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ABSTRACT

Analyzing information from the Survey of Adult Skills (PIAAC), this paper explores the frequency with which adults engage in reading, writing and numeracy practices and the relationship between these practices and a range of social and economic outcomes. Results are examined for the general adult populations as well as adult populations with low literacy or numeracy proficiencies. For most social and economic outcomes, levels of engagement in literacy practices appear to be as strong predictors as proficiency measures are, indicating the importance of encouraging more intense engagement in literacy and numeracy practices both in and outside of work.

ADULTS' ENGAGEMENT IN READING, WRITING AND NUMERACY PRACTICES

This paper focuses on adults' uses of reading, writing and numeracy skills both at work and outside of work. Although previous international surveys of adult literacy such as the Adult Literacy and Lifeskills Survey (ALLS) included some questions about such skill use, the Survey of Adult Skills (PIAAC) contains the most extensive and systematically developed information about skills use to date. The innovation of such systematic reporting of skill use has been prompted by a growing body of research conducted in a social practices framework that calls for contextualized understandings and assessments of literacy and other adult skills that lead to a deeper understanding of literacy skills that what is possible based on standardized proficiency assessments alone (Carpentieri, in press; Reder, 2009a).

Although proponents of the social practices approach have offered strong critiques of the interpretive and policy frameworks that rely on standardized test scores alone (e.g., Hamilton, 2001; Hamilton & Barton, 2000; Street, 1997), alternatives have not been proposed that are practical for use on a large scale. This gap is particularly problematic for the development of more effective adult literacy and numeracy programs, a development that would be facilitated by the availability of richer measures of learner progress and program evaluations based on those measures. In reviewing a number of possible reasons for this gap, Reder (2009a) suggested that large scale assessments could usefully incorporate both standardized proficiency measures and improved measures of adults' engagement in everyday literacy and numeracy practices.

Initial analyses of ALLS data about skill use in the workplace (Desjardins & Rubenson, 2011) and in PIAAC (OECD, 2013a) demonstrate how useful such data can be in the context of large-scale assessments. Analyses of the skill use data in both surveys showed substantially increased earnings for workers at higher levels of skill use. In the case of their more in-depth analyses of ALLS, Desjardins and Rubenson (2011) estimated 32%, 20% and 10% increased earnings for high levels of reading, writing and numeracy skill use at work, respectively, compared to low levels of skill use after controlling for proficiencies, demographics, education, work experience, occupation and industry. With the more sophisticated measurement of skill use now available in the Survey of Adult Skills (PIAAC), more comprehensive understandings of the relationship between skill use, proficiency and a range of social and economic variables become possible. In this paper, we will closely examine these relationships, both in general adult populations and particularly in low-proficiency adult populations.[1]

The potential impact of skill use, of course, is not limited to economic outcomes. OECD (2013a) estimated the likelihood of positive social outcomes (social trust, volunteerism, political efficacy and health status) of adults with high levels of literacy proficiency (Level 4 or 5) compared with adults with low literacy proficiency (at or below Level 1). For each of these outcomes, individuals with high levels of assessed literacy proficiency were more likely to have positive social outcomes, even after controlling for demographic and educational attainment variables. Dinis da Costa, Rodrigues, Vera-Toscano & Weber (2014) analysed the same four social outcomes in more detail for countries in the European Union, and found proficiencies to be more important than education in determining these key social outcomes. Neither of these analyses looked closely at the role played by skill use in these social outcomes as we will do in this paper.

There may be more at stake here than just describing empirical associations between variables of interest in the Survey of Adult Skills (PIAAC). The descriptive relationships could indicate that effective adult basic skills programs might not only improve adults' literacy and numeracy abilities, they might improve the economic and social dimensions of their lives as well. Using strong quasi-experimental controls, Reder (2014a) found that participation in such programs appears to lead to substantial gains in

long-term earnings (and other outcome variables) of high school dropouts in the United States. The recent Canadian UPSKILL project, in a random control trial, also found substantial impacts of basic skills instruction for incumbent hospitality industry workers on proficiency gains, increased skill use on the job, measures of job performance and employer profits (Gyarmati, Leckie, Dowie, Palameta *et al*, 2014).

Increased skill use may be an important mediating variable linking these programs to diverse changes in economic and social outcomes. Research on adult basic skills programs indicates that instruction has an immediate effect on levels of literacy practice (Purcell-Gates, Degener, Jacobson & Soler, 2000; Reder, 2009b). Both longitudinal (Reder, 2009b) and cross-sectional studies (Sheehan-Holt & Smith, 2000) have shown that program participation has positive short-term effects on levels of literacy practices but not on literacy proficiency levels. Three comprehensive reviews of research on the impact of program participation on literacy proficiency found no systematic effects in studies that involved comparison groups and statistical controls (Beder, 1999; Brooks *et al*, 2001; Smith, 2009).

Practice engagement theory (Reder, 1994, 2015; Smith, 2009) holds that proficiency and engagement in literacy practices mutually reinforce each other across the adult lifespan. Longitudinal studies of adult literacy development find clear program impact on *long-term* proficiency gains but not on short-term changes (Reder, 2014b). Models of practice engagement theory that have examined data on literacy practices and literacy proficiency measured at multiple points in time provide strong evidence of the mutual influence of literacy practices and proficiency across the lifecourse (Reder, 2015). These findings are directly relevant to this paper because they suggest that interventions designed to increase low proficiency adults' uses of skills – whether at work or outside of work – could be an important strategy for raising their proficiency levels over longer periods of time. We will return to consider this possibility at the end of the paper after reviewing what PIAAC tells us about skill use among low-proficiency adults.[2]

Additional figures and tables.

This paper makes reference to a number of charts and tables that are not presented in the main narrative, but which are available in the Annex. This annex content is denoted Figures A1 – A6 and Tables A1 – A9.

Measures of Engagement in Reading, Writing and Numeracy Practices in the Survey of Adult Skills (PIAAC)

The Survey of Adult Skills (PIAAC) developed a methodology for measuring individuals' use of skills based on the Job Requirements Analysis (JRA) framework (Felstead, Gallie, Green & Zhou, 2007; OECD, 2013abc). One module of the Survey of Adult Skills (PIAAC) background questionnaire asked respondents about the frequency with which they performed specific tasks in their current or last job (if they were currently or recently employed) and another module asked about performance of those tasks outside of work.

For reading, individuals were asked about whether they engaged in each of eight tasks:

- Read directions or instructions
- Read letters, memos or e-mails
- 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
- Read diagrams, maps or schematics

Respondents indicated, on a Likert scale, how often they did each task:

- 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

In one module, all respondents were asked about performing these tasks in non-work settings. In another module, respondents who were currently or recently employed were asked about performance of the tasks at work.

For writing, individuals were asked about whether they engaged in each of four tasks:

- Write letters, memos or e-mails
- Write articles for newspapers, magazines or newsletters
- Write reports
- Fill in forms

Respondents indicated for each task, using the same Likert scale described above, how often they did the task.

For numeracy, individuals were asked about whether they engaged in each of six numeracy tasks:

- Calculate prices, costs or budgets
- Use or calculate fractions, decimals or percentages
- Use a calculator, either hand-held or computer-based
- Prepare charts, graphs or tables
- Use simple algebra or formulas
- Use more advanced math or statistics such as calculus, complex algebra, trigonometry or regression techniques

Respondents indicated for each task, using the same Likert scale described above, how often they did the task.

Responses to items about how often each of the above tasks was performed were grouped into six sets for analysis and scaling: reading at work, reading outside of work, writing at work, writing outside of work, numeracy at work, and numeracy outside of work. Responses were pooled across all participating countries and each set of items was scaled independently using Item Response Theory (Partial Credit Model).[3] Each scale was set to have a mean value of 2.0 and a standard deviation of 1.0.

Table 1 shows the percentage of adults pooled across countries who responded with "Never" on all items of a given scale. Although relatively few adults (1.3%) are "all nevers" for reading outside of work, a larger percentage (4.8%) of the low literacy population is "all nevers" for reading outside of work. The percentages of the general and low literacy workforces who do not read at work are considerably higher: 6% and 15.5%, respectively. This same pattern is evident for writing and numeracy, with higher percentages of "all nevers" in low-proficiency adults and higher percentages of non-use in work than outside of work settings. Sizeable fractions of the low literacy populations do not use writing at all, either at work (32.9%) or outside of work (24.9%). Comparable numbers do not use numeracy at all, either at work (39.9%) or outside of work (19.5%).

Table 1. Percentage of adults who respond "Never" on all items relating to how often they use particular skills at work or outside of work - International average

Skill Domain	Adults proficient at Level 1 or below[4]		Overall population (16-65)	
	%	S.E.	%	S.E.
Reading at Work	15.53	(0.48)	5.97	(0.09)
Reading Outside of Work	4.82	(0.20)	1.28	(0.04)
Writing at Work	32.94	(0.63)	14.64	(0.13)
Writing Outside of Work	24.93	(0.42)	9.90	(0.10)
Numeracy at Work	39.87	(0.61)	19.39	(0.15)
Numeracy Outside of Work	19.47	(0.34)	9.36	(0.11)

Notes:
1. In the case of reading and writing at or outside of work presented results refer to those at Level 1 or below in literacy and in case of numeracy at or outside of work to those at Level 1 or below in numeracy.
2. Percentages shown for use of skills at work are only for currently or recently employer adults. International average for OECD countries participating in the Survey of Adult Skills.

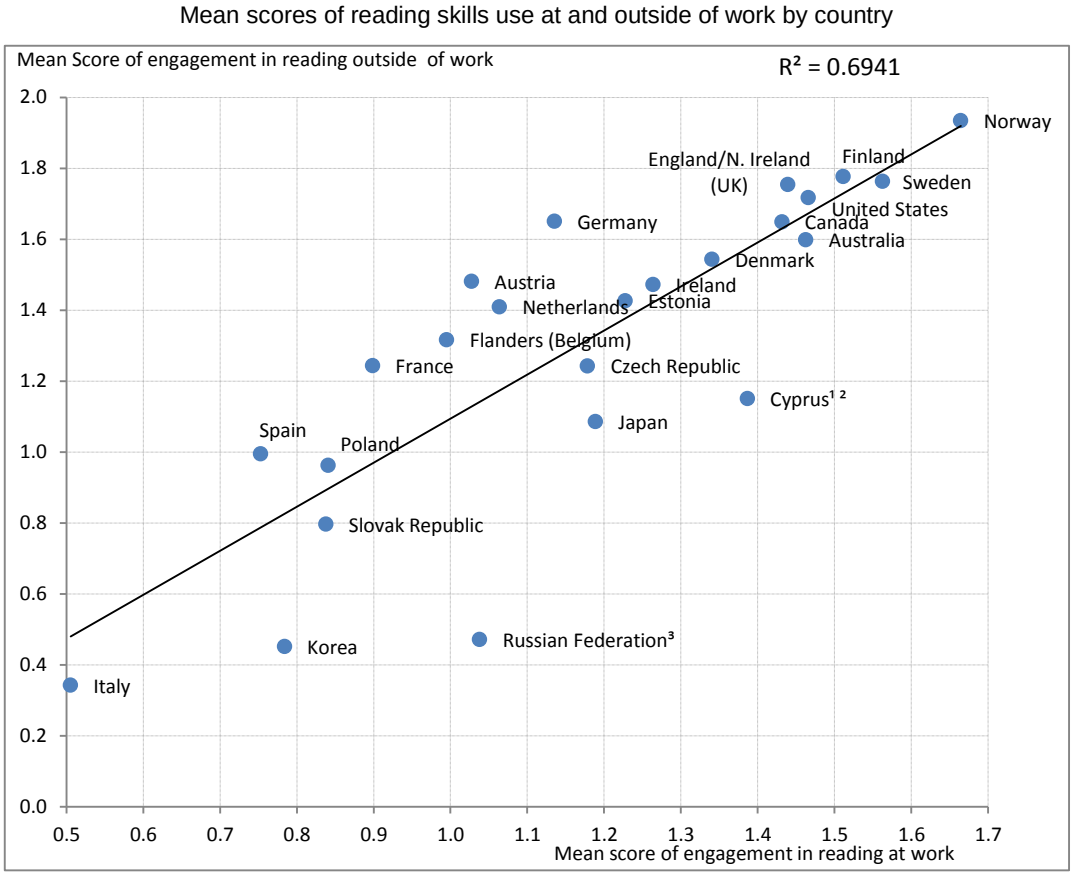
Source: Survey of Adult Skills (PIAAC) (2012)

Country Variation in Patterns of Reading, Writing and Numeracy Practices

The average values for the six literacy and numeracy practice engagement measures -- reading in work and non-work settings, writing in work and non-work settings, and numeracy in work and non-work settings -- vary widely among the countries. Annex Table A1 displays the country-specific averages of engagement in reading, writing and numeracy practices for work and outside of work settings. These tables show average values for the currently employed adult populations at work and for the entire adult populations outside of work settings.

Figures 1, 2 and 3 show average engagement levels in reading, writing and numeracy practices, respectively, for the low-proficiency populations of the countries. Figure 1 displays average engagement level by country for reading in work and outside of work settings.

Figure 1. Engagement of low-proficiency population in reading practices in work and outside of work settings



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

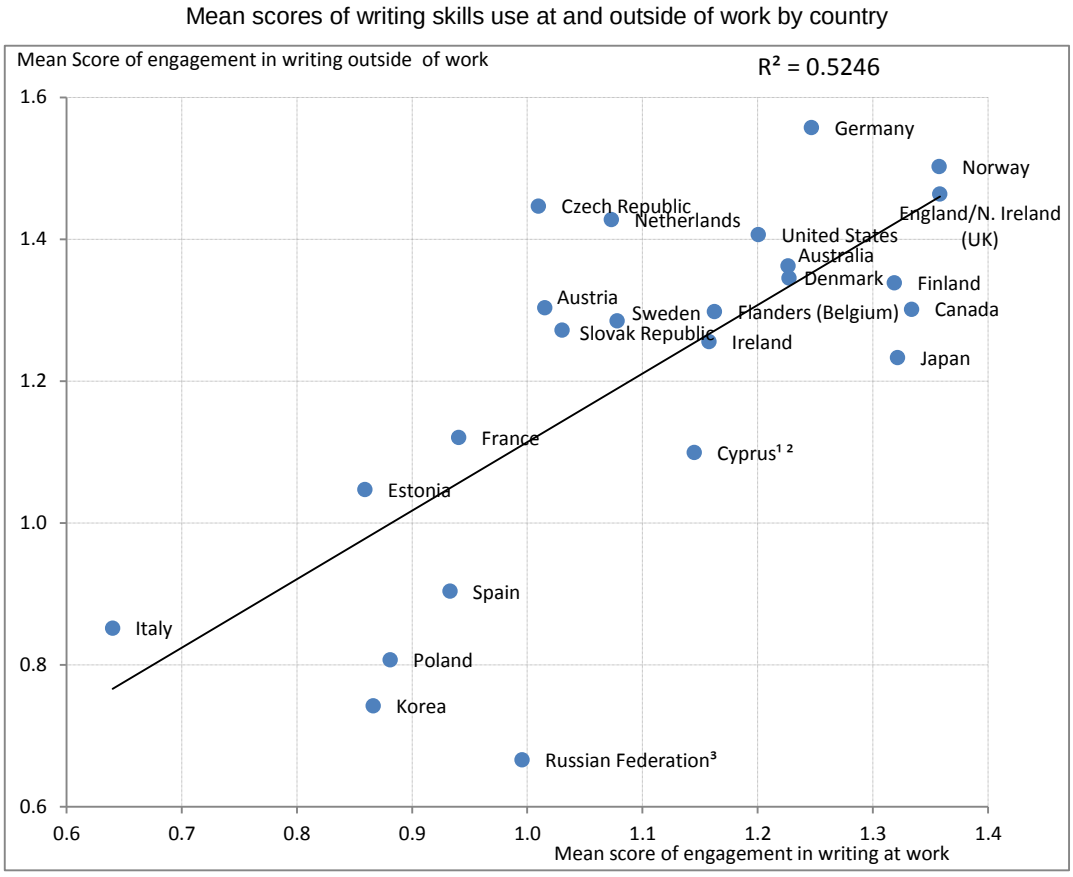
Source: Survey of Adult Skills (PIAAC) (2012).

Recall that the various engagement measures are each independently scaled to have means of 2.0 and standard deviations of 1.0 across the entire PIAAC population. However, the distributions of the modified versions of the corresponding indexes used in this paper have somewhat different means and standard deviations. The average levels of engagement shown in the figure for the low-literacy populations, centered approximately around mean values of 1.16 at work and 1.35 outside of work, are of course much lower than those of the general populations that center around the scaled mean levels of 1.86 at work and 2 outside of work. The Scandinavian and English-speaking countries are concentrated in the upper quadrant of the figure, reflecting their high average levels of engagement with reading in both workplace and non-workplace settings. By contrary, Italy, Korea and the Slovak Republic, in the lower left quadrant, exhibit

relatively low levels of engagement with reading at work and outside of work. The Russian Federation shows an average level of reading engagement at work but much lower levels outside of work.[5]

The scatter of the countries' points in the figure reflects a positive correlation between countries' average levels of reading engagement in work and outside of work settings. These patterns are evident between countries as shown in the figure as well as within populations of the individual countries. For individuals in every country, engagements in reading at work and outside of work are positively correlated. The correlation for all adults within a country ranges from 0.26 to 0.57 over countries, with an average correlation of 0.44. Within just the low-proficiency populations, the correlations are similar, ranging from 0.33 to 0.62 with an average value of 0.47.

Figure 2. Engagement of low-proficiency population in writing practices in work and outside of work settings



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Source: Survey of Adult Skills (PIAAC) (2012).

The corresponding data for the low-proficiency populations' engagement in writing practices in work and outside of work are plotted in Figure 2. The arrangement of countries for writing engagement appears to be shaped somewhat differently than for reading. The average levels of engagement shown in the figure for the low-proficiency populations are centred approximately around mean values of 1.10 at work and 1.24 outside of work, compared to the corresponding mean values of 1.72 and 1.82 for the general population. Northern European countries such as Germany and Netherlands, for example, are positioned more towards the top right quadrant than they were for reading, reflecting their higher relative levels of engagement with writing than with reading. Some countries such as the Slovak Republic have a much higher relative position for writing engagement than for reading engagement within their low-proficiency population. Italy and Korea continue to have the lowest level of engagement in writing as well as reading both at work and outside of work.

