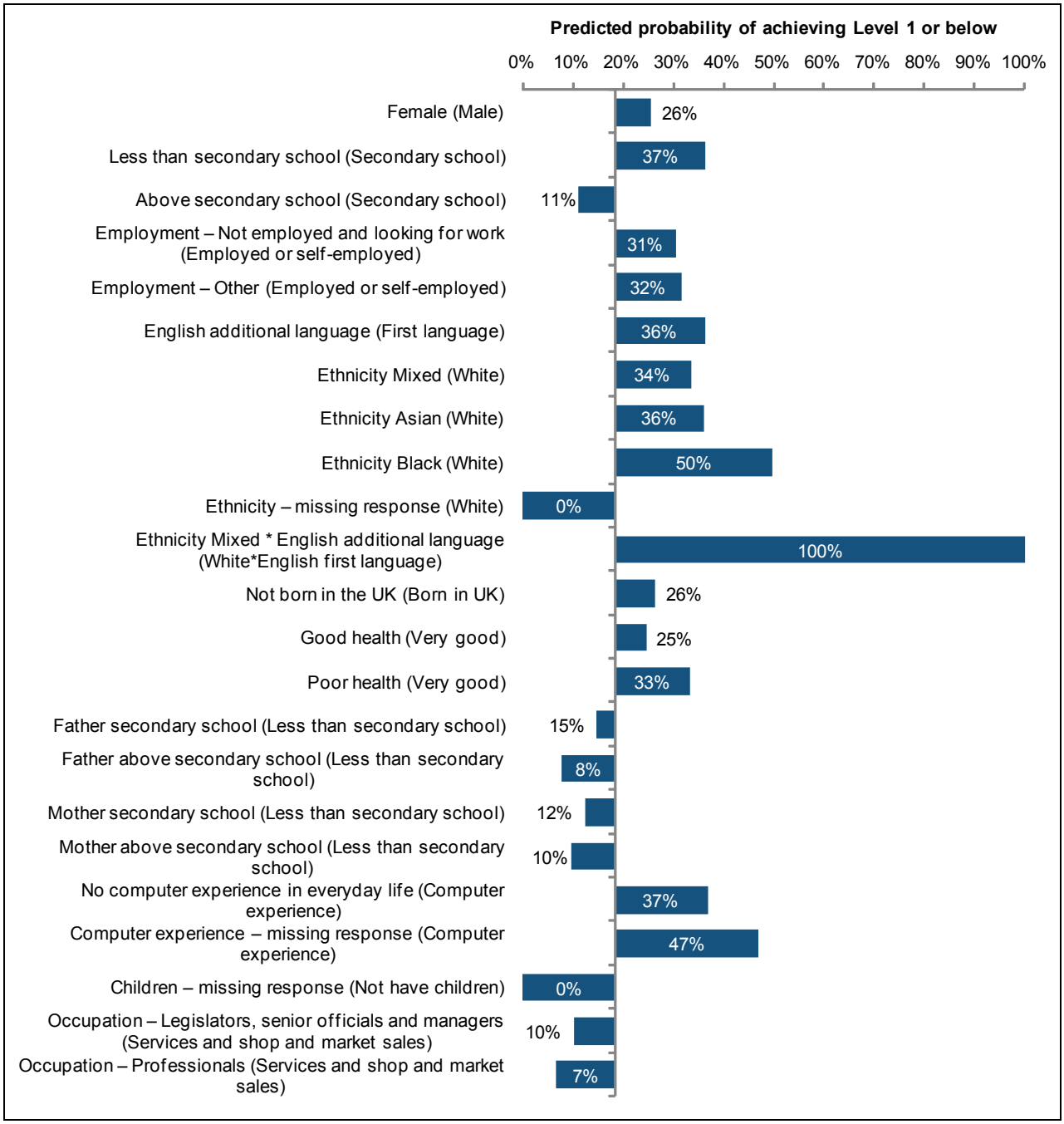
Firstly, in the regression, the youngest age group was 16-24 years old whereas in the analyses in Chapter 2 this age band was split into 16-18 year olds and 19-24 year olds. Therefore, combining the proportions of 16-18 and 19-24 year olds at Level 1 or below in the regression may conceal an effect in the youngest age group. That is, the overall proportion of 16-24 year olds at Level 1 or below has decreased compared to the proportion for 16-18 year olds alone.

Secondly, the regression considers demographic variables in isolation, drawing out the effect of age when all other variables are held constant. So, while in Chapter 2 it appears that age may be correlated with literacy proficiency, this does not take into account other variables that may be associated with age. That is, being a student, not having children and having computer experience in everyday life may all correlate with younger age groups and may have different associations with literacy proficiency. Therefore, what appears to be an effect of age in Chapter 2 may in fact be an effect of being a student, versus being employed (rather than an effect of age), but as age and employment status may be highly correlated it is difficult to ascertain the size of the effect of each separate variable. In the logistic regression discussed here, we can see the effect of age in isolation from all other variables, thus independent of employment status. The coefficients displayed in Appendix D; D2 show that the youngest age group are more likely to have low proficiency than the reference category, but the result is not significant. This may suggest that while the association between younger age and low proficiency is not statistically significant, there may be an interaction with other variables that are closely associated with age which result in the patterns of low performance in younger age bands, described in Chapter 2.

5.2.2 Numeracy

For adults in England, there are twelve variables that have significant associations with proficiency of Level 1 or below in numeracy. These are gender, level of education, employment status, English as an additional language, ethnicity, ethnicity*EAL interaction, country of birth, general health, parental level of education, computer experience, having children or not and occupation. Numeracy has more significant associations between demographic characteristics and risk of low proficiency than literacy or problem solving.