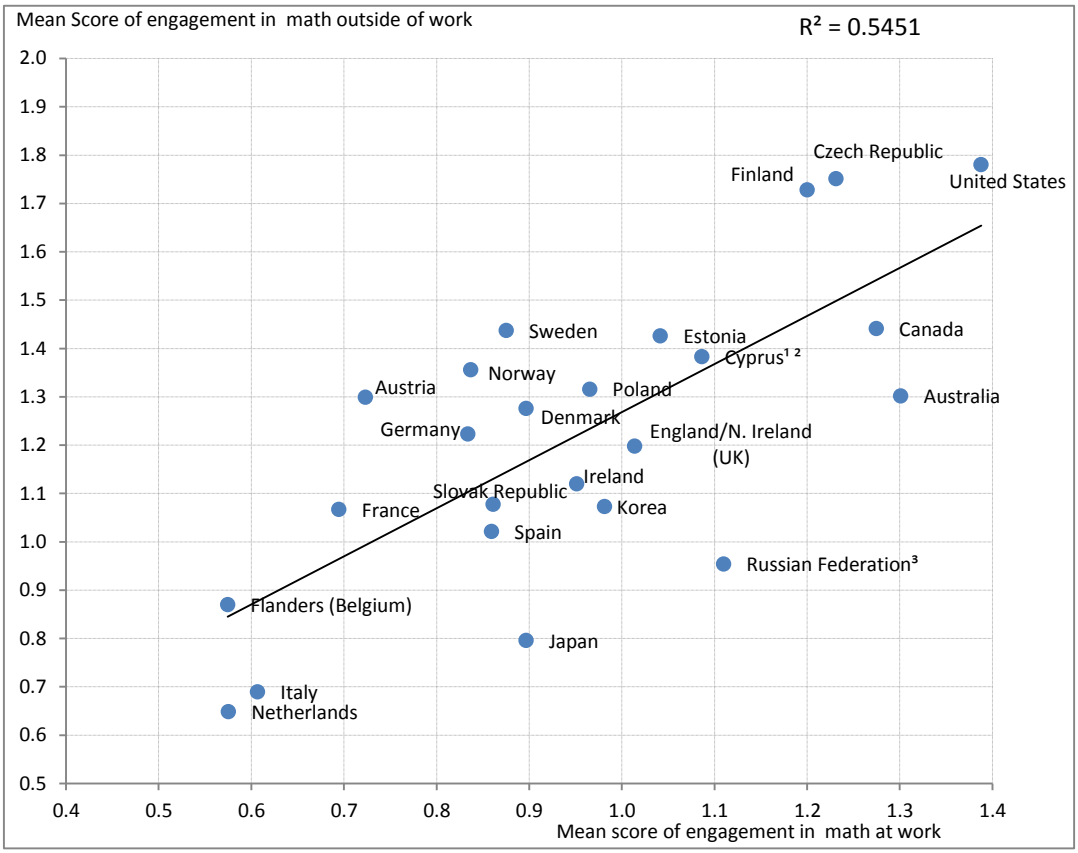
The greater dispersion of countries around the regression line indicates lower correlations between average country scores in writing engagement at work and outside of work than what was observed for reading engagement. This is also the case for correlations between scores of individual adults in writing at work and outside of work. In particular, correlations between individual scores in writing engagement at work and outside of work are lower (0.34) than those observed for reading engagement (0.44). There is a similar pattern within the low-proficiency populations, with correlations between individual scores in writing engagement at work and outside of work having an average value of 0.36.

The corresponding data for the low-proficiency populations' engagement in numeracy practices are shown in Figure 3. The average levels of engagement shown for the low-proficiency populations have mean values of 0.99 at work and 1.21 outside of work, well below the corresponding means of 1.62 and 1.80 for the general population. Again the arrangement of countries for numeracy engagement differs somewhat from their arrangements for reading engagement and writing engagement. Some countries such as the Czech Republic and the Russian Federation that have relatively low levels of literacy engagement in their low-proficiency populations show relatively high levels of numeracy engagement in their low-proficiency populations. Other countries such as France and the Netherlands show the opposite pattern.

Correlations between individuals' numeracy engagement at work and outside of work range over countries from 0.27 to 0.48, with an average value of 0.37 as compared with 0.44 correlation for reading engagement between settings and the 0.34 for writing engagement between settings. There is a similar pattern within the low-proficiency populations, with individuals' correlations between numeracy engagement in work and outside of work ranging from 0.25 to 0.61 over countries with an averaged value of 0.39. The substantially stronger cross-setting correlation for reading engagement likely reflects a greater selectivity in how work design draws on the use of writing and numeracy than it does on reading. This appears to be the case for both the low-proficiency and general adult populations.

Figure 3. Engagement of low-proficiency population in numeracy practices at work and outside of work settings

Mean scores of numeracy skills use at and outside of work by country



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Source: Survey of Adult Skills (PIAAC) (2012).

Relationships between Reading, Writing and Numeracy Practices at Work and Outside of Work

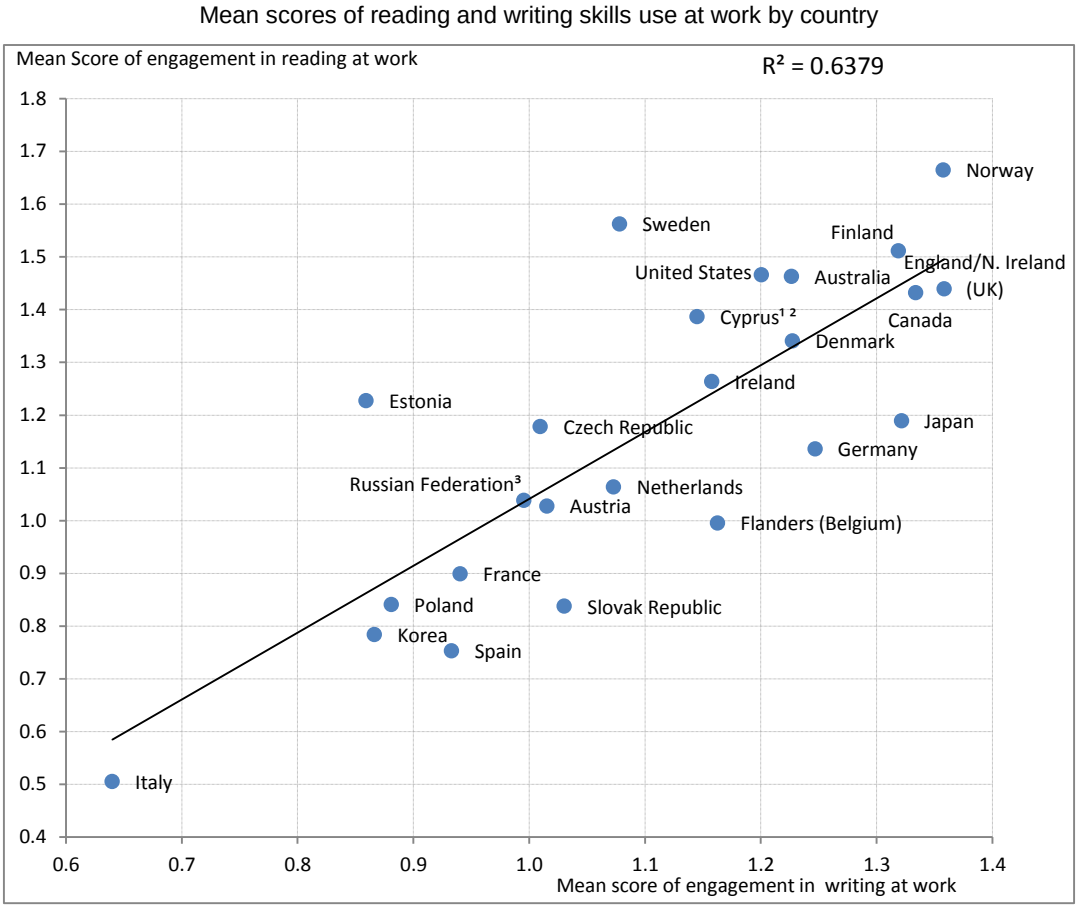
The previous section examined relationships between individuals' engagement with a particular set of skills in two settings: work and outside of work. This section considers the relationship between engagement with different sets of skills in a given setting, either the work setting or the outside of work setting.

In the work setting, correlations between individuals' engagement in reading and writing practices vary over countries from 0.57 to 0.71, with an average of 0.64. Correlations between reading and numeracy engagement are lower, ranging from 0.49 to 0.60, with an average of 0.55. Correlations between writing

engagement and numeracy engagement are lower yet, ranging from 0.49 to 0.57, with an average of 0.50. Annex Figures A1, A2 and A3 display scatterplots of countries' mean levels of engagement of reading x writing, reading x numeracy, and writing x numeracy, respectively. Country-specific correlations are given in Annex Table A4.

In the low-literacy population, the correlations between reading and writing engagement in work settings are similar to those correlations within the general population, ranging from 0.52 to 0.68 over countries, with an average of 0.61. Figure 4 displays a country-by-country scatterplot of average levels of engagement in reading and writing for low-proficiency populations in work settings.

Figure 4. Engagement of low-proficiency population in reading and writing practices, work settings



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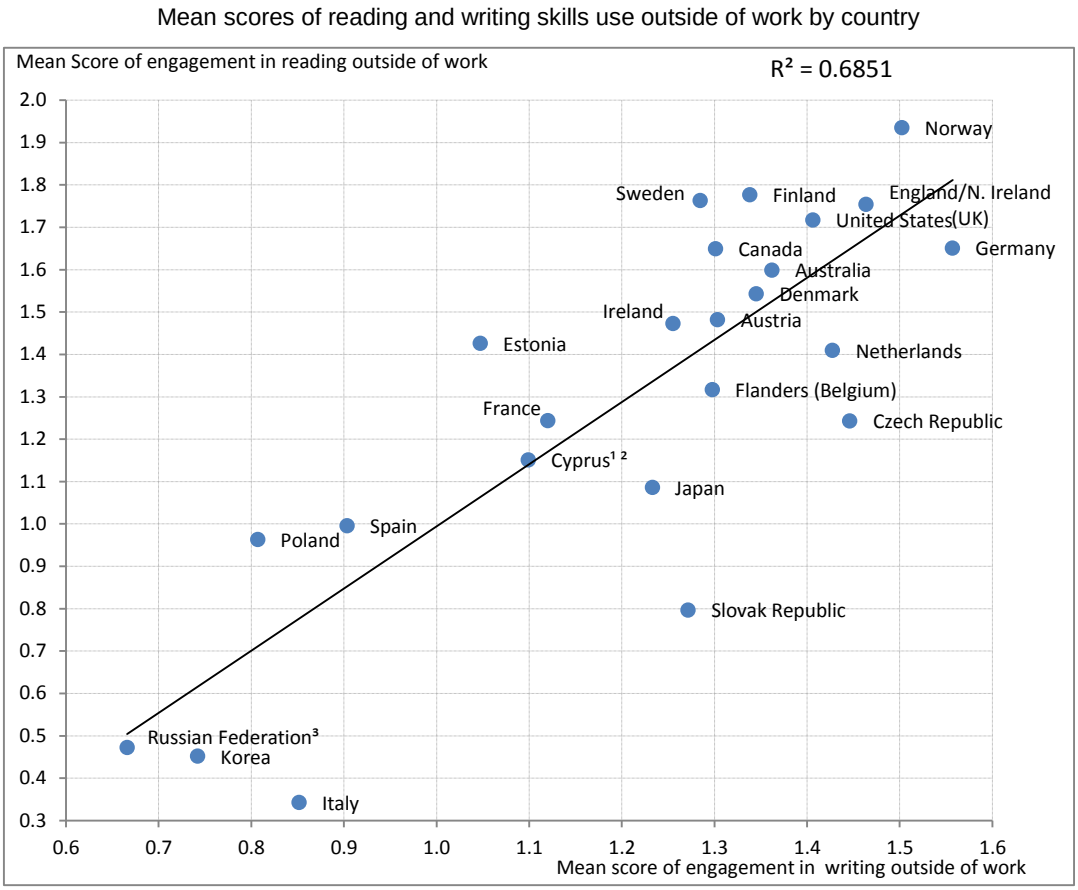
Source: Survey of Adult Skills (PIAAC) (2012).

Similar patterns of relationships are found between engagement in reading, writing and numeracy practices outside of work. Correlations between individuals' engagement in reading and writing practices vary over countries from 0.53 to 0.67, with an average of 0.60. Correlations between reading and numeracy engagement are lower, ranging from 0.47 to 0.63, with an average of 0.54. Correlations between writing engagement and numeracy engagement are lower yet, ranging from 0.43 to 0.58, with an average of 0.50. Annex Figures A4, A5 and A6 display scatterplots of countries' mean levels of engagement of reading by writing, reading by numeracy, and writing by numeracy, respectively. Country-specific correlations are given in Annex Table A5.

The correlations between reading and writing engagement outside of work are similar in the low-literacy and general populations. In low-literacy populations, the correlations range over countries from 0.51 to 0.67, with an average of 0.56. Figure 5 displays a country-by-country scatterplot of average levels of engagement in reading and writing outside of work for low-proficiency populations.

The results presented imply that given settings, whether at work or outside of work, often involve use of multiple cognitive skills. As would be expected, this high co-occurrence is especially evident in the case of reading and writing practices. It is also interesting to note that the correlations within the same setting (at work or outside of work) are stronger than correlations within the same activity (reading, writing or numeracy). This could suggest that external requirements at work and outside of work are somewhat stronger determinants of skill use compared to personal characteristics.

Figure 5. Engagement of low-proficiency population in reading and writing practices, outside of work settings



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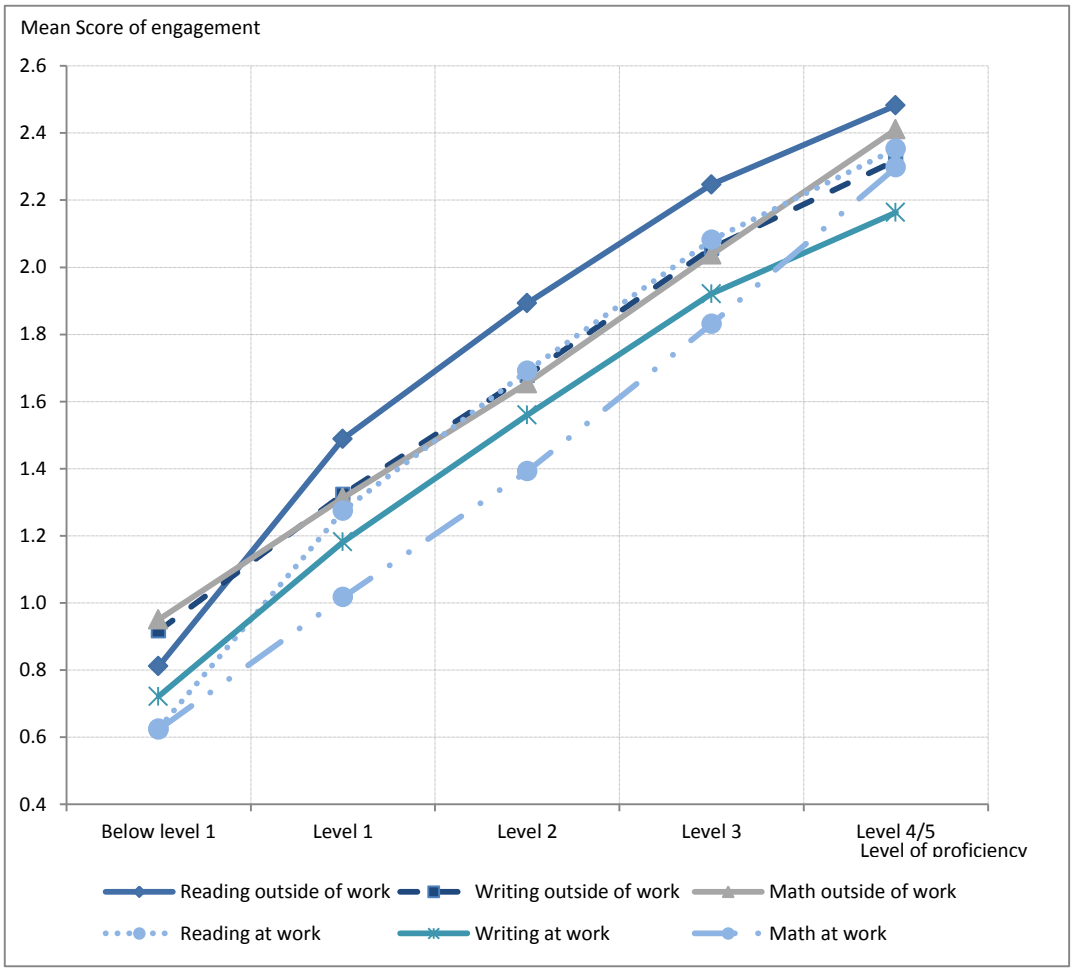
Source: Survey of Adult Skills (PIAAC) (2012).

Relationships between Proficiencies and Practices

Figure 6 shows adults' average level of engagement in reading, writing and numeracy practices in terms of their proficiencies in literacy and numeracy. Engagement in reading and writing practices are plotted against literacy proficiency level, whereas engagement in numeracy practices is plotted against numeracy proficiency level. The low-proficiency populations are comprised of "below Level 1" and "Level 1". The figure shows a clear linear relationship between proficiency level and practice engagement.

Figure 6. Engagement in skills use by level of proficiency

Mean scores of reading, writing and numeracy skills use at and outside of work by level of proficiency (OECD average)



Note: Engagement in reading and writing are plotted against literacy proficiency levels whereas engagement in numeracy is plotted against numeracy proficiency levels.