Figure 5.2 Probability of achieving Level 1 or below in numeracy, controlling for different characteristics



Source: PIAAC (2012)
Notes: Baseline probability for 'low proficiency' in numeracy is 18.6 per cent

Gender (reference category: male)

Females in England were more likely than males to have low numeracy proficiency. Numeracy was the only domain in which gender had a significant association with proficiency.

Level of education (reference category: secondary school)

Compared with those who were educated to secondary school level, adults in England who had an education level of less than secondary school were more likely to have low numeracy proficiency. However, adults whose education level was above secondary school were less likely to have low proficiency in numeracy, although this effect was smaller. This is the same pattern as for literacy; that is, lower levels of education are associated with greater risk of low proficiency.

Employment status (reference category: employed or self-employed)

Adults who were unemployed and looking for work, or categorised as 'other' were more likely to have low proficiency in numeracy than those who were employed or self-employed. These comparison categories were not significantly associated with low proficiency in literacy or problem solving, showing that the association between employment status and proficiency across these three domains varies.

English as an additional language (reference category: English as a first language)

Compared with adults who had English as a first language, adults with English as an additional language were more likely to have low numeracy proficiency. Numeracy was the only domain in which this association was significant.

Ethnicity (reference category: White)

Asian, Black and Mixed ethnicity adults were more likely to have low numeracy proficiency than White adults, with the effect being largest for Black adults. As was the case for literacy, those whose ethnicity data was missing were less likely to have low proficiency than White adults, however this finding may be due to small sample sizes. Numeracy had a higher number of significant correlations with ethnicity than either of the other two domains.

Ethnicity*English as an additional language interaction

(reference category: White*English as a first language)

The results of the regression suggest that adults who were both of Mixed ethnicity and had English as an additional language were much more likely to have low numeracy proficiency than White adults who had English as a first language. This association was only significant for numeracy and no other interactions between ethnicity and first language were significant in any of the three domains. However, the magnitude of the effect must be interpreted with caution as it may be inflated by small sample sizes.

Born in the UK or not (reference category: born in the UK)

Adults who were not born in the UK were more likely to have low proficiency than those born in the UK. This finding was only significant for numeracy.

General health (reference category: very good)

Adults in England were more likely to have low numeracy proficiency if their health was poor or good compared to adults with very good health. The effect was larger for those with poor health.

Mother and father's level of education (reference category: less than secondary school)

As in literacy, parental levels of education that were secondary school or above were associated with a decreased likelihood of adults in England having low numeracy proficiency.

Computer experience in everyday life (reference category: has computer experience)

Adults in England were more likely to have low proficiency in numeracy if they had no computer experience, or did not respond to this question, compared with adults who had computer experience in everyday life.

Having children or not (reference category: does not have children)

There was no significant difference in the probability of low numeracy proficiency between those who had children and those who did not have children. Adults who gave a missing response to whether or not they had children were less likely to have low proficiency in numeracy than adults who did not have children, but this may be due to a small sample size.

Occupation (reference category: services and shop and market sales)

Those working in services and shop and market sales occupations were more likely to have low numeracy proficiency than those working as professionals or legislators, senior officials and managers.

Characteristics that had no significant association with low proficiency in numeracy

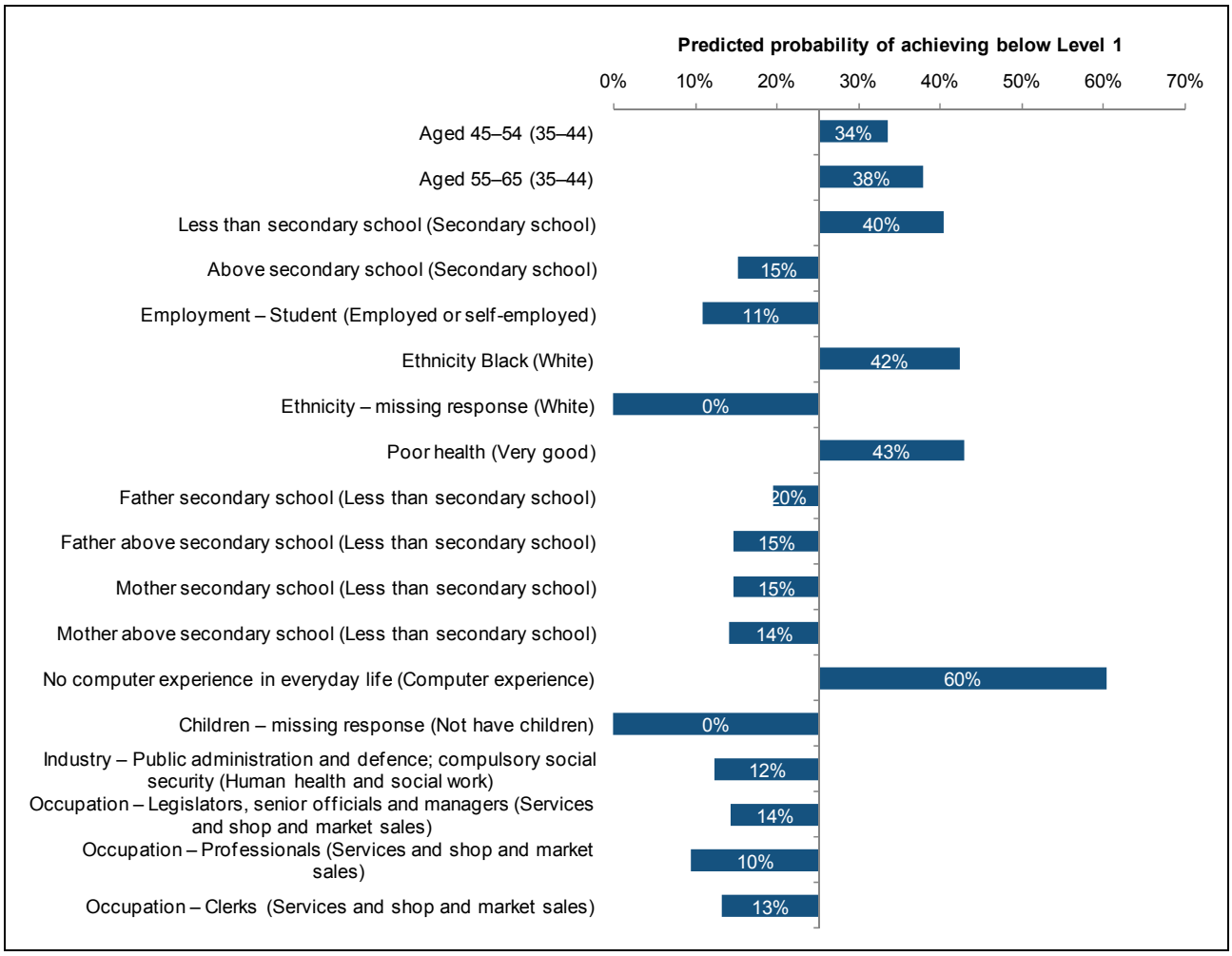
The following characteristics did not have significant associations with either an increased or decreased likelihood of achieving Level 1 or below in numeracy, when compared to the reference category (given in brackets):