Source: Survey of Adult Skills (PIAAC) (2012). Results by country are available in Annex Table A9.

Although the figure shows that low-proficiency populations are less engaged in literacy and numeracy practices, it also indicates that this is a part of a broader relationship between skills and practice engagement across the proficiency spectrum. It is important to recognize that relationships between average levels of proficiency and practice engagement in the population reflect a broad range of individual levels of practice engagement within the low-proficiency population. Many individuals in the low-proficiency population, for example, have relatively high levels engagement with reading practices, while some more proficient individuals have low levels of engagement with reading at work and/or outside of work.

This relatively strong correspondence between engagement in literacy and numeracy practices and proficiency levels is by no means surprising and can in general be regarded as a consequence of a number of mechanisms. First of all, it could be expected that low-skilled adults will be more limited in application of their skills for the very reason of their lower literacy and numeracy proficiencies. Likewise, their lower skills can prevent them accessing those jobs or situations where they could practice these skills

more often. Moreover, they may also self-select into those jobs and situations which require less engagement in these practices, thus avoiding possible situations in which their skills could be insufficient. Finally, reduced opportunity of practicing these skills prevents maintenance of existing and development of new skills, thus creating a vicious cycle and additionally contributing to the widening skill gap among adults.

Demographic and Proficiency Determinants of Engagement in Reading, Writing and Numeracy Practices

We saw above that some of the variability of practice engagement levels is attributable to differences in individuals' literacy and numeracy proficiencies. Those proficiencies in turn are partly determined by individual's educational attainment and influenced by individual demographic characteristics such as age, gender, birthplace, and so forth (OECD, 2013b). Regressions of the engagement measures on demographic characteristics and literacy and numeracy proficiencies can illustrate some of the unique patterning of reading, writing and numeracy practices engagement. A pair of engagement determination equations was estimated for each skill domain (reading, writing and numeracy practices). The baseline equation of each pair included demographic predictors (age, gender, and nativity) and educational attainment. The enhanced equation of each pair added the appropriate proficiency measure to the baseline equation as a predictor. Literacy proficiency was added to the baseline equations for reading and writing engagement, while numeracy proficiency was added to the baseline equation for numeracy engagement. Tables summarizing these pairs of regression models – baseline and enhanced -- for reading, writing and numeracy engagement at work and outside of work for the entire and low-proficiency adult populations are shown in Annex Table A3.

These practice engagement equations generally have low predictive power, with r-squared values in the 0.08 – 0. 24 range, indicating they predict about 8–24% of the variance of each measure. In general, the pattern of results for the low-proficiency and general populations are similar, with slightly more variance accounted for when an equation is estimated for the general compared to the low-proficiency population. For either population, the enhanced models that include the proficiency measure predict a statistically significant amount of additional variance over what is predicted by the baseline model containing demographics and education, consistent with practice engagement theory (Reder, 2009b). It should be noted that lower predictive power of the proficiency in the low-proficiency population should be expected due to the design effect, i.e. the restricted range of variation of this variable within this population. Practice engagement in a skill domain (reading, writing or numeracy) is generally better predicted at work than outside of work.[6]

The net effects of educational attainment and proficiencies are very consistent in these models. Educational attainment and proficiency are major positive predictors of engagement with reading, writing and numeracy practices, both at work and outside of work, for both the general and low-proficiency populations. Education and proficiency are likely to combine with variables not observed in PIAAC such as individual predispositions to engage in reading, writing and numeracy as well as the demands for skill use in specific contexts of work and social life to determine individual levels of practice engagement.

Age has systematic net effects in these regression models. The net effects of age vary with the context of practice engagement being predicted, work or outside of work. Age has positive net effects on practice engagement in work settings, with older individuals tending to be more engaged in the use of reading, writing and numeracy in work. Outside of work, age has negative net effects on practice engagement, with older individuals tending to be less engaged with the use of reading, writing and numeracy. One important consideration here is that among workers, age may be a proxy for work experience, such that more experienced workers tending to have jobs or work styles that afford more

opportunities for practice engagement. We will consider this possibility more carefully in the following section on the embedding of reading, writing and numeracy practices in economic outcomes.

Gender also has some common effects on practice engagement in these models. Within the general population, women tend to engage less than men with reading, writing and numeracy practices in the workplace when other variables are controlled. In the low-proficiency population, women tend to be more engaged than men with reading, writing and numeracy outside of the workplace. Other generalizations about the net effects of gender are not as clear-cut. The specifics need further exploration and analysis. We will see additional effects of gender in the following section below when we look at how the use of skills is embedded in economic outcomes.

Embedding of Literacy and Numeracy in Economic and Social Outcomes

Data from the Survey of Adult Skills (PIAAC) and earlier international surveys of adult skills has been helpful in examining the relationships between assessed skills and a range of economic and social outcomes. Previous research looking at relationships between information-processing skills and economic and social outcomes has focused on literacy and numeracy proficiencies. The measures of engagement in literacy and numeracy practices in Survey of Adult Skills (PIAAC) enable us to expand the scope of this research by examining the importance of both proficiency and skill use on these economic and social outcomes. In this section, we consider multivariate regression models of various economic and social outcomes that incorporate a range of variables including measures of both proficiency and practice engagement.

In these models, the statistical associations found between proficiency and an outcome or between practice engagement and the outcome do *not* necessarily reflect specific causal or explanatory models of underlying mechanisms linking literacy and numeracy to the outcome. We will say that reading, writing or numeracy practices are *embedded* in an outcome when there are positive correlations between engagement in reading, writing or numeracy practices and the outcome after controlling for demographic, education, proficiency and other variables. Because we have seen that proficiency is positively correlated with practice engagement, care is needed in interpreting positive correlations between practice engagement measures and an outcome. Measures of practice engagement could be proxies for proficiency measures. By controlling proficiency measures, it becomes easier to see the unique relationship between engagement in reading, writing or numeracy practices and the outcome variable.

We will examine *embedding* with pairs of predictive models: the *baseline* model of the pair includes the practice engagement measure along with demographic, education and possibly other control variables, whereas the *enhanced* model of the pair also includes the relevant proficiency measure as a control. If the practice engagement measure is a significant positive predictor of the outcome in *both* the baseline and enhanced models, then we will say those practices are *embedded* in that outcome.

The terminology of embedding is intended to be reminiscent of such popular phrases as "literacy is embedded in poverty", referring to a myriad of underlying relationships between literacy and poverty that underlie their correlation; such embedding is not meant to convey a single, a simple or a unidirectional influence between the two constructs. Such embedding can, however, serve as a starting point for other investigations of possible underlying mechanisms between information processing (proficiencies and practices) and the various economic and social outcomes considered here.

Embedding in Economic Outcomes

Embedding in earnings. In low-proficiency populations, reading, writing and numeracy practices – whether at work or outside of work– are embedded in workers' earnings. In the general

population, reading, writing and numeracy practices in the workplace are embedded in workers' earnings, but their engagement in these practices outside of work is not embedded in earnings. Reading and writing practices show equivalent magnitudes of embedding in earnings, considerably larger than the magnitude of embedding of numeracy practices in earnings. With practice engagement, education and other variables controlled, literacy and numeracy proficiencies are also important determinants of earnings within the general adult population.

Table 2. Summary of embedding of reading, writing and numeracy practices in prime age (25-54) workers' earnings, for low-proficiency and general populations

Practices	Low-proficiency population	General population
Reading at work	Yes	Yes
Reading outside of work	Yes	No
Writing at work	Yes	Yes
Writing outside of work	Yes	No
Numeracy at work	Yes	Yes
Numeracy outside of work	Yes	Yes

Research based on numerous surveys of skills in previous decades in OECD and non-OECD countries have demonstrated the economic value of well-developed literacy and numeracy skills to both individuals and societies (Hanushek & Wößmann, 2012a,b) The first Survey of Adult Skills (PIAAC) results reported by OECD (2013a) lays out a descriptive case for the importance of both proficiencies and skill use for economic outcomes. Hanushek, Schwerdt, Wiederhold & Woessmann (2013), in one of the first econometric analyses of the Survey of Adult Skills (PIAAC) data, report substantial wage returns to assessed proficiencies over and above the wage returns attributable to education for prime age workers in countries around the world. Desjardins and Rubenson (2011), analyzing the earlier ALLS data, extended theses type of wage models to include both assessed proficiencies and self-reported information about skill use in the workplace. PIAAC's innovations in assessing skill use open up important new analytical possibilities.

Building on this earlier work, we estimate Mincer (1974) type wage determination equations with Survey of Adult Skills (PIAAC) data from currently employed, prime age adults. These models regress individuals' total monthly earnings on educational attainment, assessed literacy and numeracy proficiencies, and levels of engagement in reading, writing and numeracy practices, at work or outside of work. The models include controls for demographic characteristics, occupational groups and work experience.

Embedding models for reading, writing and numeracy practices in workers' earnings were developed as pairs of earnings equations as described above. Both the baseline and enhanced models in a pair regress the logarithm of total monthly earnings on the same baseline set of variables: demographic variables, dummy variables specifying educational attainment levels and occupational groups, years of work experience and the measure of practice engagement. The enhanced model adds the relevant proficiency measure to the baseline model – either literacy proficiency to models involving reading and writing engagement or numeracy proficiency to models involving numeracy engagement. As explained above, when the practice engagement measure is a positive predictor of earnings in *both* the baseline and enhanced models, we will identify those practices as embedded in the earnings outcome.

Our primary focus here is on the embedding of skills in the earnings of the low-proficiency populations. Tables of parameter estimates of the embedding models for low-proficiency and the entire populations are available in Annex Table A4. As we present findings about embedding of practices within the low-proficiency populations, we will note whether the same findings are applicable to the general population. The embedding models were estimated separately for each country, with country-specific estimates averaged across OECD countries into the pooled estimates shown in the tables.

Reading at work. Annex Table A4 displays the models of the embedding of reading engagement in workers' earnings. The table shows the pair of regression models of log earnings on engagement in reading practices at work. The two models have the same structure except that the enhanced model on the right adds literacy proficiency as an independent variable. The key result here is that with demographic, educational attainment, occupation and work experience controls in place, engagement in reading practices at work is a significant positive predictor of earnings. Coefficients in the two specifications are very similar, including the coefficient for reading at work, which is estimated at 0.1100 in the baseline model and remains essentially unchanged at 0.1072 when literacy proficiency is added to the model. Literacy proficiency is not a statistically significant predictor of earnings once engagement in reading at work is taken into account. Similar results occur when these models are applied to the general adult population, as summarized in Annex Table A4. Although engagement in reading practices at work is the more potent predictor of the two, literacy proficiency is a significant, positive predictor of earnings within the general population. It is not surprising that literacy proficiency, with greatly reduced variability by definition of the low-proficiency population, has much less predictive influence within the low-proficiency population. Thus, it is difficult to know whether the lower predictive power of literacy proficiency in the low-skilled population is due to substantive or design reasons. Engagement in reading practices at work is embedded in earnings, for both low-proficiency and adult workers more generally.

Age is not a significant predictor of earnings in these models but years of work experience is. In many multivariate wage determination equations estimated on other data sets, age is a positive predictor of earnings but is generally thought to be a proxy for years of work experience. In the Survey of Adult Skills (PIAAC) data, where both age and years of work experience are available, it is the stronger predictor and has a significant positive coefficient in the models. Educational attainment, modeled here as dummy variables (Ed2 is a binary indicating completion of secondary school; Ed3 is a binary indicator of a postsecondary degree), has strong positive effects on earnings as almost always found in such models. Gender has significant effects on earnings even after all of these variables are taken into account, with the coefficients here indicating that women earn about 31-32% less than men on average, given the same general occupations, education, proficiencies, skill use and work experience. Immigrant status is not significantly associated with earnings in this multivariate modeling environment.

It is of considerable interest that engagement in reading practices at work is a more potent predictor of earnings than literacy proficiency is within these models. In evaluating similar earnings models in ALLS data using the same literacy proficiency measure but a less well developed measure of reading practices, Desjardins and Rubenson (2011) and OECD (2013a) emphasized that although literacy proficiency is a characteristic of the individual worker (like age or gender), the reading tasks carried out at work are characteristics of the *job*. In their analysis, assessed literacy proficiency is a supply side factor in wage determination whereas reading practices are a demand side factor; the employer specifies the reading demands of the job, the worker supplies the necessary proficiencies.

Although the results in Annex Table A4 are consistent with the framework proposed by Desjardins and Rubenson, their interpretation of what we call practice engagement may not be the best way to understand such findings for the low-proficiency population. It could be, as they propose, that the opportunity to utilize skills on the job is determined by the employer. It is also possible, however, that individuals differ in the extent of and manner in which they use their information processing skills in

performing a given job, so that individual engagement in reading practices at work would generally vary with both the individual and the job. There is not enough data (nor quite the right kind of data) in PIAAC to disentangle these two components of variation, as might be done if sufficient numbers of individuals performing the same job were sampled.

Reading outside of work. Annex Table A4 provides some additional insight about interpreting practice engagement effects in these earnings models. The embedding models in Table A4 use workers' engagement in reading *outside of work* as a predictor of earnings. Note the similar pattern of covariate coefficients for demographic, education, occupation and work experience variables for the reading engagement models using either reading at work or outside of work. Despite shifting from engagement in reading at work to reading outside of work, the overall results shown in Annex Table A4 are quite similar for low-proficiency populations. Their engagement in reading practices, either at work or outside of work, is a positive predictor of earnings in multivariate models that control for demographics, educational attainment, occupation and work experience, and literacy proficiency. These findings indicate that for low-proficiency populations, engagement in reading practices is important for earnings but not necessarily because it indexes the kind of jobs to which individuals have access. We conclude that reading practices – whether at work or outside of work -- are embedded in the earnings of the low-proficiency population.

As Annex Table A4 shows, this conclusion does not apply to general (as opposed to low-proficiency) adult populations. Literacy proficiency is a significant, positive predictor of earnings in the general population, whereas engagement in reading practices outside of work is not a significant predictor when proficiency is controlled.

Writing at work. Results for the embedding of writing practices are generally similar to those for reading practices. Annex Table A4 displays the estimated regression parameters for writing at work in low-proficiency populations. Literacy proficiency is not a significant predictor of earnings, whereas engagement in writing practices at work is a significant, positive predictor in both the baseline and enhanced models. The coefficients for demographic, education, occupation and work experience variables are patterned similarly in the writing and the reading engagement models. Results for engagement with writing at work for the general adult population are shown in Annex Table A4 – they are similar to those for engagement in reading at work in the general population. Writing engagement at work, either by itself or in combination with literacy proficiency, is a significant, positive predictor of earnings. Writing at work is embedded in workers' earnings, both in the low-proficiency and general populations.

Writing outside of work. Results for writing outside of work are displayed in Annex Table A4. Within the low-proficiency population, engagement in writing, like engagement in reading, is embedded in earnings regardless of whether the writing practices are at work or outside of work. These results do not apply to the general population, as shown in Annex Table A4. Engagement in writing outside of work is not related to earnings, in contrast to writing at work.

Numeracy at work. The embedding of numeracy practices at work in the earnings of low-proficiency populations is shown in Annex Table A4. Engagement in numeracy practices at work is a positive predictor of earnings in both specifications – with and without numeracy proficiency – and so numeracy practices at work are embedded in earnings. Similar results are found in the general population, as shown in Annex Table A4. In all of these models, numeracy proficiency is also positively associated with earnings. The patterns of coefficients for demographic, education, occupation and work experience variables are very similar to those in the embedding models for other measures of practice engagement.

Numeracy outside of work. Annex Table A4 shows the corresponding findings for engagement in numeracy practices outside of work. Again we see that numeracy practices – whether at work or outside of work – are embedded in workers' earnings in the low-proficiency population. In all of these models,

numeracy proficiency is also positively associated with earnings. The patterns of coefficients for demographic, education, occupation and work experience variables are very similar to those in the embedding models for other measures of practice engagement. These findings also apply to the general population, as shown in Annex Table A4.

Embedding in Social Outcomes

Reading, writing and numeracy practices may be embedded in social as well as economic outcomes. OECD (2013a) identified contributions of proficiencies to a number of social outcomes: social trust, volunteerism, political efficacy and general health. For each social outcome variable, the OECD estimated a regression-adjusted odds ratio for a negative social outcome given low versus high levels of literacy proficiency. For example, adults with low levels of literacy proficiency were found to be about four times as likely to have a negative health outcome as their counterparts with the highest levels of literacy. Significant odds ratios were estimated in this way for each of the four social outcomes. Dinis da Costa et al. (2014) analysed these same four social outcomes in more depth for countries of the European Union, and found proficiencies to be more important than education in predicting better outcomes for each measure.

The results that are presented below about the embedding of information-processing practices in social outcomes are summarized in Table 3. Reading, writing and numeracy practices (all outside of outside of work) are embedded in each of social outcomes examined, within both the low-proficiency and the general populations, with the only exception being that numeracy practices are not significantly embedded in social trust within the low-proficiency population. Increased engagement in information-processing practices (reading, writing, numeracy) outside of work is positively associated with better social outcomes, controlling for demographic, education and proficiency variables.

Table 3. Summary of embedding of reading, writing and numeracy practices outside of work in social outcomes, for low-proficiency and general populations aged 25 to 65

	Reading	Writing	Numeracy
Low-proficiency			
Social trust	Yes	Yes	No
Volunteering	Yes	Yes	Yes
Political efficacy	Yes	Yes	Yes
Health	Yes	Yes	Yes
General			
Social trust	Yes	Yes	Yes
Volunteering	Yes	Yes	Yes
Political efficacy	Yes	Yes	Yes
Health	Yes	Yes	Yes

Note: 'Yes' indicates that engagement in specified practices outside of work is embedded in the given social outcome variable.

The mechanisms and processes linking information-processing skills with these social outcomes are complex and may well differ across outcome measures as well as between countries and social groups. Some possibilities were discussed by OECD (2013a) and Desjardins (2008, 2003). There is widespread consensus among researchers that information processing skills are linked to various forms of political participation (e.g., Tolbert & MacNeal, 2003). There is also a substantial research base in health literacy that connects information-processing skills with health, although there is far more research about how skills are used for accessing health information than for communicating with health-care providers or managing one's own health and care (e.g., Feinberg, Greenberg & Frijters, 2015; Rudd, Kirsch & Yamamoto, 2004).