- age (35-44 years);
- disability (no disability); and
- job industry (human health and social work).

5.2.3 Problem solving in a technology-rich environment

For adults in England, ten variables have significant associations with proficiency of below Level 1 in problem solving. These are age, level of education, employment status, ethnicity, general health, parental level of education, computer experience, having children or not, job industry and occupation.

Figure 5.3 Probability of achieving below Level 1 in problem solving, controlling for different characteristics



Source: PIAAC (2012)
Notes: Baseline probability for 'low proficiency' in literacy is 25.2 per cent

Age (reference category: 35-44 years)

Problem solving was the only domain in which some age categories were significantly associated with an increased likelihood of having low proficiency. Adults aged 45-54 years and 55-65 years were more likely to have low proficiency in problem solving than 35-44 year olds, and the effect was larger for the older age group. Adults in the younger age groups (16-24 and 25-34) did not differ significantly in their probability of having low proficiency compared to 35-44 year olds.

Level of education (reference category: secondary school)

As in literacy and numeracy, higher levels of education were associated with lower risk of low proficiency in problem solving. Adults whose level of education was lower than secondary school were more likely to have low proficiency in problem solving. Those who studied beyond secondary school were less likely to have low proficiency than those whose highest level of education was secondary school, although this effect was smaller.

Employment status (reference category: employed or self-employed)

Students were less likely to have low proficiency in problem solving than adults who were employed or self-employed. No other status of employment was significantly associated with problem solving proficiency, compared with the reference category.

Ethnicity (reference category: White)

As for literacy and numeracy, Black adults in England were more likely to have low proficiency in problem solving than White adults. Those who had missing information regarding their ethnicity were less likely to have low proficiency than White adults as well, but this association may be due to small sample sizes (as was the case for literacy and numeracy).

General health (reference category: very good)

Adults with poor health were more likely than those with very good health to have low proficiency in problem solving skills.

Mother and father's level of education (reference category: less than secondary school)

Lower levels of parental education had the same association with low proficiency in problem solving as that seen for literacy and numeracy. That is, adults with parental education levels that were secondary school or above were less likely to have low proficiency than those whose parental education was less than secondary school.

Computer experience in everyday life (reference category: has computer experience)

Adults who said they had computer experience in everyday life were less likely to have low proficiency in problem solving than those who did not have computer experience in everyday life. This was a large effect and is unsurprising due to the technology-rich environment of the problem solving task.

Having children or not (reference category: does not have children)

As for numeracy, adults who gave a missing response to whether or not they had children appeared to be less likely to have low proficiency in problem solving than adults who were identified as not having children. However, this finding may be inflated by small sample sizes.

Job industry (reference category: human health and social work)

Those working in human health and social work were more likely to have low proficiency in problem solving compared with adults working in public administration and defence.

Occupation (reference category: services and shop and market sales)

Professionals, clerks and legislators, senior officials and managers were less likely to have low proficiency in problem solving compared with those working in services and shop and market sales.

Characteristics that had no significant correlation with low proficiency in problem solving

The following characteristics did not have significant correlations with either an increased or decreased likelihood of achieving below Level 1 in problem solving, when compared with the reference category (given in brackets):

- gender (male);
- English as an additional language (EAL) (English as a first language);
- ethnicity*EAL interaction (White*English as a first language);
- born in the UK or not (born in the UK); and
- disability (no disability).

5.3 Conclusions

For literacy and numeracy, low proficiency is defined as achieving Level 1 or below, whereas for problem solving achieving below Level 1 defines low proficiency. By these definitions, less than a fifth of adults in England had low proficiency in literacy and problem solving, while just under a quarter had low proficiency in numeracy (as shown in Table 5.1 earlier). The OECD averages for low proficiency were slightly below those for England in each domain, with the difference in numeracy being statistically significant.

Table 5.4 summarises the characteristics associated with low proficiency in each of the three domains, for adults in England.

Table 5.4 Characteristics significantly associated with low proficiency in each domain

Literacy	Numeracy	Problem solving
Lower levels of education	Lower levels of education	Lower levels of education
Ethnicity (i.e. Black)	Ethnicity (i.e. Black, Asian or Mixed)	Ethnicity (i.e. Black)
Not having 'very good' general health	Having less than 'very good' general health	Having 'poor' general health
Lower parental level of education	Lower parental level of education	Lower parental level of education
No computer experience in everyday life	No computer experience in everyday life	No computer experience in everyday life
Occupation (i.e. services and shop and market sales)	Occupation (i.e. services and shop and market sales)	Occupation (i.e. services and shop and market sales)
Job industry (i.e. human health and social work)		Job industry (i.e. human health and social work)
	Employment status (i.e. not employed or looking for work)	Employment status (i.e. employed or self-employed)
	Having children or not	Having children or not
	English as an additional language	
	Being female	
	Ethnicity*EAL (i.e. Mixed)	
	Not born in the UK	
		Age (i.e. being 45-65 years old)

Source: PIAAC (2012)

There are six characteristics which have significant associations with low proficiency common to all three domains. The results from the regression indicate that the characteristics most likely to predict low proficiency are having a low level of education, belonging to particular ethnic groups, having poorer general health, having parents who have low levels of education, not having computer experience in everyday life and working in certain occupations.

Some characteristics were identified as having larger effects, or stronger associations, with low proficiency than other characteristics. Across the three domains, the characteristics with the strongest associations were having less than secondary school education, being Black and having poor health. Having no computer experience also had a strong effect in numeracy and problem solving.

Some of the characteristics associated with low proficiency in all three domains could be regarded as within the individual's control and therefore possible to change (indicated by green shading in Table 5.4): level of education, computer experience and occupation. However, others (indicated by purple shading in Table 5.4) are fixed and cannot be controlled or changed (ethnicity and parental education), or are difficult to define in these terms (such as general health). The implication, therefore, is that many of the characteristics associated with low proficiency can be influenced and changed; there is scope for example to improve individuals' everyday computer experience by providing more opportunities to support this.

There are also some unchangeable characteristics that are only significant in one domain, for example older age in problem solving. While it may not be a surprising finding that older age is associated with lower proficiency in problem solving, due to the technological context of this assessment, it is surprising that age was not significantly correlated with low proficiency in literacy or numeracy.

Country of birth (UK or not), English as an additional language, and ethnicity and EAL interactions were only significant for numeracy, which is somewhat surprising as it may be expected that of the three domains, numeracy would be the least language- or cultural-context-dependent. However, it is important to recognise that for some of the categories the sample sizes were small and therefore these findings should be interpreted with caution. Gender was also only significant in numeracy, in favour of males.

Disability status was the only characteristic that had no significant associations with low proficiency in any of the three domains.

It is not possible to infer causation from the logistic regression; we can only identify an association between characteristics and low proficiency. As mentioned above, some characteristics can be determined by an individual while others are fixed (such as gender). This attribute of the characteristic should therefore be borne in mind when interpreting associations. For instance, increasing your level of education may reduce the risk of having low proficiency, but this will not affect the contribution of your ethnicity or gender on levels of proficiency, and these unchangeable characteristics may influence those life decisions which place individuals at greater risk of low proficiency. For example, level of parental education may influence an individual's choices about their own level of education, affecting their likelihood of performing at low levels in the domains assessed in the International Survey of Adult Skills. However, there may be other mediating variables that affect the interplay of different characteristics on levels of proficiency in each domain.

6. Comparisons with IALS

Key findings

The two surveys, the International Adult Literacy Survey (IALS) in 1996 and the International Survey of Adult Skills in 2012, can be compared in terms of literacy. The other two domains in the International Survey of Adult Skills do not provide a sufficient basis for comparison.

Major demographic changes between the two surveys have related to education and migration: the majority of respondents now have some secondary school or higher qualifications; growth in migration has raised the proportion of respondents not born in the UK significantly.

The average scores by population demographics and literacy proficiency levels show some significant improvements between IALS and the International Survey of Adult Skills, with England being one of a small group of countries with improved scores; only Poland, Italy, Australia and Northern Ireland also had significantly improved average scores. Unlike IALS, average literacy scores in England are now close to international averages (when compared with the other 15 countries that took part in both surveys).

The average scores of the oldest age band (55-65) increased significantly; the scores for all other age bands apart from the youngest also increased although these were not significant; the average score for the youngest band (16-24) decreased but this was not significant.

There was a statistically significant increase in the proportion of respondents with Level 2 literacy proficiency (from 29 per cent in IALS to 34 per cent in the International Survey of Adult Skills) and a significant decline in the proportion at Below Level 1 (from 8 per cent to 1 per cent) with half the population now having literacy proficiency of Level 3 or above.

Average scores have decreased when analysed by education levels, but a far higher proportion of respondents have a higher education level when compared with IALS.

6.1 Introduction

This chapter describes changes in demographic characteristics between the weighted samples for the International Adult Literacy Survey (IALS) and the International Survey of Adult Skills. It compares the distribution of literacy skills by gender, age, education levels and immigration status. Some comparisons are made with the other 15 countries that also took part in IALS.[83] An international report comparing IALS with the International Survey of

[83] Australia, Belgium (Flanders), Canada, Czech Republic, Denmark, Finland, Germany, Republic of Ireland, Italy, The Netherlands, Northern Ireland, Norway, Poland, Sweden, USA

Adult Skills will be published by the OECD but the date of publication has not yet been announced.

All four countries of the United Kingdom took part in IALS in 1996. National results were reported separately for Great Britain[84] (comprising England, Wales and Scotland)[85] and Northern Ireland[86].

While there are similarities and differences between the surveys, one objective of the International Survey of Adult Skills was to provide measures of proficiency in the domains of literacy and numeracy[87] that were comparable with previous surveys. As explained in detail in Chapter 1 (section 1.4), literacy skills can be compared between the International Survey of Adult Skills and IALS, but this is not possible for numeracy: the domain of quantitative literacy in IALS – which measured numeracy in a different form – is very different from the definition of numeracy in the International Survey of Adults Skills, making comparisons impossible. Further information is available in the *Technical Report of the Survey of Adult Skills (PIAAC)*.[88] In addition, there can be no comparison of problem solving in technology-rich environments because this was a new domain for the current survey. The OECD report specifies that the validity of any comparison rests upon:

- the comparability of the construct and the background questionnaire;
- the comparability of the samples; and
- the degree of similarity in conducting the surveys.[89]

The impact of each of these is discussed below.