The initial analyses of the social outcomes in PIAAC point to the importance of examining these social outcomes in low-proficiency populations and understanding how both proficiencies and engagement in reading, writing and numeracy practices may lie at the foundations of civil societies. We will expand this emerging research topic by looking at the embedding of reading, writing and numeracy practices in these social outcomes, especially in low-proficiency populations. The embedding models will be set up in much the same way as they were for the earnings outcome, except that here the populations of interest will be adults age 25-65 rather than the prime age workers considered for the economic outcomes. Since each of these social outcomes is measured on an ordinal rather than continuous scale (OECD, 2013a,c), ordinal logistic regressions are conducted on the outcome variables. Because adults who are currently employed as well as those who are not currently employed are included, embedding will be modeled for reading, writing and numeracy practices outside of work. Occupation and work experience variables are omitted from the model specifications while a binary variable, WORKING, is added to specify current employment status.

Social trust. Annex Table A5 presents results for the embedding of reading, writing and numeracy practices, respectively, in social trust within low-proficiency populations. Both reading and writing practices are embedded in social trust but numeracy practices are not. Proficiency measures are not significantly related to social trust in these models. Age is negatively related to social trust, such that older adults have lower levels of social trust, but neither gender nor immigrant status is significantly related to social trust. Both education and employment status are positively associated with social trust; those with more education and those currently working have higher levels of social trust. Results for the general population, shown in Annex Tables A5, are a bit different, in that reading, writing and numeracy practices are all embedded in social trust for the general adult population. Proficiency measures are also positively associated with social trust in the embedding models for the general adult population.

Volunteerism. Results for the embedding of reading, writing and numeracy practices in volunteerism for low-proficiency populations are shown in Annex Table A6. Engagement in each of these domains of practice is embedded in volunteerism. Literacy proficiency is not significantly related to volunteerism but numeracy proficiency is positively associated with volunteerism. Neither age nor immigrant status is significantly related to volunteerism. Both education and employment status are positively associated with volunteerism; those with more education and those currently employed have higher levels of volunteerism. Results for the general adult population, shown in Annex Table A6, are generally similar, with reading, writing and numeracy practices embedded in volunteerism. One difference in results for the general population is that literacy proficiency is positively associated with volunteerism in the general population.

Political efficacy. The embedding models of reading, writing and numeracy practices in political efficacy within low-proficiency populations are shown in Annex Table A7. Engagement in each of these domains of practice is embedded in political efficacy. Neither literacy nor numeracy proficiency is significantly associated with political efficacy. Both education and employment status are positively associated with political efficacy; those with more education and those currently employed have higher levels of political efficacy. Effects of age, gender and immigrant status on political efficacy vary over the different practices models. Results for the general adult population, shown in Annex Tables A7, are similar, with reading, writing and numeracy practices embedded in political efficacy and proficiencies positively associated with political efficacy.

Health status. The analysis of the embedding of reading, writing and numeracy practices in health status within low-proficiency populations is displayed in Annex Table A8. Engagement in each of these domains of practice is embedded in health status. Both literacy and numeracy proficiency are significantly associated with health. Age is also significantly related to health, with younger adults reporting better overall health status. Both education and employment status are positively associated with health; those

with more education and those currently employed have better health status. Neither gender nor immigrant status has a significant association with health status in these modeling contexts. Results for the general adult population, shown in Annex Tables A8, are generally the same, with reading, writing and numeracy practices embedded in better health status and proficiencies positively associated with health.

Summary

Individuals' engagement with a given domain of cognitive practices – whether reading, writing or numeracy – is positively correlated (ranging between 0.35-0.45) between the two settings of work and outside of work. This relationship holds at the level of individuals as well as at the level of countries. There is broad cross-national variation in levels of engagement in various information-processing practices. These findings are observed in both low-proficiency and general adult populations. At the same time, at work, many low-proficiency adults are not engaged with reading, others not with writing, and others not with numeracy practices. Outside of work, many other low-proficiency adults are not engaged with some of these domains of practice. On the one hand, these moderate correlations indicate that individuals tend to use same sets of skills at different settings. This could be expected given that using skills in one setting help maintain and improve those skills, thus making them more likely to be used in other situations. However, the moderate strength of these correlations also shows that there is high degree of context dependency in terms of engagement in cognitive practices. In other words, the fact that certain skills are used at work by no means indicates that they will necessarily be used outside of work or vice versa.

Engagement levels in reading and writing practices are strongly correlated in a given setting, whether that is at work or outside of work. It is important to note that these correlations (ranging between 0.50-0.65) are stronger than the correlations between engagement in the same practices across different settings. This could be seen as an indication of somewhat stronger role of external requirements compared to individual characteristics in terms of likelihood of engaging in these cognitive practices.

Literacy proficiency is correlated with engagement in reading and in writing practices. Numeracy proficiency is correlated with engagement in numeracy practices. As literacy and numeracy proficiency levels rise, average levels of engagement in reading, writing and numeracy practices steadily increase. In addition to proficiency, both educational attainment and demographic characteristics systematically shape individuals' levels of engagement in reading, writing and numeracy practices, both at work and outside of work. As indicated before, the positive relationship between proficiency levels and engagement in cognitive practices could be expected for a number of reasons. On the one hand, lower proficiency can create various subjective and objective barriers for engaging in these types of activities. On the other hand, lower engagement on its own can limit skill development and widen skill gaps.

Engagement in reading, writing and numeracy practices appears to be important for individual and societal well-being. In low-proficiency populations, reading, writing and numeracy practices – whether at work or outside of work– are embedded in workers' earnings. At given levels of education and proficiency, the more individuals engage in these cognitive activities (either at work or outside of work), the higher their earnings tend to be. Although proficiencies remain important predictors of economic outcomes in the general population, these results indicate that engagement in literacy and numeracy practices is by itself an important dimension of the relationship between skills and earnings, even after proficiency is taken into account.

Although others have suggested that measures of skills used at work specifically reflect properties of individuals' jobs, our finding that reading, writing and numeracy practices *outside of work* are also embedded in workers' earnings challenges the idea that proficiency is a characteristic of the individual and skill use is a characteristic of only the job (Desjardins & Rubenson, 2011). We suggest instead that practice

engagement at work should be seen as resulting from a process of adaptation of workers and tasks to each other, so that levels of skill use will jointly reflect characteristics of workers and jobs.

Reading, writing and numeracy practices are also embedded in a number of important social outcomes for both the low-proficiency and general adult populations. The sole exception to this was that engagement in numeracy practices is not significantly embedded in social trust for the low-proficiency population. Increased engagement in information-processing practices outside of work is positively associated with better social outcomes after controlling for demographic, education and proficiency variables. The magnitude of the embedding of practices in these social outcomes varies with the practice domain (reading, writing, numeracy) and the social outcome (trust, volunteering, political efficacy, general health). Reading is more embedded than writing which is more embedded than numeracy for each of the social outcomes. For social trust, volunteering and political efficacy, the reading, writing and numeracy are more embedded within the general adult population than within the low-skilled population, whereas for general health, reading, writing and numeracy practices are more strongly embedded in the low-skilled than the general adult population. To get a sense of the magnitude of these impacts, consider the embedding of reading practices in volunteering: With demographic, education and proficiency variables held constant, a unit increase in reading engagement is associated with 61% greater odds of a higher rate of volunteering in the general adult population (the corresponding number is 54% for the low-proficiency population).

Within both the low-proficiency and general adult populations, proficiency is a significant predictor of general health after controlling for engagement in information-processing practices and other variables. Proficiency also predicts the other social outcomes for the general adult populations, but is not a significant predictor within low-proficiency adult populations, in part because of the restricted range of proficiency by definition within in low-proficiency populations.

The embedding of reading, writing and numeracy practices in these social outcomes reflects the society's literate and numerate environments. The embedding of these practices in the social outcomes is part of the fabric with which the social worlds are woven. Although the frequencies with which individuals engage in various reading, writing and numeracy activities certainly index the literate and numerate environments, the embedding of those practices in key social outcomes takes this relationship a step further. To the extent that society broadly values social trust, volunteerism, political efficacy and general health, the embedding of reading, writing and numeracy practices in those social outcomes becomes a hallmark feature of the literate and numerate environments.

It is worth emphasizing again that the pervasive embedding of information-processing practices we observe in these social and economic outcomes do not necessarily imply direct causal relationships between practice engagement and those outcomes. The embedding results do suggest, however, that we conduct more research on this topic with an eye towards developing policies and programs to increase low-proficiency populations' engagement with reading, writing and numeracy practices. As detailed in the introduction to this paper, previous research indicates that adult basic skills programs can directly affect students' engagement in literacy and numeracy practices, and over time, gains in practice engagement can lead to longer term proficiency gains (Reder, 2009b, 2014b). The embedding of reading, writing and numeracy practices in a broad range of social outcomes further suggests that adult education programs may lead to broad social improvements as well as to increased earnings. Further research and development efforts should be directed towards determining the types of adult education programs and policies that might have these broad impacts on earnings and social outcomes.

References

Beder, H. (1999). *The outcomes and impacts of adult literacy education in the United States*. (Report No. 6). Cambridge, MA: National Center for the Study of Adult Learning and Literacy. Retrieved from http://ncsall.net/fileadmin/resources/research/report6.pdf

Brooks, G., Davies, R., Ducke, L., Hutchison, D., Kendall, S., & Wilkin, A. (2001). *Progress in adult literacy: Do learners learn?* London: The Basic Skills Agency.

Carpentieri, J. (2015). Adding new numbers to the literacy narrative: Using PIAAC data to focus on literacy practices . In Literacy as Numbers: Researching the Politics and Practices of International Literacy Assessment Regimes. Cambridge University Press. Cedefop (2010). *The skill matching challenge: Analysing skill mismatch and policy implications*. Luxembourg: Publications Office of the European Union.

Desjardins, R. (2008). Researching the links between education and well-being. *European Journal of Education, 43*(1), 23-35.

Desjardins, R. (2003). Determinants of economic and social outcomes from a life-wide learning perspective in Canada. *Education Economics, 11*(1), 11-38.

Desjardins, R. and K. Rubenson (2011). "An Analysis of Skill Mismatch Using Direct Measures of Skills", ***OECD Education Working Papers***, No. 63, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/5kg3nh9h52g5-en

Dinis da Costa, P., Rodrigues, M., Vera-Toscano, E., & Weber, A. (2014). *Education, adult skills and social outcomes: Empirical evidence from the Survey on Adult Skills (PIAAC 2013).* Luxembourg: Publications Office of the European Union.

Feinberg I., Greenberg D., & Frijters J. (2015). *Understanding Health Information Seeking Behaviors of Adults with Low Literacy, Numeracy, and Problem Solving Skills: Results from the 2012 US PIAAC Study*. Retrieved February 23, 2015 from http://static1.squarespace.com/static/51bb74b8e4b0139570ddf020/t/54da7889e4b004762df45b52/1423603849970/Feinberg_Greenberg_Frijters_PIAAC.pdf

Green, F. (2013). *Skills and skilled work: An economic and social analysis***.** Oxford: Oxford University Press.

Grotlüschen, A., Mallows, D., Reder, S., & Sabatini, J. (2016). *Adults with low proficiency in literacy or numeracy*. OECD Education Working Papers, No. 131, OECD Publishing, Paris. http://dx.doi.org/10.1787/5jm0v44bnmnx-en

Gyarmati, D., Leckie, N., Dowie, M., Palameta, B., Hui, T. S., Dunn, E., & Hébert, S. (2014). *UPSKILL: A credible test of workplace literacy and essential skills training. Technical Report.* Ottawa: Social Research and Demonstration Corporation.

Hanushek, E. A., Schwerdt, G., Wiederhold, S., & Woessmann, L. (2013). *Returns to skills around the world: Evidence from PIAAC.* Paris: OECD Education Working Paper No. 101.

Hanushek, E., & Wößmann, L. (2012a). Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. *The Journal of Economic Growth*, *17*(4), 267-321.

Hanushek, E., & Wößmann, L. (2012b). The role of cognitive skills in economic development. *Journal of Economic Literature*, *46*(3), 607-668.

Mincer, J. A. (1974). *Schooling, experience, and earnings*. Washington DC: National Bureau of Economic Research (NBER) Books.

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

OECD (2013b). *Technical Report of the Survey of Adult Skills (PIAAC)*. http://www.oecd.org/site/piaac/_Technical%20Report_17OCT13.pdf

OECD (2013c). ***The Survey of Adult Skills: Reader's Companion***, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264204027-en

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

OECD/Statistics Canada (2011). ***Literacy for Life: Further Results from the Adult Literacy and Life Skills Survey***, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264091269-en

Pellizzari, M. and A. Fichen (2013). "A New Measure of Skills Mismatch: Theory and Evidence from the Survey of Adult Skills (PIAAC)", ***OECD Social, Employment and Migration Working Papers***, No. 153, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/5k3tpt04lcnt-en

Purcell-Gates, V., Degener, S., Jacobson, E., & Soler, M. (2000). *Affecting change in literacy practices of adult learners: Impact of two dimensions of instruction.* Cambridge MA: National Center for the Study of Adult Learning and Literacy, Harvard Graduate School of Education.

Reder, S. (2015). Expanding emergent literacy practices: Busy intersections of context and practice. In M. G. Santos & A. Whiteside (Eds.), *Low Educated Second Language and Literacy Acquisition: Proceedings of the Ninth Symposium* (pp. 1-29). San Francisco: Lulu.

Reder, S. (2014a). *The impact of ABS program participation on long-term economic outcomes.* Washington, DC: U. S. Department of Education, Office of Career, Technical and Adult Education.

Reder, S. (2014b). *The impact of ABS program participation on long-term literacy growth.* Washington, DC: U. S. Department of Education, Office of Career, Technical and Adult Education.

Reder, S. (2009a). Scaling up and moving in: Connecting social practices views to policies and programs in adult education. *Literacy and Numeracy Studies, 16.2/17.1* (1), 35-50.

Reder, S. (2009b). The development of literacy and numeracy in adult life. In S. Reder & J. Bynner, (Eds.), *Tracking adult literacy and numeracy: Findings from longitudinal research* (pp. 59-84). New York and London: Routledge.

Rudd, R., Kirsch, I., & Yamamoto, K. (2004), *Literacy and health in America: A Policy Information Center report.* Princeton, NJ: Educational Testing Service.

Sheehan-Holt, J., & Smith, C. (2000). Does basic skills education affect adults' literacy proficiencies and reading practices? *Reading Research Quarterly, 35*(2) 226-243.

Smith, M. C. (2009) Literacy in adulthood. In M. C. Smith (Ed.), *Handbook of research on adult learning and development*. New York and London: Routledge.

Spitz-Oener, A. (2006), Technical change, job tasks, and rising educational demands: Looking outside the wage structure. *Journal of Labor Economics, 24*, 235-270.

Tolbert, C. J., & McNeal, R. S. (2003). Unraveling the effects of the Internet on political participation? *Political Research Quarterly*, 56(2), 175-185.

[1] "Low proficiency" adults are defined here as in Grotlüschen, Mallows, Reder and Sabatini (2016): those respondents scoring at Level 1 or below Level 1 (i.e. having an estimated proficiency score of less than 226) on the PIAAC literacy or numeracy scales. Level 1 on the PIAAC literacy and numeracy scales represents a level of proficiency at which a person can successfully complete reading tasks involving short texts and relatively simple operations or mathematical tasks involving basic operations. These definitions will enable us to map and understand better who these populations are, what they can do with their skills, and suggest effective ways for policies and programmes to further develop their skills.

[2] "Skill use" can be framed in two different ways. One approach is concerned with the extent to which an employer or an economy effectively uses the skills of its workforce. This perspective has been utilized, for example, in analyses of "skills mismatch" between the demands of particular jobs and the assessed proficiencies of those holding them. This demand-side framework of "skill use" prioritizes assessed proficiencies and utilizes measures of "skill use" to estimate how effectively workers' proficiencies are utilized in various types of jobs, industries, and economies more generally (Cedefop, 2010; Desjardins & Rubenson, 2011; OECD, 2013ac, 2011; Pellizzari & Fichen, 2013). This paper, in contrast, frames "skill use" in terms of the individual's engagement in everyday reading, writing and numeracy practices. Measures of practice engagement are utilized in analyses of social and economic phenomena along with measures of individuals' proficiencies, educational attainment and demographic characteristics. The practice engagement measures can be understood as indicators of human capital in supply-side frameworks of work. These two frameworks for skill use are not contraries, of course, but offer partially overlapping lenses for understanding literacy and numeracy skills in the workplace.

[3] Each of these six scales was found to have acceptable psychometric properties (OECD, 2013b), reflecting a single dimension of engagement with a broad set of reading, writing or numeracy practices. An important limitation of the way these data were scaled is that individuals who responded "Never" to all items comprising a particular scale were not assigned a scale score, they were given a missing value for that particular scale. For example, an individual who did no writing at work (i.e., answered "Never" to each question about how often they performed the writing tasks at work) was given a missing value rather than a low scale score for writing at work. In contrast, an individual who answered "Never" to each item except for the item about filling in forms for which "Less than once a month" was answered -- received a very low scale score. Rather than omitting many individuals from analyses who answered with all "Nevers" on a scale, the report team decided to impute low scale scores for them on the corresponding practice engagement scales. The lowest value assigned to any individual (in any of the participating countries) on a given scale was selected as the value to be imputed for the "all nevers" responses on that scale.

[4] In the case of reading and writing at or outside of work presented results refer to those at Level 1 or below in literacy and in case of numeracy at or outside of work to those at Level 1 or below in numeracy.

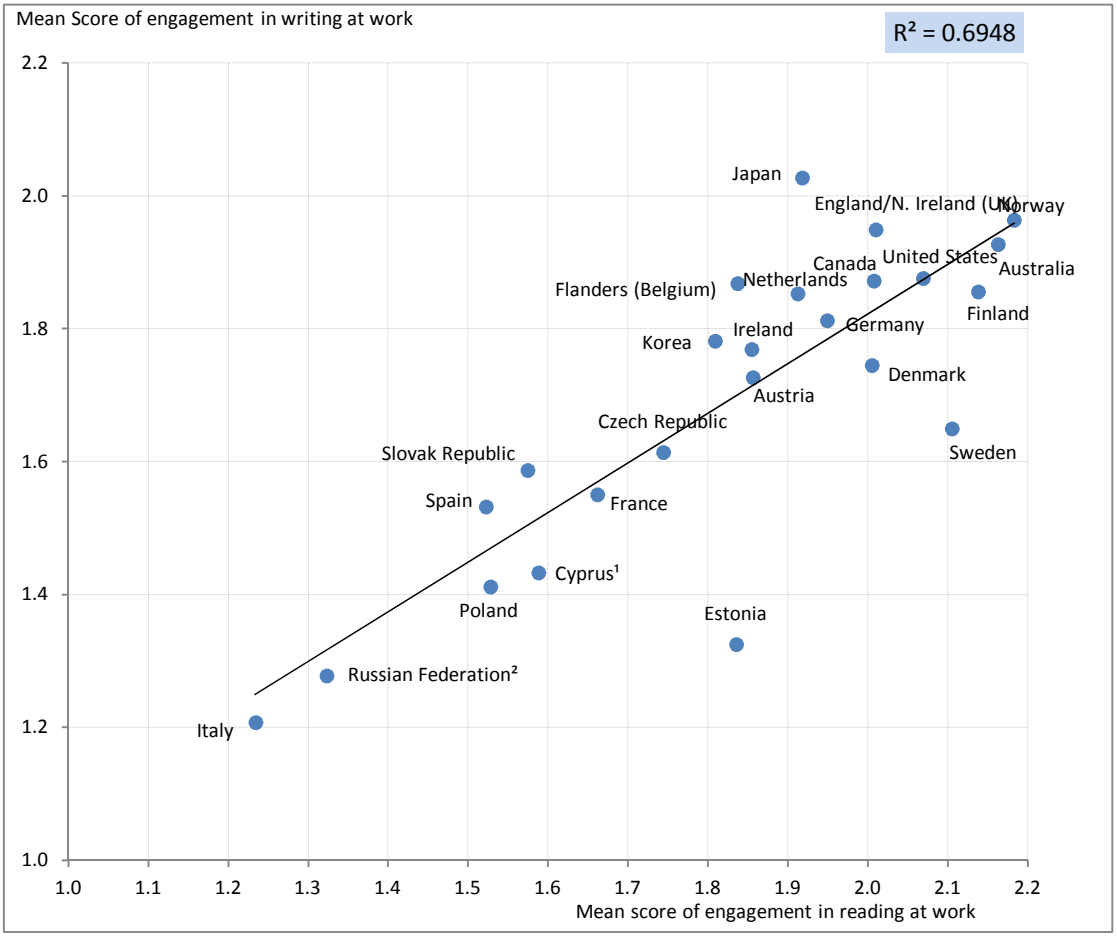
[5] Readers should note that the sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in Russia but rather the population of Russia excluding the population residing in the Moscow municipal area. More detailed information regarding the data from the Russian Federation as well as that of other countries can be found in the Technical Report of the Survey of Adult Skills (http://www.oecd.org/site/piaac/_Technical%20Report_17OCT13.pdf)

[6] One way to strengthen the interpretation of this comparison would be to estimate the equations for engagement at work and outside of work for the same populations. Questions about skill use (e.g., reading) at work were only asked of employed adults, whereas questions about skill use outside of work were asked of everyone. To compare, for example, engagement in reading at work and outside of work, the two equations could both be estimated for the employed subpopulation.

Figure A1

Engagement in reading practices by engagement in writing practices, work settings

Mean scores of reading and writing skills use at work by country



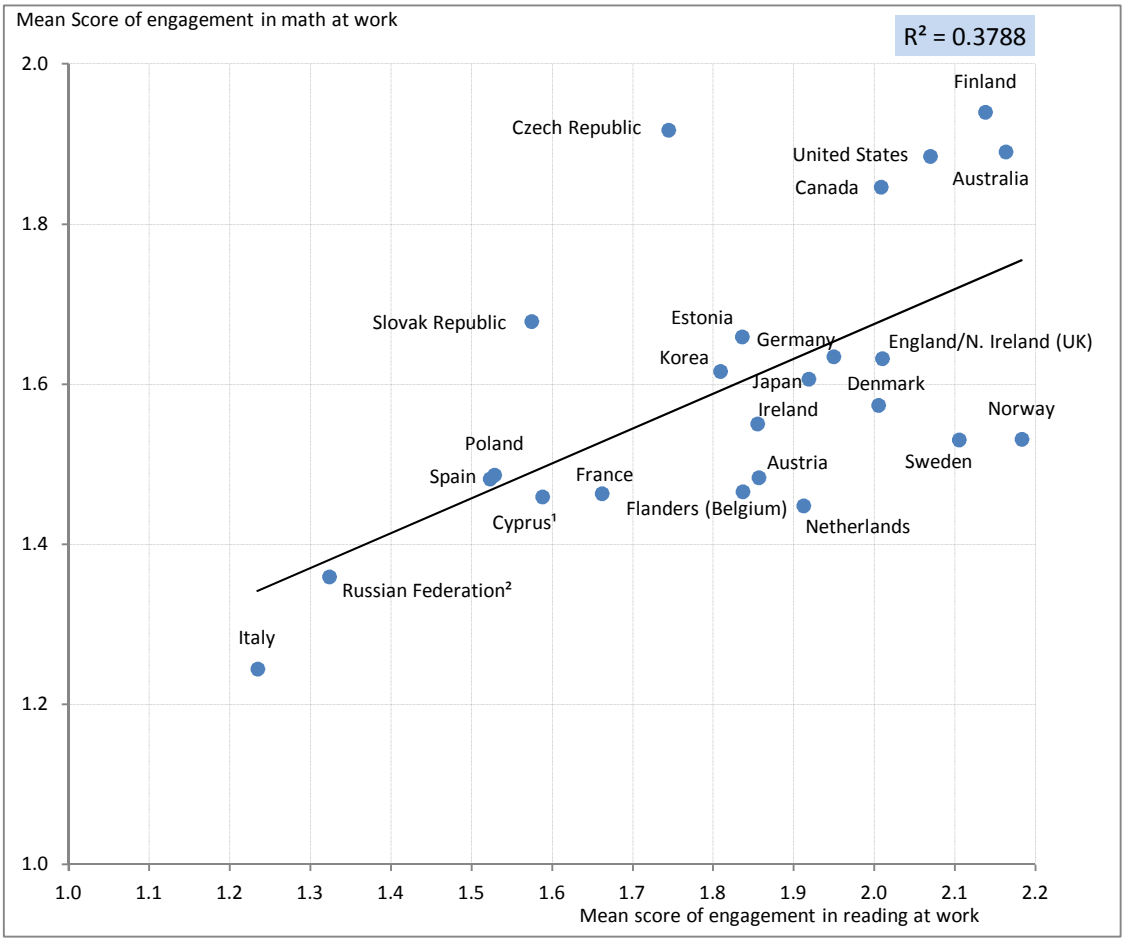
1. Note by Turkey: The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.
Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
2. Readers should note that the sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in Russia but rather the population of Russia excluding the population residing in the Moscow municipal area.

Source: Survey of Adult Skills (PIAAC) (2012).

Figure A2

Engagement in reading practices by engagement in math pratices, work settings

Mean scores of reading and numeracy skills use at work by country



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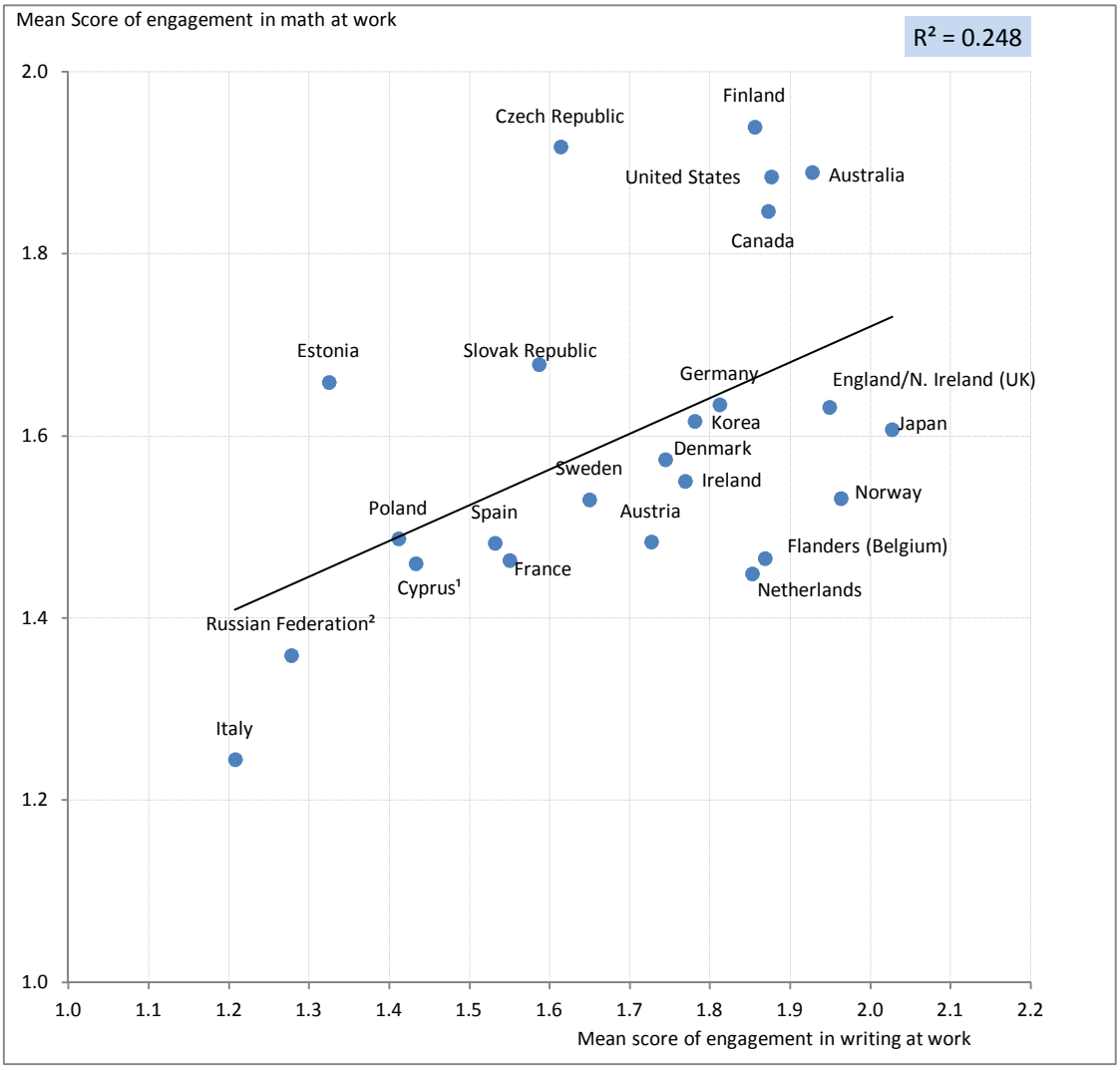
Source: Survey of Adult Skills (PIAAC) (2012)

Figure A3

Engagement in writing practices by engagement in math pratices, work settings

Mean scores of writing and numeracy skills use at work by country



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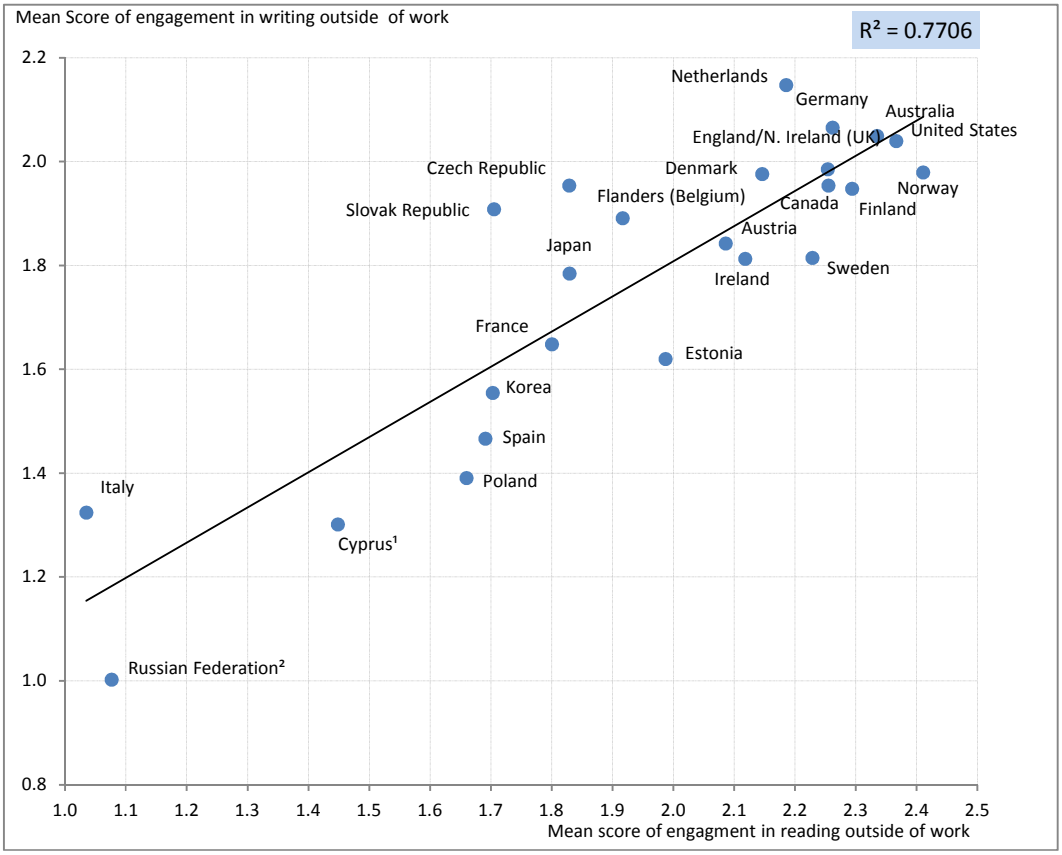
Source: Survey of Adult Skills (PIAAC) (2012).

Figure A4
Engagement in reading practices by engagement in writing pratices, outside of work settings
Mean scores of reading and writing skills use outside of work by country



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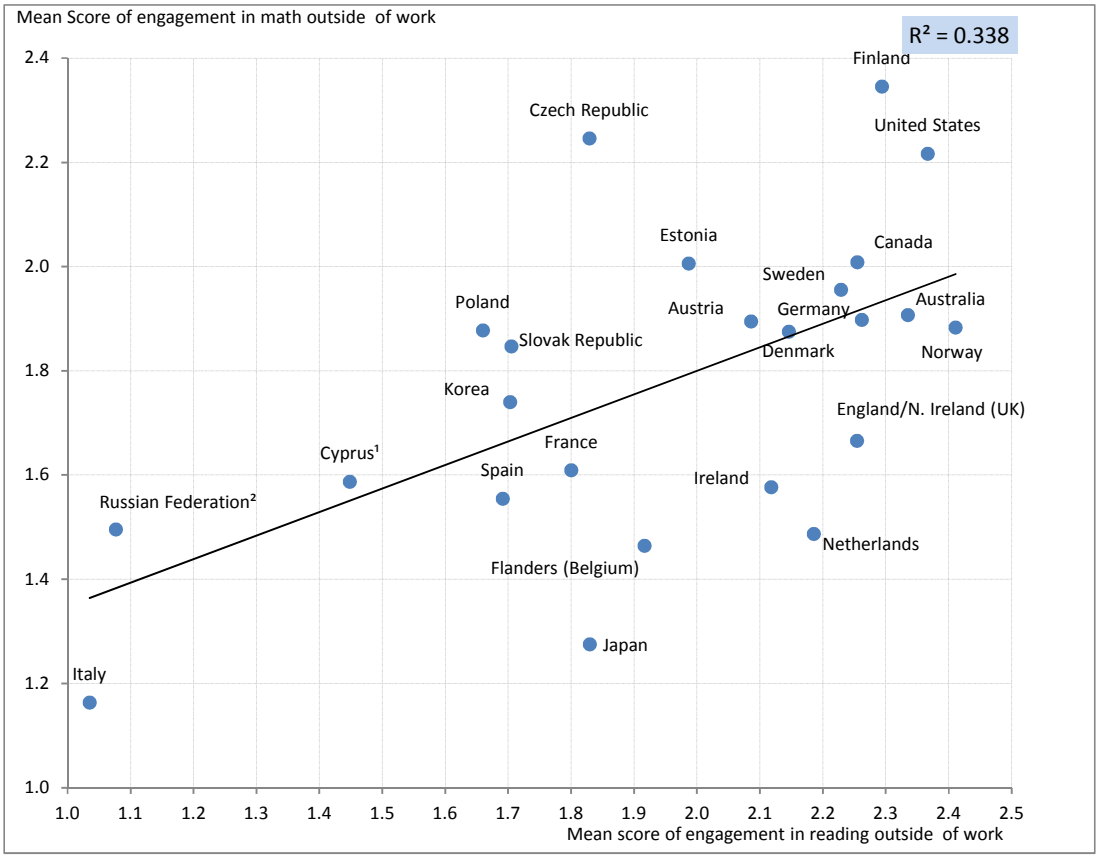
Source: Survey of Adult Skills (PIAAC) (2012).