6.1.1 Comparability of construct and the background questionnaire

In the International Survey of Adult Skills, literacy has a broader definition than it did in IALS, encompassing both prose and document literacy; it also includes reading digital as well as print based texts (see section 1.6 for more detail).

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[84] Carey, S., Low, S. and Hansbro, J. (1997). *Adult Literacy in Britain.* London: The Stationery Office.

[85] The national report also included some analysis by region

[86] Sweeney, K., Morgan, B. and Dermot, D. (1998). *Adult Literacy in Northern Ireland.* London: The Stationery Office.

[87] Comparisons of numeracy relate the results of the International Survey of Adults Skills to those of the Adult Literacy and Life Skills Survey (ALL); England did not participate in the latter.

[88] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing.

[89] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing.

There are considerable similarities in the concept of the cognitive processes involved, the definitions of the context for reading and the factors affecting the difficulty of the test items. Additionally, the International Survey of Adult Skills is linked to IALS through the use of a high number of common test items – 29 (of 52) in the computer based assessment and 18 (of 24) in the paper based version. When items were re-cast for the computer based assessment, every effort was made to keep them as close as possible to the original paper based versions.

It could be suggested that the different modes of assessment for IALS and the International Survey of Adult Skills may have an impact on the comparability of the results. This issue was explored during the field test for the International Survey of Adult Skills, where participants were assigned to computer based or paper based assessment in a random way and no significant mode effects were found. When all other variables were taken into account, the results were not affected by whether participants took the assessments on paper or on computer.

The background questionnaires for both surveys comprised very similar or identical questions and collected information in very similar response categories. Where there were differences in response categories, derived variables were created to facilitate comparison. Changes were also made to results of questions relating to occupation as the International Standard Classification of Occupations (ISCO)[90] had been revised between the surveys, but these classifications remained stable between the surveys.

6.1.2 Comparability of samples in relation to the target populations

The target population for each survey was defined in the same way: all adults aged 16-65 not in institutions.[91] Samples were weighted to populations at the time. Please see Appendix A, section A8.2 for more details. Given this, the samples are both representative and comparable but they reveal some slightly different demographic distributions which are discussed in section 6.2.

As indicated earlier, the achieved sample for the International Survey of Adult Skills was 5,131 participants, which represented a 59 per cent response rate. In IALS, the overall achieved sample for Great Britain was 3,811 participants, which represented a response rate of 68 per cent. The results for IALS for England have been disaggregated for this analysis, resulting in an achieved sample for England of 2,472.[92]

Data for England are not included in international tables comparing performance in IALS with the International Survey of Adult Skills as England did not participate as a separate

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[90] International Labour Organization (2012). *International Standard Classification of Occupations: ISCO-08.*, Geneva: ILO [online]. Available: http://www.ilo.org/public/english/bureau/stat/isco/isco08/ [27 September, 2013].

[91] The target population excludes adults who live in a communal arrangement of an institutional nature for disciplinary, health, custodial or other reasons, such as prisons, barracks, hospitals and nursing homes.

[92] ETS, who carried out the analysis of IALS, advised NFER on the extraction of the relevant data files from the UK (England, Scotland and Wales) IALS database.

entity in IALS. However, England, Wales and Scotland were used as variables for generation of IALS plausible values and were also stratification variables for sampling and used for weighting. Consequently, it is appropriate to include the analyses in this chapter, although the smaller IALS sample size must be borne in mind when looking at results in detail.

6.1.3 Conduct of the surveys

Both surveys (IALS and the International Survey of Adult Skills) were conducted by personal interview in respondents' homes and, similarly, comprised two elements: a background questionnaire and an assessment. As indicated above, there were considerable similarities in the background questionnaire and the assessments were psychometrically linked in spite of the change in delivery mode in the majority of cases.

The International Survey of Adult Skills was, however, conducted with far greater emphasis on the standardisation and monitoring of survey procedures than was the case with IALS. Some doubts were expressed about the procedures and standards followed by the countries that took part in the first round of IALS in 1994, but these were subsequently improved for the second and third rounds.[93] This potential variation, therefore, has minimal impact on the results for England and Northern Ireland as both countries took part in the second round of IALS in 1996.

A major change between the surveys has been the change in response probability (RP) (in relation to the scores); in IALS this was 80 per cent but this has changed to 67 per cent for the International Survey of Adult Skills. In order to allow comparisons to be made, the original IALS data have been recalibrated to match the 67 per cent RP of the International Survey of Adult Skills. For this reason, findings for the current survey cannot be compared with previously published information on IALS. All comparisons here are made using the recalibrated IALS trend data.

Further information on this recalibration, including details in the change in response probability from RP80 in IALS to RP67 in the International Survey of Adult Skills is available in the *Technical Report of the Survey of Adult Skills (PIAAC)*.[94]

6.2 Changes in demographic characteristics since IALS

As indication in section 6.1.2, the samples for IALS and the International Survey of Adult Skills were weighted to population estimates at the time (1996 and 2012 respectively), but there have been changes in the characteristics of the population of England (as shown by the samples) since IALS was carried out. The structure of the samples for each survey is generally similar, apart from the levels of education (see section 6.2.2) and some variation in the proportions in each age band.

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[93] OECD (2013b, forthcoming). *Survey of Adult Skills (PIAAC) International Report: Volume II.* Paris: OECD Publishing. Chapter 5:193.