Figure A5
Engagement in reading practices by engagement in math pratices, outside of work settings
Mean scores of reading and numeracy skills use outside of work by country



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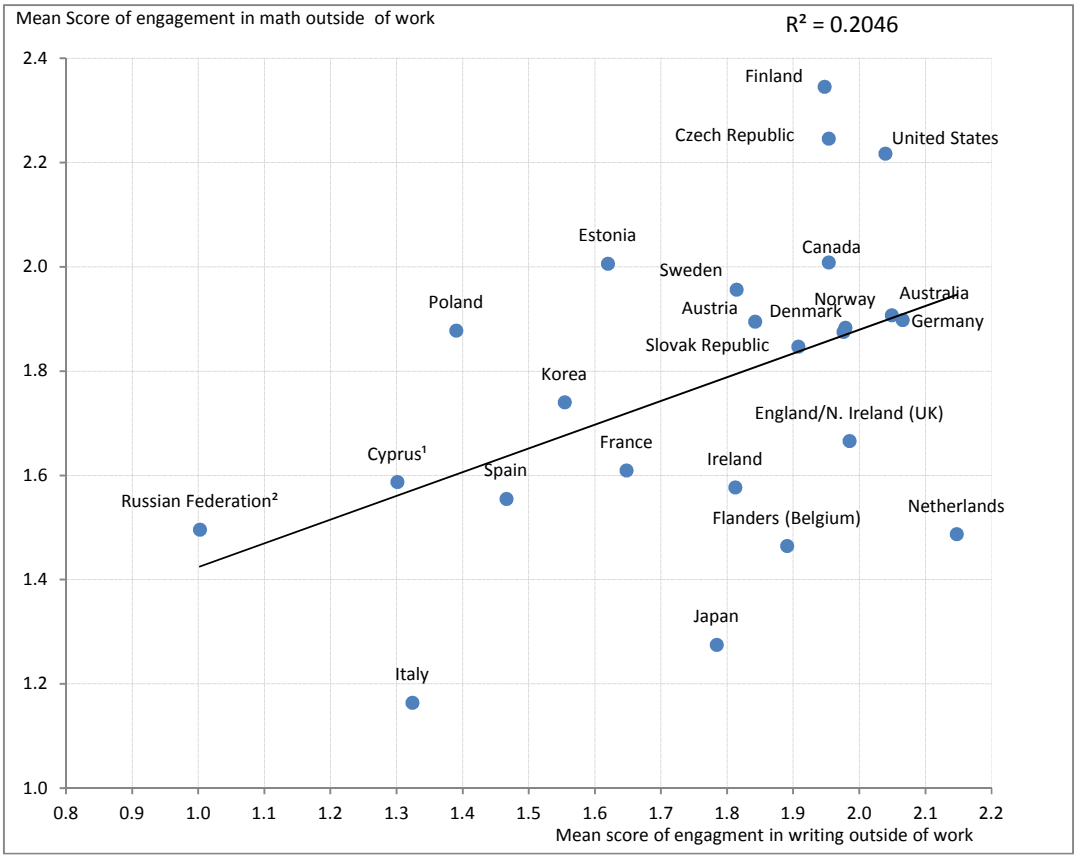
Source: Survey of Adult Skills (PIAAC) (2012).

Figure A6
Engagement in writing practices by engagement in math pratices, outside of work settings
Mean scores of writing and numeracy skills use outside of work by country



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Source: Survey of Adult Skills (PIAAC) (2012).

Table A1
Mean engagement in reading, writing and math practices, at and outside of work settings, by country

	At work settings												Outside of work settings											
	General population						Low-proficiency population						General population						Low-proficiency population					
	Reading practice		Writing practice		Math practice		Reading practice		Writing practice		Math practice at work		Reading practice		Writing practice		Math practice		Reading practice		Writing practice		Math practice	
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.
OECD																								
National entities																								
Australia	2.2	(0.0)	1.9	(0.0)	1.9	(0.0)	1.5	(0.1)	1.2	(0.1)	1.3	(0.1)	2.3	(0.0)	2.0	(0.0)	1.9	(0.0)	1.6	(0.1)	1.4	(0.1)	1.3	(0.0)
Austria	1.9	(0.0)	1.7	(0.0)	1.5	(0.0)	1.0	(0.1)	1.0	(0.1)	0.7	(0.1)	2.1	(0.0)	1.8	(0.0)	1.9	(0.0)	1.5	(0.1)	1.3	(0.1)	1.3	(0.1)
Canada	2.0	(0.0)	1.9	(0.0)	1.8	(0.0)	1.4	(0.0)	1.3	(0.0)	1.3	(0.0)	2.3	(0.0)	2.0	(0.0)	2.0	(0.0)	1.6	(0.0)	1.3	(0.0)	1.4	(0.0)
Czech Republic	1.7	(0.0)	1.6	(0.0)	1.9	(0.0)	1.2	(0.1)	1.0	(0.1)	1.2	(0.1)	1.8	(0.0)	2.0	(0.0)	2.2	(0.0)	1.2	(0.1)	1.4	(0.1)	1.8	(0.1)
Denmark	2.0	(0.0)	1.7	(0.0)	1.6	(0.0)	1.3	(0.1)	1.2	(0.0)	0.9	(0.1)	2.1	(0.0)	2.0	(0.0)	1.9	(0.0)	1.5	(0.0)	1.3	(0.0)	1.3	(0.0)
Estonia	1.8	(0.0)	1.3	(0.0)	1.7	(0.0)	1.2	(0.1)	0.9	(0.1)	1.0	(0.0)	2.0	(0.0)	1.6	(0.0)	2.0	(0.0)	1.4	(0.0)	1.0	(0.0)	1.4	(0.0)
Finland	2.1	(0.0)	1.9	(0.0)	1.9	(0.0)	1.5	(0.1)	1.3	(0.1)	1.2	(0.1)	2.3	(0.0)	1.9	(0.0)	2.3	(0.0)	1.8	(0.1)	1.3	(0.1)	1.7	(0.0)
France	1.7	(0.0)	1.6	(0.0)	1.5	(0.0)	0.9	(0.1)	0.9	(0.0)	0.7	(0.0)	1.8	(0.0)	1.6	(0.0)	1.6	(0.0)	1.2	(0.0)	1.1	(0.0)	1.1	(0.0)
Germany	1.9	(0.0)	1.8	(0.0)	1.6	(0.0)	1.1	(0.1)	1.2	(0.1)	0.8	(0.1)	2.3	(0.0)	2.1	(0.0)	1.9	(0.0)	1.7	(0.1)	1.6	(0.0)	1.2	(0.1)
Ireland	1.9	(0.0)	1.8	(0.0)	1.6	(0.0)	1.3	(0.1)	1.2	(0.1)	1.0	(0.1)	2.1	(0.0)	1.8	(0.0)	1.6	(0.0)	1.5	(0.0)	1.3	(0.0)	1.1	(0.0)
Italy	1.2	(0.0)	1.2	(0.0)	1.2	(0.0)	0.5	(0.1)	0.6	(0.1)	0.6	(0.1)	1.0	(0.0)	1.3	(0.0)	1.2	(0.0)	0.3	(0.1)	0.9	(0.0)	0.7	(0.0)
Japan	1.9	(0.0)	2.0	(0.0)	1.6	(0.0)	1.2	(0.2)	1.3	(0.2)	0.9	(0.1)	1.8	(0.0)	1.8	(0.0)	1.3	(0.0)	1.1	(0.1)	1.2	(0.1)	0.8	(0.1)
Korea	1.8	(0.0)	1.8	(0.0)	1.6	(0.0)	0.8	(0.1)	0.9	(0.1)	1.0	(0.0)	1.7	(0.0)	1.6	(0.0)	1.7	(0.0)	0.5	(0.1)	0.7	(0.1)	1.1	(0.0)
Netherlands	1.9	(0.0)	1.9	(0.0)	1.4	(0.0)	1.1	(0.1)	1.1	(0.1)	0.6	(0.1)	2.2	(0.0)	2.1	(0.0)	1.5	(0.0)	1.4	(0.1)	1.4	(0.1)	0.6	(0.0)
Norway	2.2	(0.0)	2.0	(0.0)	1.5	(0.0)	1.7	(0.1)	1.4	(0.1)	0.8	(0.1)	2.4	(0.0)	2.0	(0.0)	1.9	(0.0)	1.9	(0.0)	1.5	(0.1)	1.4	(0.1)
Poland	1.5	(0.0)	1.4	(0.0)	1.5	(0.0)	0.8	(0.1)	0.9	(0.1)	1.0	(0.1)	1.7	(0.0)	1.4	(0.0)	1.9	(0.0)	1.0	(0.0)	0.8	(0.0)	1.3	(0.0)
Slovak Republic	1.6	(0.0)	1.6	(0.0)	1.7	(0.0)	0.8	(0.1)	1.0	(0.1)	0.9	(0.1)	1.7	(0.0)	1.9	(0.0)	1.8	(0.0)	0.8	(0.1)	1.3	(0.1)	1.1	(0.1)
Spain	1.5	(0.0)	1.5	(0.0)	1.5	(0.0)	0.8	(0.1)	0.9	(0.1)	0.9	(0.0)	1.7	(0.0)	1.5	(0.0)	1.6	(0.0)	1.0	(0.0)	0.9	(0.0)	1.0	(0.0)
Sweden	2.1	(0.0)	1.6	(0.0)	1.5	(0.0)	1.6	(0.1)	1.1	(0.1)	0.9	(0.1)	2.2	(0.0)	1.8	(0.0)	2.0	(0.0)	1.8	(0.0)	1.3	(0.0)	1.4	(0.1)
United States	2.1	(0.0)	1.9	(0.0)	1.9	(0.0)	1.5	(0.1)	1.2	(0.1)	1.4	(0.1)	2.4	(0.0)	2.0	(0.0)	2.2	(0.0)	1.7	(0.1)	1.4	(0.1)	1.8	(0.0)
Sub-national entities																								
Flanders (Belgium)	1.8	(0.0)	1.9	(0.0)	1.5	(0.0)	1.0	(0.1)	1.2	(0.1)	0.6	(0.1)	1.9	(0.0)	1.9	(0.0)	1.5	(0.0)	1.3	(0.0)	1.3	(0.1)	0.9	(0.0)
England (UK)	2.0	(0.0)	2.0	(0.0)	1.6	(0.0)	1.4	(0.1)	1.4	(0.1)	1.0	(0.1)	2.3	(0.0)	2.0	(0.0)	1.7	(0.0)	1.8	(0.0)	1.5	(0.1)	1.2	(0.0)
Northern Ireland (UK)	1.9	(0.0)	1.8	(0.0)	1.6	(0.0)	1.3	(0.1)	1.0	(0.1)	0.9	(0.1)	2.0	(0.0)	1.8	(0.0)	1.5	(0.0)	1.5	(0.1)	1.3	(0.1)	1.0	(0.0)
England/N. Ireland (UK)	2.0	(0.0)	1.9	(0.0)	1.6	(0.0)	1.4	(0.1)	1.4	(0.1)	1.0	(0.1)	2.3	(0.0)	2.0	(0.0)	1.7	(0.0)	1.8	(0.0)	1.5	(0.1)	1.2	(0.0)
OECD average	1.9	(0.0)	1.7	(0.0)	1.6	(0.0)	1.2	(0.0)	1.1	(0.0)	0.9	(0.0)	2.0	(0.0)	1.8	(0.0)	1.8	(0.0)	1.3	(0.0)	1.2	(0.0)	1.2	(0.0)
Partners																								
Cyprus[1]	1.6	(0.0)	1.4	(0.0)	1.5	(0.0)	1.4	(0.1)	1.1	(0.1)	1.1	(0.1)	1.4	(0.0)	1.3	(0.0)	1.6	(0.0)	1.2	(0.1)	1.1	(0.1)	1.4	(0.1)
Russian Federation[2]	1.3	(0.1)	1.3	(0.1)	1.4	(0.0)	1.0	(0.2)	1.0	(0.1)	1.1	(0.1)	1.1	(0.1)	1.0	(0.1)	1.5	(0.1)	0.5	(0.2)	0.7	(0.1)	1.0	(0.1)

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Note : The practice engagement measures include imputed low scale scores in place of otherwise missing values for “all never” respondents.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A2
Correlation between engagement in reading, writing and math practices, at and outside of work settings

	At work settings						Outside of work settings					
	General population			Low-proficiency population			General population			Low-proficiency population		
	Correlation between reading and writing practices	Correlation between reading and math practices	Correlation between writing and math practices	Correlation between reading and writing practices	Correlation between reading and math practices	Correlation between writing and math practices	Correlation between reading and writing practices	Correlation between reading and math practices	Correlation between writing and math practices	Correlation between reading and writing practices	Correlation between reading and math practices	Correlation between writing and math practices
OECD												
National entities												
Australia	0.67	0.53	0.48	0.66	0.54	0.46	0.61	0.55	0.51	0.57	0.53	0.40
Austria	0.67	0.59	0.51	0.64	0.58	0.49	0.63	0.58	0.52	0.53	0.55	0.43
Canada	0.63	0.51	0.48	0.61	0.56	0.48	0.59	0.54	0.50	0.58	0.51	0.46
Czech Republic	0.63	0.55	0.52	0.59	0.57	0.61	0.55	0.51	0.49	0.51	0.46	0.38
Denmark	0.64	0.52	0.44	0.59	0.51	0.42	0.58	0.53	0.52	0.56	0.48	0.50
Estonia	0.65	0.56	0.55	0.59	0.54	0.56	0.62	0.53	0.49	0.53	0.44	0.37
Finland	0.60	0.53	0.46	0.56	0.49	0.37	0.58	0.52	0.52	0.56	0.48	0.46
France	0.61	0.57	0.50	0.62	0.59	0.51	0.58	0.53	0.49	0.54	0.53	0.46
Germany	0.64	0.57	0.48	0.59	0.58	0.49	0.57	0.54	0.49	0.56	0.45	0.50
Ireland	0.64	0.51	0.47	0.65	0.57	0.50	0.60	0.55	0.51	0.55	0.50	0.51
Italy	0.71	0.58	0.57	0.64	0.57	0.55	0.67	0.54	0.56	0.61	0.52	0.56
Japan	0.62	0.58	0.54	0.65	0.66	0.55	0.54	0.48	0.44	0.62	0.52	0.58
Korea	0.65	0.58	0.54	0.62	0.63	0.58	0.60	0.55	0.55	0.57	0.62	0.48
Netherlands	0.68	0.55	0.45	0.61	0.52	0.43	0.61	0.53	0.47	0.56	0.46	0.41
Norway	0.57	0.49	0.40	0.52	0.45	0.41	0.53	0.50	0.48	0.52	0.46	0.46
Poland	0.64	0.59	0.53	0.56	0.58	0.47	0.66	0.63	0.55	0.57	0.56	0.49
Slovak Republic	0.66	0.60	0.53	0.68	0.62	0.58	0.60	0.58	0.49	0.65	0.63	0.56
Spain	0.68	0.56	0.50	0.61	0.56	0.44	0.64	0.53	0.50	0.57	0.48	0.40
Sweden	0.61	0.52	0.45	0.56	0.46	0.37	0.57	0.53	0.43	0.51	0.50	0.38
United States	0.65	0.52	0.50	0.63	0.56	0.52	0.60	0.60	0.58	0.61	0.66	0.58
Sub-national entities												
Flanders (Belgium)	0.65	0.56	0.49	0.57	0.56	0.44	0.61	0.53	0.47	0.57	0.48	0.49
England (UK)	0.66	0.51	0.49	0.61	0.49	0.45	0.59	0.55	0.49	0.54	0.50	0.49
Northern Ireland (UK)	0.65	0.51	0.47	0.61	0.52	0.46	0.59	0.56	0.52	0.59	0.55	0.53
England/N. Ireland (UK)	0.66	0.51	0.49	0.61	0.49	0.44	0.59	0.55	0.49	0.54	0.50	0.50

OECD average	0.64	0.55	0.50	0.61	0.55	0.49	0.60	0.54	0.50	0.56	0.51	0.47
Partners												
Cyprus[1]	0.67	0.50	0.41	0.67	0.53	0.46	0.67	0.47	0.43	0.67	0.50	0.41
Russian Federation[2]	0.67	0.49	0.50	0.67	0.51	0.53	0.67	0.56	0.45	0.67	0.57	0.53

1. Note by Turkey: The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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

Source: Survey of Adult Skills (PIAAC) (2012)

Table A3
Regression of engagement in reading, writing and math practices, at and outside of work settings, on demographic, education and proficiency predictors (country average)

	Reading practices at work						Reading practices outside of work						Writing practices at work						Writing practices outside of work						Math practices at work						Math practices outside of work					
	Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)			Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)			Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)			Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)			Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)			Model 1 (socio-demographic variables)			Model 2 (socio-demographic variables + proficiency)		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue	Coef	S.E.	p-vlaue
General population																																				
Intercept	-0.204	(0.05)	0.000	-1.314	(0.06)	0.000	2.566	(0.03)	0.000	0.959	(0.04)	0.000	-0.304	(0.05)	0.000	-1.261	(0.06)	0.000	3.052	(0.03)	0.000	1.748	(0.04)	0.000	0.273	(0.05)	0.000	-1.221	(0.05)	0.000	3.660	(0.03)	0.000	1.859	(0.04)	**0.000**
Age	0.066	(0.00)	0.000	0.065	(0.00)	0.000	-0.045	(0.00)	0.000	-0.040	(0.00)	0.000	0.074	(0.00)	0.000	0.073	(0.00)	0.000	-0.066	(0.00)	0.000	-0.062	(0.00)	0.000	0.052	(0.00)	0.000	0.047	(0.00)	0.000	-0.089	(0.00)	0.000	-0.086	(0.00)	0.000
Age squared	-0.073	(0.00)	0.000	-0.068	(0.00)	0.000	0.042	(0.00)	0.000	0.042	(0.00)	0.000	-0.088	(0.00)	0.000	-0.084	(0.00)	0.000	0.054	(0.00)	0.000	0.053	(0.00)	0.000	-0.067	(0.00)	0.000	-0.058	(0.00)	0.000	0.084	(0.00)	0.000	0.085	(0.00)	0.000
Educational attainment																																				
Upper secondary	0.676	(0.01)	0.000	0.568	(0.01)	0.000	0.510	(0.01)	0.000	0.360	(0.01)	0.000	0.548	(0.01)	0.000	0.455	(0.01)	0.000	0.389	(0.01)	0.000	0.265	(0.01)	0.000	0.491	(0.01)	0.000	0.314	(0.01)	0.000	0.215	(0.01)	0.000	0.007	(0.01)	0.474
Tertiary	1.409	(0.01)	0.000	1.184	(0.02)	0.000	0.951	(0.01)	0.000	0.648	(0.01)	0.000	1.193	(0.01)	0.000	0.999	(0.02)	0.000	0.848	(0.01)	0.000	0.598	(0.01)	0.000	1.056	(0.01)	0.000	0.695	(0.02)	0.000	0.592	(0.01)	0.000	0.181	(0.01)	0.000
Women	-0.207	(0.01)	0.000	-0.196	(0.01)	0.000	-0.041	(0.01)	0.000	-0.027	(0.01)	0.000	-0.109	(0.01)	0.000	-0.099	(0.01)	0.000	0.072	(0.01)	0.000	0.084	(0.01)	0.000	-0.340	(0.01)	0.000	-0.261	(0.01)	0.000	-0.117	(0.01)	0.000	-0.035	(0.01)	0.000
Foreign born	-0.362	(0.02)	0.000	-0.248	(0.02)	0.000	-0.119	(0.01)	0.000	0.040	(0.01)	0.003	-0.282	(0.02)	0.000	-0.182	(0.02)	0.000	-0.049	(0.01)	0.000	0.089	(0.01)	0.000	-0.276	(0.02)	0.000	-0.109	(0.02)	0.000	-0.066	(0.01)	0.000	0.123	(0.01)	0.000
Literacy proficiency	-	-	-	0.004	(0.00)	0.000	-	-	-	0.006	(0.00)	0.000	-	-	-	0.004	(0.00)	0.000	-	-	-	0.005	(0.00)	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	(0.00)	0.000	-	-	-	0.007	(0.00)	0.000
R-square	*0.22*			*0.24*			*0.14*			*0.19*			*0.17*			*0.20*			*0.17*			*0.20*			*0.14*			*0.18*			*0.13*			*0.20*		
Low-proficency population																																				
Intercept	-0.044	(0.18)	0.812	-1.480	(0.25)	0.000	1.705	(0.11)	0.000	-0.279	(0.15)	0.060	0.150	(0.16)	0.351	-0.897	(0.22)	0.000	2.562	(0.10)	0.000	1.487	(0.14)	0.000	0.714	(0.12)	0.000	-0.240	(0.16)	0.127	2.592	(0.09)	0.000	1.529	(0.11)	0.000
Age	0.039	(0.01)	0.000	0.040	(0.01)	0.000	-0.031	(0.01)	0.000	-0.026	(0.01)	0.000	0.034	(0.01)	0.000	0.035	(0.01)	0.000	-0.060	(0.01)	0.000	-0.057	(0.01)	0.000	0.010	(0.01)	0.113	0.011	(0.01)	0.081	-0.064	(0.00)	0.000	-0.060	(0.00)	0.000
Age squared	-0.038	(0.01)	0.001	-0.039	(0.01)	0.001	0.030	(0.01)	0.000	0.026	(0.01)	0.000	-0.038	(0.01)	0.000	-0.039	(0.01)	0.000	0.047	(0.01)	0.000	0.044	(0.01)	0.000	-0.018	(0.01)	0.022	-0.019	(0.01)	0.018	0.057	(0.01)	0.000	0.054	(0.01)	0.000
Educational attainment																																				
Upper secondary	0.695	(0.04)	0.000	0.629	(0.04)	0.000	0.598	(0.03)	0.000	0.490	(0.03)	0.000	0.492	(0.03)	0.000	0.443	(0.04)	0.000	0.395	(0.02)	0.000	0.337	(0.03)	0.000	0.366	(0.03)	0.000	0.309	(0.03)	0.000	0.224	(0.02)	0.000	0.152	(0.02)	0.000
Tertiary	1.341	(0.05)	0.000	1.254	(0.05)	0.000	1.076	(0.04)	0.000	0.937	(0.04)	0.000	1.123	(0.05)	0.000	1.065	(0.05)	0.000	0.882	(0.04)	0.000	0.804	(0.04)	0.000	0.701	(0.04)	0.000	0.630	(0.05)	0.000	0.485	(0.03)	0.000	0.391	(0.03)	0.000
Women	-0.206	(0.03)	0.000	-0.216	(0.03)	0.000	0.066	(0.02)	0.003	0.055	(0.02)	0.011	-0.067	(0.03)	0.027	-0.073	(0.03)	0.016	0.103	(0.02)	0.000	0.096	(0.02)	0.000	-0.165	(0.03)	0.000	-0.165	(0.03)	0.000	0.049	(0.02)	0.009	0.050	(0.02)	0.008
Foreign born	-0.461	(0.04)	0.000	-0.331	(0.04)	0.000	-0.120	(0.03)	0.000	0.053	(0.03)	0.122	-0.281	(0.04)	0.000	-0.194	(0.04)	0.000	0.012	(0.03)	0.694	0.110	(0.03)	0.001	-0.262	(0.03)	0.000	-0.173	(0.04)	0.000	0.043	(0.03)	0.115	0.139	(0.03)	0.000
Literacy proficiency	-	-	-	0.007	(0.00)	0.000	-	-	-	0.010	(0.00)	0.000	-	-	-	0.005	(0.00)	0.000	-	-	-	0.005	(0.00)	0.000				(0.0)	(0.0)	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.006	(0.00)	0.000	-	-	-	0.005	(0.00)	0.000
R-square	*0.17*			*0.19*			*0.12*			*0.17*			*0.13*			*0.15*			*0.15*			*0.17*			*0.08*			*0.10*			*0.10*			*0.12*		

Notes: The reference category for educational attainment is lower than upper secondary.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A4
Regressions of log earnings on reading, writing and math practices, at and outside of work settings, for workers aged 25 to 54, with and without proficiency, with demographic, education, occupation and work experience controls (country average)

	Reading practices at work						Reading practices outside of work						Writing practices at work						Writing practices outside of work						Math practices at work						Math practices outside of work					
	Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value
Low-proficiency population																																				
Skills use practices																																				
Reading practices at work	0.110	0.010	0.000	0.107	0.010	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices at work	-	-	-	-	-	-	-	-	-	-	-	-	0.116	0.011	0.000	0.114	0.011	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Math practices at work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.067	0.010	0.000	0.064	0.010	0.000	-	-	-	-	-	-
Reading practices outside of work	-	-	-	-	-	-	0.051	0.012	0.000	0.046	0.012	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.031	0.012	0.007	0.028	0.012	0.016	-	-	-	-	-	-	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.028	0.010	0.005	0.024	0.010	0.017
Proficiency																																				
Literacy proficency	-	-	-	0.001	0.001	0.137	-	-	-	0.001	0.001	0.076	-	-	-	0.001	0.001	0.079	-	-	-	0.001	0.001	0.020	-	-	-	-	-	-	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	0.000	0.002	-	-	-	0.001	0.000	0.001
Socio-demographics controls																																				
Intercept	8.335	0.301	0.000	8.169	0.320	0.000	8.418	0.334	0.000	8.208	0.353	0.000	8.244	0.307	0.000	8.041	0.323	0.000	8.419	0.320	0.000	8.150	0.339	0.000	8.322	0.251	0.000	8.087	0.265	0.000	8.347	0.251	0.000	8.080	0.267	0.000
Age	-0.006	0.017	0.736	-0.006	0.017	0.740	-0.004	0.019	0.833	-0.004	0.019	0.844	-0.002	0.018	0.915	-0.002	0.018	0.916	-0.003	0.018	0.884	-0.003	0.018	0.880	-0.002	0.014	0.859	-0.002	0.014	0.861	0.000	0.014	0.973	0.000	0.014	0.974
Age squared	0.000	0.000	0.784	0.000	0.000	0.800	0.000	0.000	0.707	0.000	0.000	0.721	0.000	0.000	0.658	0.000	0.000	0.676	0.000	0.000	0.644	0.000	0.000	0.673	0.000	0.000	0.565	0.000	0.000	0.582	0.000	0.000	0.439	0.000	0.000	0.460
Upper secondary	0.086	0.024	0.000	0.079	0.024	0.001	0.108	0.024	0.000	0.101	0.024	0.000	0.101	0.024	0.000	0.093	0.024	0.000	0.127	0.024	0.000	0.116	0.024	0.000	0.111	0.024	0.000	0.098	0.024	0.000	0.120	0.024	0.000	0.106	0.024	0.000
Tertiary	0.151	0.044	0.001	0.142	0.044	0.001	0.182	0.045	0.000	0.173	0.046	0.000	0.154	0.043	0.000	0.143	0.044	0.001	0.204	0.045	0.000	0.190	0.045	0.000	0.223	0.045	0.000	0.210	0.046	0.000	0.235	0.046	0.000	0.220	0.047	0.000
Women	-0.313	0.028	0.000	-0.317	0.028	0.000	-0.345	0.029	0.000	-0.349	0.029	0.000	-0.330	0.028	0.000	-0.334	0.029	0.000	-0.344	0.028	0.000	-0.349	0.028	0.000	-0.293	0.023	0.000	-0.297	0.023	0.000	-0.311	0.024	0.000	-0.313	0.024	0.000
Foreign born	0.036	0.026	0.160	0.049	0.027	0.064	0.013	0.027	0.630	0.031	0.028	0.257	0.024	0.026	0.348	0.039	0.027	0.152	0.006	0.026	0.831	0.027	0.028	0.328	0.015	0.025	0.547	0.033	0.025	0.193	0.010	0.024	0.695	0.030	0.025	0.230
Semi-skilled white-collar occupations	-0.210	0.036	0.000	-0.211	0.036	0.000	-0.257	0.036	0.000	-0.256	0.036	0.000	-0.202	0.036	0.000	-0.202	0.036	0.000	-0.265	0.036	0.000	-0.263	0.036	0.000	-0.257	0.033	0.000	-0.256	0.033	0.000	-0.277	0.033	0.000	-0.275	0.033	0.000
Semi-skilled blue-collar occupations	-0.065	0.036	0.071	-0.066	0.036	0.064	-0.147	0.035	0.000	-0.147	0.035	0.000	-0.055	0.036	0.133	-0.056	0.036	0.124	-0.158	0.036	0.000	-0.157	0.036	0.000	-0.133	0.033	0.000	-0.131	0.033	0.000	-0.169	0.033	0.000	-0.165	0.033	0.000
Elementary occupation	-0.271	0.043	0.000	-0.272	0.043	0.000	-0.410	0.041	0.000	-0.408	0.041	0.000	-0.283	0.043	0.000	-0.283	0.044	0.000	-0.427	0.041	0.000	-0.424	0.041	0.000	-0.377	0.039	0.000	-0.371	0.039	0.000	-0.439	0.038	0.000	-0.430	0.038	0.000
Work experience	0.027	0.007	0.000	0.027	0.007	0.000	0.030	0.008	0.000	0.030	0.008	0.000	0.027	0.007	0.000	0.027	0.007	0.000	0.030	0.007	0.000	0.030	0.007	0.000	0.034	0.005	0.000	0.034	0.005	0.000	0.036	0.005	0.000	0.035	0.005	0.000
Work experience squared	0.000	0.000	0.118	0.000	0.000	0.108	0.000	0.000	0.107	0.000	0.000	0.098	0.000	0.000	0.115	0.000	0.000	0.102	0.000	0.000	0.100	0.000	0.000	0.097	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.002
General population																																				
Skills use practices																																				
Reading practices at work	0.117	0.003	0.000	0.112	0.003	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices at work	-	-	-	-	-	-	-	-	-	-	-	-	0.122	0.003	0.000	0.118	0.003	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Math practices at work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.084	0.003	0.000	0.076	0.003	0.000	-	-	-	-	-	-
Reading practices outside of work	-	-	-	-	-	-	0.011	0.004	0.006	-0.001	0.004	0.770	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.005	0.003	0.103	-0.003	0.003	0.424	-	-	-	-	-	-	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.009	0.003	0.004	-0.008	0.003	0.017
Proficiency																																				
Literacy proficency	-	-	-	0.001	0.000	0.000	-	-	-	0.001	0.000	0.000	-	-	-	0.001	0.001	0.079	-	-	-	0.001	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	0.000	0.000	-	-	-	0.002	0.000	0.000
Socio-demographics controls																																				
Intercept	8.120	0.084	0.000	7.781	0.087	0.000	8.303	0.085	0.000	7.900	0.089	0.000	8.079	0.084	0.000	7.730	0.088	0.000	8.301	0.086	0.000	7.886	0.089	0.000	8.176	0.085	0.000	7.853	0.087	0.000	8.301	0.085	0.000	7.871	0.088	0.000
Age	0.008	0.005	0.112	0.009	0.005	0.079	0.009	0.005	0.057	0.010	0.005	0.040	0.010	0.005	0.050	0.010	0.005	0.036	0.010	0.005	0.045	0.011	0.005	0.032	0.008	0.005	0.088	0.009	0.005	0.057	0.010	0.005	0.053	0.011	0.005	0.030
Age squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper secondary	0.070	0.010	0.000	0.047	0.010	0.000	0.109	0.010	0.000	0.082	0.011	0.000	0.077	0.010	0.000	0.052	0.010	0.000	0.114	0.010	0.000	0.085	0.011	0.000	0.094	0.010	0.000	0.066	0.011	0.000	0.113	0.011	0.000	0.077	0.011	0.000
Tertiary	0.263	0.012	0.000	0.217	0.013	0.000	0.335	0.012	0.000	0.282	0.013	0.000	0.274	0.012	0.000	0.225	0.012	0.000	0.342	0.012	0.000	0.285	0.013	0.000	0.304	0.012	0.000	0.251	0.013	0.000	0.341	0.013	0.000	0.273	0.013	0.000
Women	-0.316	0.006	0.000	-0.312	0.006	0.000	-0.344	0.006	0.000	-0.338	0.006	0.000	-0.326	0.006	0.000	-0.321	0.006	0.000	-0.345	0.006	0.000	-0.338	0.006	0.000	-0.310	0.006	0.000	-0.297	0.006	0.000	-0.344	0.006	0.000	-0.325	0.006	0.000
Foreign born	-0.020	0.010	0.044	0.008	0.010	0.447	-0.041	0.010	0.000	-0.005	0.010	0.647	-0.028	0.010	0.005	0.001	0.010	0.893	-0.043	0.010	0.000	-0.006	0.010	0.581	-0.033	0.010	0.001	-0.007	0.010	0.501	-0.042	0.010	0.000	-0.005	0.010	0.660
Semi-skilled white-collar occupations	-0.277	0.008	0.000	-0.265	0.008	0.000	-0.327	0.008	0.000	-0.312	0.008	0.000	-0.277	0.008	0.000	-0.265	0.008	0.000	-0.330	0.008	0.000	-0.314	0.008	0.000	-0.299	0.007	0.000	-0.286	0.007	0.000	-0.330	0.008	0.000	-0.309	0.008	0.000
Semi-skilled blue-collar occupations	-0.160	0.010	0.000	-0.140	0.010	0.000	-0.260	0.009	0.000	-0.233	0.009	0.000	-0.153	0.009	0.000	-0.132	0.009	0.000	-0.263	0.009	0.000	-0.236	0.009	0.000	-0.197	0.009	0.000	-0.179	0.009	0.000	-0.263	0.009	0.000	-0.235	0.009	0.000
Elementary occupation	-0.357	0.014	0.000	-0.333	0.014	0.000	-0.526	0.014	0.000	-0.490	0.014	0.000	-0.374	0.014	0.000	-0.346	0.015	0.000	-0.532	0.014	0.000	-0.495	0.014	0.000	-0.430	0.014	0.000	-0.404	0.014	0.000	-0.532	0.014	0.000	-0.488	0.014	0.000
Work experience	0.036	0.002	0.000	0.035	0.002	0.000	0.039	0.002	0.000	0.038	0.002	0.000	0.035	0.002	0.000	0.035	0.002	0.000	0.039	0.002	0.000	0.038	0.002	0.000	0.036	0.002	0.000	0.035	0.002	0.000	0.039	0.002	0.000	0.037	0.002	0.000
Work experience squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The reference category for educational attainment is lower than upper secondary. The reference category for occupation is skilled occupations. Baseline model is the model controlling for the skills use practices and the socio-demographic variables. The enhanced model corresponds to the baseline model where the proficiency is added as control.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A5
Ordinal regressions of social trust on reading, writing and math practices, outside of work settings, adults aged 25 to 65, with and without literacy proficiency, with demographic, education and employment status controls (country average)