[94] OECD (2013c, forthcoming). *Technical Report of the Survey of Adult Skills (PIAAC)*. Paris: OECD Publishing. Chapter 17.4.2.

In terms of gender split, the two samples represent similar demographics with equal proportions of men and women. Full data are available in Appendix E, Table E2.

6.2.1 Age

The weighted percentages of adults by age band are shown in Table 6.1 below. The only statistically significant difference between the two surveys is for the 55-65 age group, where there is an increase of two per cent in the proportion of adults of this age for the International Survey of Adult Skills, clearly reflecting the generally ageing population. There are also changes in the 25-34 and 35-44 age bands (a decrease of two per cent in each case), but these are not statistically significant.

Table 6.1 Participants by age band (weighted)

Age band	IALS per cent		International Survey of Adult Skills per cent	
16-24	18	(0.5)	18	(0.1)
25-34	22	(1.1)	20	(0.1)
35-44	23	(1.1)	21	(0.1)
45-54	20	(1.5)	21	(0.1)
55-65*	17	(0.7)	19	(0.1)
Total	100		100	

Source: PIAAC 2012; IALS Trend Data
Totals may not sum to 100 per cent due to rounding
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

6.2.2 Education

There have been considerable changes in the level of education between the two surveys. The school leaving age was changed in 1972, raising the compulsory end of secondary education from 15 to 16. There has also been a much greater emphasis on Higher Education since then, with dramatic increases in the numbers engaging at this level. The change in the school leaving age affected a higher proportion of the IALS sample; nearly half the target population were old enough (born in 1957 or earlier) to have potentially left school at age 15; they would, therefore, have completed three years or less of secondary education and were unlikely to have achieved secondary school qualifications equivalent to GCSE. This would only affect those in the oldest age group (55-65) in the International Survey of Adult Skills.

Education levels in this report, therefore, relate to three groups:

- Three years or less of secondary education: those who had either not completed secondary education or had not achieved any of the qualifications associated with that stage;

- Full secondary education: those who had GCSEs, A levels or equivalent; and
- University or equivalent: those with higher qualifications such as degrees.

Tables 6.2 and 6.3 show the proportions of adults by level of education and age group (and overall) for each survey.

Table 6.2 Proportions at different education levels by age bands in IALS

Education level*	Age bands											
	16-24		25-34		35-44		45-54		55-65		Total	
Three years or fewer of secondary education	61	(0.9)	54	(1.4)	54	(1.4)	65	(6.3)	76	(3.2)	61	(1.7)
Full secondary education	30	(1.0)	23	(1.2)	20	(1.2)	13	(8.5)	10	(3.7)	20	(2.1)
University or equivalent	9	(0.5)	23	(1.2)	25	(1.3)	22	(2.5)	14	(1.4)	19	(0.5)
Total	18	(0.5)	22	(1.1)	23	(1.1)	20	(1.5)	17	(0.7)	100	

Source: PIAAC 2012; IALS Trend Data
Totals may not sum to 100 per cent due to rounding
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level for all categories in this table, as shown in Appendix table E5.
() Standard errors appear in parentheses

Table 6.3 Proportions at different education levels by age bands in the International Survey of Adult Skills

Education level	Age bands											
	16-24		25-34		35-44		45-54		55-65		Total	
Three years or fewer of secondary education	8	(0.6)	6	(0.6)	7	(0.5)	11	(0.5)	20	(0.7)	10	(0.3)
Full secondary education	70	(1.1)	43	(1.1)	46	(1.4)	53	(1.4)	48	(1.4)	52	(0.6)
University or equivalent	20	(1.1)	49	(1.1)	44	(1.4)	35	(1.3)	31	(1.3)	36	(0.6)
Not definable	2	(0.7)	3	(0.6)	2	(0.5)	1	(0.3)	1	(0.4)	2	(0.2)
Total	18	(0.1)	20	(0.1)	21	(0.1)	21	(0.1)	19	(0.1)	100	

Source: PIAAC 2012; IALS Trend Data
Totals may not sum to 100 per cent due to rounding
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level for all categories in this table, as shown in Appendix table E5.

() Standard errors appear in parentheses

These changes are shown in the comparison of education levels by age bands. While more than half the adults in each age band in IALS had completed three years or fewer of secondary education, this is only the case for ten per cent overall in the International Survey of Adult Skills and far fewer for all the other age groups.

Full details are available in Appendix E, Tables E5 and E6.

6.2.3 Employment

There has been little change in the overall statistics when the two surveys are compared in terms of employment status. The percentage of those in paid work, at 67 per cent in 2012, has changed by less than one percentage point between the two surveys.

The percentage of students who took part has increased between the two surveys, from three per cent in IALS to eight per cent in the International Survey of Adult Skills. This difference is statistically significant. The proportion of those who have retired has increased by one percentage point in the International Survey of Adult Skills; this difference also is statistically significant. There was a small decrease in the proportion of those taking part who were doing unpaid household work, although this percentage has changed by less than one percentage point.

Full details are available in Appendix E, Table E3.

6.2.4 Immigration

The proportion of participants who were not born in the country (UK) has increased significantly between the two surveys. The percentage of immigrants has increased by six percentage points from nine per cent in IALS to 15 per cent in the International Survey of Adult Skills. However, this is a partial view of the impact of immigration as data about respondents' first language is not available in the IALS trend data so no comparison can be drawn with the International Survey of Adult Skills.

In both surveys, those born in the UK had a significantly higher average score than those born elsewhere, but there is a smaller points gap in the International Survey of Adult Skills (21 points compared with a 36 point gap in IALS).

Full details comparing those born in the UK with those who were born abroad are available in Appendix E, Table E4.

6.3 Comparing changes in the distribution of literacy skills

As discussed in Chapter 1 and section 6.1.3 of this chapter, the International Survey of Adult Skills was designed to be linked psychometrically with IALS. The results of the earlier survey (IALS) have been recalibrated so that score points can be compared.

In England, the overall literacy score increased significantly from 267 in IALS to 273 in the International Survey of Adult Skills. This contrasts with a statistically significant fall of two points in the international average and shows that the gap with the OECD average has

been overcome. In IALS, the average score for England was eight points below the OECD average while for the International Survey of Adult Skills the two scores are the same: 273 points (on a scale from 0 to 500). It also contrasts with findings from the national Skills for Life Survey, which has shown no significant change in literacy performance between 2003 and 2011.[95] Overall, the trend is more positive for England than for many other countries. Only Poland, Italy, Australia and Northern Ireland also showed a significant increase in score. In IALS, by contrast, the average score for England was higher only than the Republic of Ireland, Italy, Poland and Northern Ireland. These differences may or may not be significant as the data for England for IALS is not included in the International Data Explorer (England data will be available on 8 October 2013).

Table 6.4 gives the average scores for the two surveys for all countries that took part in both. Those countries with a statistically different score between the two surveys are starred: a single star indicates that the average score for IALS was significantly lower than that for the International Survey of Adult Skills and two stars indicate that the average score for IALS was significantly higher than that for International Survey of Adult Skills.

[95] Department for Business, Innovation and Skills (2012b). *2011 Skills for Life: Annexes* (Research Paper 81a). London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/36066/12-p168an1-2011-skills-for-life-survey-annexes.pdf [30 September, 2013].

Table 6.4 International average scores for IALS and the International Survey of Adults Skills

	IALS		International Survey of Adults Skills	
	Average		Average	
Average of participating countries **	275	(0.4)	273	(0.2)
Australia*	272	(1.0)	280	(0.9)
Belgium	277	(3.5)	275	(0.8)
Canada**	279	(2.7)	273	(0.6)
Czech Republic**	277	(1.0)	274	(1.0)
Denmark**	289	(0.8)	271	(0.6)
Finland	287	(0.9)	288	(0.7)
Germany**	282	(1.0)	270	(0.9)
Ireland (Republic of)	264	(3.2)	267	(0.9)
Italy*	243	(1.9)	250	(1.1)
Netherlands	286	(0.9)	284	(0.7)
Norway**	294	(1.1)	278	(0.6)
Poland*	232	(1.1)	267	(0.6)
Sweden**	306	(1.0)	279	(0.7)
United States**	273	(1.4)	270	(1.0)
England (UK)*	267	(2.0)	273	(1.1)
Northern Ireland (UK)*	264	(1.2)	269	(1.9)

Source: PIAAC Data Explorer plus England analyses for IALS
The data in this table are weighted
* Statistically significant lower score for IALS when compared with the International Survey of Adults Skills at the 5 per cent level
** Statistically significant higher score for IALS when compared with the International Survey of Adults Skills at the 5 per cent level
() Standard errors appear in parentheses
Countries are ordered alphabetically as they are in the international report for the International Survey of Adult Skills. England and Northern Ireland appear at the end of the table as they are both part of the UK.

6.3.1 Literacy skills by age band

The trend data available for age comparisons are limited to 10-year age bands in the recalibrated data from IALS. The finer analysis of the youngest age group (16-24 separated into 16-18 and 19-24) available from the data from the International Survey of Adult Skills cannot therefore be extended to the IALS data. Table 6.5 shows the comparison of scores in the two surveys by age band. Further data are available in Table 6.7.

Table 6.5 Literacy scores by age band

Age band	IALS	International Survey of Adult Skills
16-24	273 (3.8)	265 (2.4)
25-34	277 (2.8)	280 (2.1)
35-44	277 (2.9)	279 (1.6)
45-54	265 (4.3)	271 (1.8)
55-65*	235 (3.8)	265 (2.0)

Source: PIAAC 2012; IALS Trend Data
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

The average scores of those under 25 have declined a little, although this difference is not statistically significant and may also be affected by the relatively small number in this age band in IALS. The comparison of average scores supports the view that adults are now retaining skills to an older age, rather than showing the marked fall in scores evident in IALS. This is further supported by the fact that the increase in average score in the 55-65 age band is statistically significant.

As IALS took place 16 years before the International Survey of Adult Skills, those who were in the 16-24 age group for the earlier survey would now be in either the 25-34 or the 35-44 bands,[96] with the expectation that the majority would fall into the older age group. In either case, the results suggest that adults have continued to gain skills, as scores for both these age bands are higher than those achieved by those under 25 in 1996. In addition, the decline in averages in the older age groups is less marked in the International Survey of Adults Skills than it was in IALS, adding further evidence for the successful acquisition of skills throughout working life. The significant increase in the average score of those aged 55-65 is interesting as it is only people in this cohort who would have been eligible to leave school at age 15; it seems they have acquired or retained skills more effectively than many internationally. These findings are supported by the national Skills for Life Survey, which found improved literacy skills for those aged 55-65 in 2011 compared with 2003.[97] As discussed in this report, this change could be attributed not only to the raising of the school leaving age, but also to the educational experiences of these participants, as those surveyed in 2003 were educated during the Second World War.

[96] In 2012 they would be aged 32-40.

[97] Department for Business, Innovation and Skills (2012b). *2011 Skills for Life: Annexes* (Research Paper 81a). London: BIS [online]. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/36066/12-p168an1-2011-skills-for-life-survey-annexes.pdf [30 September, 2013].

Section 2.5 in Chapter 2 provides in depth analysis of performance in the International Survey of Adult Skills by age.

6.3.2 Literacy skills by proficiency levels

Table 6.6 shows the distribution of literacy proficiency skills for IALS and the International Survey of Adult Skills.

Table 6.6 Literacy proficiency levels

Proficiency level	IALS per cent	International Survey of Adult Skills per cent
Below Level 1*	8 (0.9)	3 (0.8)
Level 1	14 (0.9)	13 (0.4)
Level 2*	29 (1.3)	34 (0.7)
Level 3	34 (1.3)	36 (1.0)
Level 4	14 (1.0)	13 (1.0)
Level 5	1 (0.3)	1 (0.7)
Total	100	100

Source: PIAAC 2012; IALS Trend Data
Totals may not sum to 100 per cent due to rounding
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Comparing the distribution of performance by proficiency levels between IALS and the International Survey of Adult Skills, there has been a significant decrease in the proportion of adults with Below Level 1 literacy skills and a significant increase in the proportion of adults with Level 2 literacy skills. Further data are available in Table E8 in Appendix E.

6.3.3 Literacy skills by gender

In England, the average scores for men were similar for IALS and the International Survey of Adult Skills, at 270 and 274 respectively. The average score for women increased between the surveys, with respondents achieving an average score of 263 in IALS and 271 for the International Survey of Adult Skills. This increase was statistically significant. However, the gap between men and women was not significantly different for either survey.

While the IALS scores were below the OECD average, they were much closer (or at the average) in the International Survey of Adult Skills, with the average score for men being identical to the average at 274 and just one point below for women. Table E2 in Appendix E provides further data.

6.4 Comparing education levels and literacy skills

As described in section 6.2.2, literacy scores are compared between three groups[98]:

- Three years or less of secondary education: those who had either not completed secondary education or had not achieved any of the qualifications associated with that stage;

- Full secondary education: those who had GCSEs, A levels or equivalent; and

- University or equivalent: those with higher qualifications such as degrees.

Table 6.7 shows the proportions and scores. Tables 6.8 and 6.9 show average scores by age band. Further data are available in Appendix E, table E5.

[98] These groupings were decided because of difficulties assigning education levels to the IALS data: at the time of IALS there were two options for categorising A-C GCSEs according to the International Standard Classification of Education (ISCED), either ISCED 2 or ISCED 3. ISCED 2 was chosen for IALS, whereas in the International Survey of Adult Skills those with A-C GCSEs were assigned to ISCED 3. This partly explains the difference in proportions in Table 6.7.

Table 6.7 Scores by education levels (and proportions)

Education level*	IALS proportion		IALS score		International Survey of Adult Skills proportion		International Survey of Adult Skills score	
Three years or fewer of secondary education	61	(1.7)	249	(2.6)	10	(0.3)	224	(2.6)
Full secondary education	20	(2.1)	282	(3.2)	52	(0.6)	268	(1.3)
University or equivalent	19	(0.5)	308	(2.0)	36	(0.6)	294	(1.5)
Not definable	Not applicable		Not applicable		2	(0.2)	230	(9.6)

Source: PIAAC 2012; IALS Trend Data
Totals may not sum to 100 per cent due to rounding
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level for all categories in this table
() Standard errors appear in parentheses

Average scores are slightly lower for each group in the International Survey of Adult Skills when compared with IALS. This seems counter-intuitive when the average score for the current survey is higher (273), but can be accounted for by the large increases in the proportions of people with higher educational achievement.

In IALS, just over 60 per cent of the sample population had an average score of 249; this therefore reduced the overall average. In the International Survey of Adult Skills nearly 90 per cent of the sample population had an average score of 268 or higher, leading to a higher overall average for this survey.

Tables 6.8 and 6.9 show average scores by education levels and age bands in the two surveys.

Table 6.8 Average scores by education levels and age bands in IALS

Education level	Age bands											
	16-24		25-34		35-44		45-54		55-65		Total	
Three years or fewer of secondary education	263*	(4.7)	258*	(4.2)	258*	(3.9)	247*	(5.3)	223	(4.7)	249*	(2.6)
Full secondary education	284*	(6.8)	290*	(5.5)	280	(5.0)	287*	(6.4)	257	(6.3)	282	(3.2)
University or equivalent	301*	(7.5)	312*	(3.8)	316*	(3.3)	306*	(4.4)	288	(4.5)	308	(2.0)
Total	273	(3.8)	277	(2.8)	277	(2.9)	265	(4.3)	235	(3.8)	267	(2.0)

Source: PIAAC 2012; IALS Trend Data
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

Table 6.9 Average scores by education levels and age bands in the International Survey of Adult Skills

Education level	Age bands											
	16-24		25-34		35-44		45-54		55-65		Total	
Three years or fewer of secondary education	213*	(8.6)	224*	(7.2)	218*	(6.4)	230*	(5.5)	228	(4.0)	224*	(2.6)
Full secondary education	268*	(2.5)	273*	(3.1)	270	(2.4)	265*	(2.4)	267	(2.5)	268*	(1.3)
University or equivalent	284*	(4.1)	296*	(2.8)	301*	(1.9)	294*	(2.9)	289	(3.2)	294*	(1.5)
Total	265	(2.4)	280	(2.1)	279	(1.6)	271	(1.8)	265	(2.0)	273*	(1.1)

Source: PIAAC 2012; IALS Trend Data
The data in this table are weighted
* The differences between IALS and the International Survey of Adult Skills mean scores are statistically significant at the 5 per cent level
() Standard errors appear in parentheses

When comparing average scores by age bands, all changes are statistically significant apart from those for respondents aged 35-44 who completed full secondary education and those aged 55-65 in all education categories.

For all categories of education, average scores are lower for the International Survey of Adult Skills apart from those in the oldest age group (55-65), where the increase is not significant. As this group would have fallen into the 35-54 bands in IALS, it can be seen that there has been a decline in proficiency with age, but at a slower rate than in many other countries, as discussed in section 6.3.1.

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