	Reading practices outside of work						Writing practices outside of work						Math practices outside of work					
	Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value
Low-proficiency population																		
Skills use practices																		
Reading practices outside of work	0.047	0.019	0.015	0.052	0.020	0.009	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.049	0.020	0.015	0.052	0.020	0.011	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.020	0.824	0.005	0.021	0.820
Proficiency																		
Literacy proficency	-	-	-	0.000	0.001	0.682	-	-	-	0.000	0.001	0.812	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000	0.001	0.738
Socio-demographics controls																		
Age	-0.039	0.017	0.018	-0.040	0.017	0.015	-0.039	0.016	0.018	-0.040	0.016	0.015	-0.028	0.014	0.050	-0.028	0.014	0.050
Age squared	0.000	0.000	0.009	0.000	0.000	0.007	0.000	0.000	0.008	0.000	0.000	0.006	0.000	0.000	0.022	0.000	0.000	0.021
Upper secondary	0.161	0.048	0.001	0.163	0.048	0.001	0.173	0.048	0.000	0.175	0.048	0.000	0.196	0.042	0.000	0.192	0.042	0.000
Tertiary	0.445	0.082	0.000	0.446	0.082	0.000	0.441	0.083	0.000	0.442	0.084	0.000	0.595	0.071	0.000	0.591	0.072	0.000
Women	-0.018	0.041	0.658	-0.018	0.041	0.663	-0.017	0.041	0.682	-0.017	0.041	0.687	-0.008	0.037	0.838	-0.006	0.037	0.873
Foreign born	0.086	0.096	0.369	0.072	0.097	0.458	0.084	0.096	0.380	0.075	0.097	0.439	0.061	0.086	0.481	0.059	0.087	0.500
Employed	0.135	0.045	0.002	0.141	0.045	0.002	0.144	0.045	0.001	0.150	0.045	0.001	0.167	0.039	0.000	0.171	0.040	0.000
General population																		
Skills use practices																		
Reading practices outside of work	0.147	0.008	0.000	0.101	0.008	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.129	0.007	0.000	0.094	0.007	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.073	0.007	0.000	0.024	0.007	0.001
Proficiency																		
Literacy proficency	-	-	-	0.004	0.000	0.000	-	-	-	0.004	0.000	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.000	0.000
Socio-demographics controls																		
Age	-0.002	0.005	0.731	-0.001	0.005	0.875	-0.001	0.005	0.770	0.000	0.005	0.929	-0.003	0.005	0.484	-0.002	0.005	0.602
Age squared	0.000	0.000	0.130	0.000	0.000	0.058	0.000	0.000	0.087	0.000	0.000	0.042	0.000	0.000	0.059	0.000	0.000	0.043
Upper secondary	0.241	0.020	0.000	0.157	0.021	0.000	0.262	0.020	0.000	0.170	0.021	0.000	0.290	0.020	0.000	0.185	0.021	0.000
Tertiary	0.901	0.023	0.000	0.720	0.024	0.000	0.923	0.023	0.000	0.728	0.024	0.000	0.983	0.022	0.000	0.775	0.024	0.000
Women	0.135	0.013	0.000	0.143	0.013	0.000	0.121	0.013	0.000	0.134	0.013	0.000	0.139	0.013	0.000	0.183	0.013	0.000
Foreign born	-0.180	0.028	0.000	-0.058	0.028	0.041	-0.190	0.028	0.000	-0.061	0.028	0.030	-0.192	0.028	0.000	-0.072	0.028	0.011
Employed	0.247	0.017	0.000	0.209	0.017	0.000	0.253	0.017	0.000	0.213	0.017	0.000	0.252	0.017	0.000	0.195	0.017	0.000

Notes: The reference category for educational attainment is lower than upper secondary. Baseline model is the model controlling for the skills use practices and the socio-demographic variables. The enhanced model corresponds to the baseline model where the proficiency is added as control.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A6
Ordinal regressions of volunteerism on reading, writing and math practices, outside of work settings, adults aged 25 to 65, with and without literacy proficiency, with demographic, education and employment status controls (country average)

	Reading practices outside of work						Writing practices outside of work						Math practices outside of work					
	Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value
Low-proficiency population																		
Skills use practices																		
Reading practices outside of work	0.432	0.031	0.000	0.430	0.031	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.399	0.026	0.000	0.393	0.026	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.333	0.034	0.000	0.324	0.035	0.000
Proficiency																		
Literacy proficency	-	-	-	0.001	0.001	0.575	-	-	-	0.002	0.001	0.107	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.001	0.030
Socio-demographics controls																		
Age	0.038	0.024	0.119	0.038	0.025	0.120	0.038	0.024	0.113	0.039	0.024	0.110	0.024	0.022	0.266	0.026	0.022	0.229
Age squared	0.000	0.000	0.324	0.000	0.000	0.322	0.000	0.000	0.427	0.000	0.000	0.413	0.000	0.000	0.658	0.000	0.000	0.593
Upper secondary	0.263	0.069	0.000	0.262	0.071	0.000	0.326	0.067	0.000	0.312	0.069	0.000	0.373	0.062	0.000	0.351	0.065	0.000
Tertiary	0.515	0.091	0.000	0.511	0.092	0.000	0.574	0.092	0.000	0.555	0.092	0.000	0.762	0.083	0.000	0.724	0.084	0.000
Women	-0.099	0.058	0.085	-0.101	0.058	0.080	-0.115	0.057	0.045	-0.119	0.058	0.038	-0.022	0.052	0.676	-0.024	0.052	0.646
Foreign born	-0.445	0.817	0.586	-0.416	0.830	0.616	-0.492	0.818	0.547	-0.442	0.829	0.594	-0.448	0.439	0.308	-0.382	0.442	0.387
Employed	0.170	0.064	0.009	0.163	0.065	0.012	0.204	0.064	0.001	0.193	0.065	0.003	0.199	0.064	0.002	0.181	0.064	0.005
General population																		
Skills use practices																		
Reading practices outside of work	0.503	0.011	0.000	0.477	0.011	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.484	0.009	0.000	0.464	0.009	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.334	0.009	0.000	0.298	0.009	0.000
Proficiency																		
Literacy proficency	-	-	-	0.003	0.000	0.000	-	-	-	0.003	0.000	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.000	0.000
Socio-demographics controls																		
Age	0.058	0.006	0.000	0.059	0.006	0.000	0.061	0.006	0.000	0.062	0.006	0.000	0.055	0.006	0.000	0.056	0.006	0.000
Age squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper secondary	0.293	0.029	0.000	0.232	0.029	0.000	0.337	0.029	0.000	0.266	0.029	0.000	0.409	0.028	0.000	0.329	0.029	0.000
Tertiary	0.514	0.030	0.000	0.387	0.033	0.000	0.553	0.030	0.000	0.412	0.033	0.000	0.714	0.029	0.000	0.555	0.032	0.000
Women	-0.041	0.016	0.010	-0.032	0.016	0.042	-0.097	0.016	0.000	-0.086	0.016	0.000	-0.026	0.016	0.101	0.011	0.016	0.502
Foreign born	-0.416	0.040	0.000	-0.335	0.040	0.000	-0.448	0.040	0.000	-0.365	0.040	0.000	-0.436	0.039	0.000	-0.349	0.039	0.000
Employed	0.212	0.021	0.000	0.187	0.021	0.000	0.220	0.021	0.000	0.195	0.021	0.000	0.227	0.021	0.000	0.186	0.021	0.000

Notes: The reference category for educational attainment is lower than upper secondary. Baseline model is the model controlling for the skills use practices and the socio-demographic variables. The enhanced model corresponds to the baseline model where the proficiency is added as control.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A7
Ordinal regressions of political efficacy on reading, writing and math practices, outside of work settings, adults aged 25 to 65, with and without literacy proficiency, with demographic, education and employment status controls (country average)

	Reading practices outside of work						Writing practices outside of work						Math practices outside of work					
	Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value
Low-proficiency population																		
Skills use practices																		
Reading practices outside of work	0.137	0.019	0.000	0.137	0.020	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.123	0.020	0.000	0.122	0.020	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.109	0.020	0.000	0.108	0.020	0.000
Proficiency																		
Literacy proficency	-	-	-	0.000	0.001	0.881	-	-	-	0.001	0.001	0.435	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.000	0.001	0.742
Socio-demographics controls																		
Age	-0.021	0.016	0.173	-0.022	0.016	0.164	-0.022	0.016	0.163	-0.022	0.016	0.159	-0.029	0.013	0.030	-0.029	0.014	0.030
Age squared	0.000	0.000	0.159	0.000	0.000	0.151	0.000	0.000	0.125	0.000	0.000	0.122	0.000	0.000	0.030	0.000	0.000	0.030
Upper secondary	0.121	0.047	0.010	0.121	0.048	0.011	0.147	0.046	0.001	0.141	0.047	0.003	0.193	0.043	0.000	0.189	0.043	0.000
Tertiary	0.340	0.074	0.000	0.338	0.075	0.000	0.353	0.075	0.000	0.344	0.075	0.000	0.530	0.064	0.000	0.518	0.064	0.000
Women	0.018	0.040	0.654	0.018	0.040	0.645	0.022	0.039	0.581	0.021	0.040	0.593	0.075	0.037	0.043	0.076	0.037	0.042
Foreign born	-0.006	0.056	0.914	0.001	0.058	0.992	-0.023	0.056	0.678	-0.007	0.058	0.899	-0.038	0.051	0.452	-0.032	0.053	0.550
Employed	0.104	0.043	0.017	0.105	0.044	0.017	0.119	0.043	0.006	0.118	0.044	0.007	0.104	0.040	0.009	0.104	0.041	0.010
General population																		
Skills use practices																		
Reading practices outside of work	0.274	0.008	0.000	0.234	0.008	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.206	0.007	0.000	0.174	0.007	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.189	0.007	0.000	0.153	0.007	0.000
Proficiency																		
Literacy proficency	-	-	-	0.004	0.000	0.000	-	-	-	0.004	0.000	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.000	0.000
Socio-demographics controls																		
Age	-0.003	0.005	0.462	-0.002	0.005	0.643	-0.003	0.005	0.510	-0.002	0.005	0.710	-0.006	0.005	0.173	-0.006	0.005	0.219
Age squared	0.000	0.000	0.786	0.000	0.000	0.615	0.000	0.000	0.538	0.000	0.000	0.412	0.000	0.000	0.299	0.000	0.000	0.261
Upper secondary	0.207	0.020	0.000	0.126	0.020	0.000	0.259	0.019	0.000	0.163	0.020	0.000	0.273	0.019	0.000	0.191	0.020	0.000
Tertiary	0.666	0.021	0.000	0.500	0.023	0.000	0.736	0.021	0.000	0.542	0.023	0.000	0.776	0.021	0.000	0.619	0.023	0.000
Women	0.063	0.013	0.000	0.069	0.013	0.000	0.039	0.013	0.003	0.049	0.013	0.000	0.076	0.013	0.000	0.106	0.013	0.000
Foreign born	-0.212	0.027	0.000	-0.106	0.028	0.000	-0.233	0.028	0.000	-0.115	0.028	0.000	-0.232	0.027	0.000	-0.151	0.028	0.000
Employed	0.120	0.016	0.000	0.086	0.016	0.000	0.124	0.016	0.000	0.087	0.017	0.000	0.135	0.016	0.000	0.094	0.017	0.000

Notes: The reference category for educational attainment is lower than upper secondary. Baseline model is the model controlling for the skills use practices and the socio-demographic variables. The enhanced model corresponds to the baseline model where the proficiency is added as control.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A8
Ordinal regressions of health status on reading, writing and math practices, outside of work settings, adults aged 25 to 65, with and without literacy proficiency, with demographic, education and employment status controls (country average)

	Reading practices outside of work						Writing practices outside of work						Math practices outside of work					
	Baseline model			Enhanced model			Baseline model			Enhanced model			Baseline model			Enhanced model		
	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value	Coef	S.E.	p-vlaue	Coef	S.E.	p-value
Low-proficiency population																		
Skills use practices																		
Reading practices outside of work	0.164	0.019	0.000	0.146	0.020	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.141	0.019	0.000	0.126	0.019	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.083	0.019	0.000	0.064	0.019	0.001
Proficiency																		
Literacy proficency	-	-	-	0.004	0.001	0.000	-	-	-	0.004	0.001	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	0.001	0.000
Socio-demographics controls																		
Age	-0.159	0.017	0.000	-0.159	0.017	0.000	-0.158	0.017	0.000	-0.158	0.017	0.000	-0.148	0.014	0.000	-0.145	0.015	0.000
Age squared	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000
Upper secondary	0.247	0.049	0.000	0.222	0.049	0.000	0.286	0.048	0.000	0.249	0.049	0.000	0.330	0.045	0.000	0.283	0.046	0.000
Tertiary	0.412	0.074	0.000	0.379	0.074	0.000	0.447	0.073	0.000	0.400	0.074	0.000	0.578	0.067	0.000	0.509	0.068	0.000
Women	-0.017	0.042	0.686	-0.021	0.042	0.621	-0.013	0.042	0.759	-0.019	0.042	0.656	0.028	0.039	0.469	0.028	0.039	0.470
Foreign born	0.038	0.739	0.959	0.094	0.755	0.901	0.014	0.743	0.985	0.085	0.753	0.910	0.021	0.082	0.793	0.097	0.083	0.239
Employed	1.102	0.047	0.000	1.093	0.047	0.000	1.116	0.047	0.000	1.102	0.047	0.000	1.066	0.043	0.000	-1.040	0.044	0.000
General population																		
Skills use practices																		
Reading practices outside of work	0.156	0.008	0.000	0.123	0.008	0.000	-	-	-	-	-	-	-	-	-	-	-	-
Writing practices outside of work	-	-	-	-	-	-	0.129	0.007	0.000	0.102	0.007	0.000	-	-	-	-	-	-
Math practices outside of work	-	-	-	-	-	-	-	-	-	-	-	-	0.067	0.007	0.000	0.027	0.007	0.000
Proficiency																		
Literacy proficency	-	-	-	0.003	0.000	0.000	-	-	-	0.003	0.000	0.000	-	-	-	-	-	-
Numeracy proficiency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	0.000	0.000
Socio-demographics controls																		
Age	-0.104	0.005	0.000	-0.103	0.005	0.000	-0.103	0.005	0.000	-0.102	0.005	0.000	-0.105	0.005	0.000	-0.104	0.005	0.000
Age squared	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000
Upper secondary	0.381	0.022	0.000	0.314	0.022	0.000	0.411	0.021	0.000	0.333	0.022	0.000	0.440	0.021	0.000	0.354	0.022	0.000
Tertiary	0.726	0.023	0.000	0.584	0.024	0.000	0.761	0.022	0.000	0.601	0.024	0.000	0.827	0.022	0.000	0.654	0.024	0.000
Women	-0.006	0.013	0.640	-0.001	0.013	0.947	-0.020	0.013	0.128	-0.011	0.013	0.396	-0.008	0.013	0.564	0.027	0.013	0.038
Foreign born	-0.079	0.026	0.002	0.006	0.026	0.821	-0.094	0.026	0.000	-0.002	0.026	0.950	-0.092	0.026	0.000	0.000	0.026	0.995
Employed	0.846	0.019	0.000	0.819	0.019	0.000	0.849	0.019	0.000	0.820	0.019	0.000	0.847	0.019	0.000	0.805	0.019	0.000

Notes: The reference category for educational attainment is lower than upper secondary. Baseline model is the model controlling for the skills use practices and the socio-demographic variables. The enhanced model corresponds to the baseline model where the proficiency is added as control.

Source: Survey of Adult Skills (PIAAC) (2012)

Table A9
Mean engagement in reading, writing and math practices, at and outside of work settings, by proficiency levels

	Mean engagement in reading outside of work										Mean engagement in reading at work									
	Below level 1		Level 1		Level 2		Level 3		Level 4/5		Below level 1		Level 1		Level 2		Level 3		Level 4/5	
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.
OECD																				
National entities																				
Australia	0.8	(0.2)	1.8	(0.1)	2.2	(0.0)	2.5	(0.0)	2.7	(0.0)	0.8	(0.2)	1.6	(0.1)	2.0	(0.0)	2.3	(0.0)	2.4	(0.0)
Austria	0.9	(0.2)	1.6	(0.1)	2.0	(0.0)	2.3	(0.0)	2.6	(0.0)	0.3	(0.2)	1.2	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.1)
Canada	1.1	(0.1)	1.8	(0.0)	2.2	(0.0)	2.5	(0.0)	2.6	(0.0)	0.9	(0.1)	1.6	(0.0)	1.9	(0.0)	2.2	(0.0)	2.4	(0.0)
Czech Republic	1.0	(0.3)	1.3	(0.1)	1.7	(0.0)	2.0	(0.0)	2.3	(0.1)	0.9	(0.4)	1.2	(0.1)	1.6	(0.1)	1.9	(0.0)	2.2	(0.1)
Denmark	1.1	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)	2.5	(0.0)	0.8	(0.2)	1.5	(0.1)	1.9	(0.0)	2.2	(0.0)	2.3	(0.0)
Estonia	0.8	(0.1)	1.5	(0.0)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)	0.7	(0.2)	1.3	(0.1)	1.7	(0.0)	2.0	(0.0)	2.3	(0.0)
Finland	1.4	(0.2)	1.9	(0.0)	2.1	(0.0)	2.4	(0.0)	2.6	(0.0)	0.9	(0.3)	1.6	(0.1)	2.0	(0.0)	2.2	(0.0)	2.4	(0.0)
France	0.7	(0.1)	1.4	(0.0)	1.8	(0.0)	2.1	(0.0)	2.3	(0.0)	0.4	(0.1)	1.0	(0.1)	1.6	(0.0)	2.0	(0.0)	2.2	(0.1)
Germany	1.1	(0.1)	1.8	(0.1)	2.2	(0.0)	2.5	(0.0)	2.7	(0.0)	0.6	(0.2)	1.2	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)
Ireland	0.8	(0.1)	1.7	(0.1)	2.1	(0.0)	2.4	(0.0)	2.6	(0.0)	0.8	(0.2)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.3	(0.1)
Italy	-0.1	(0.2)	0.5	(0.1)	1.0	(0.1)	1.7	(0.1)	2.1	(0.1)	0.1	(0.2)	0.6	(0.1)	1.1	(0.1)	1.9	(0.1)	2.3	(0.2)
Japan	c	c	1.2	(0.1)	1.6	(0.0)	1.9	(0.0)	2.1	(0.0)	c	c	1.2	(0.2)	1.6	(0.1)	2.0	(0.0)	2.3	(0.0)
Korea	-0.4	(0.2)	0.6	(0.1)	1.6	(0.0)	2.1	(0.0)	2.4	(0.1)	0.0	(0.2)	0.9	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.1)
Netherlands	0.8	(0.2)	1.6	(0.1)	2.1	(0.0)	2.3	(0.0)	2.5	(0.0)	0.5	(0.2)	1.2	(0.1)	1.7	(0.0)	2.0	(0.0)	2.3	(0.0)
Norway	1.7	(0.1)	2.0	(0.1)	2.3	(0.0)	2.5	(0.0)	2.7	(0.0)	1.2	(0.2)	1.8	(0.1)	2.1	(0.0)	2.3	(0.0)	2.4	(0.0)
Poland	0.5	(0.1)	1.1	(0.1)	1.5	(0.0)	2.0	(0.0)	2.4	(0.1)	0.5	(0.2)	0.9	(0.1)	1.3	(0.1)	1.8	(0.1)	2.3	(0.1)
Slovak Republic	-0.3	(0.2)	1.0	(0.1)	1.6	(0.0)	2.0	(0.0)	2.3	(0.0)	0.0	(0.4)	0.9	(0.1)	1.3	(0.0)	1.8	(0.0)	2.1	(0.1)
Spain	0.4	(0.1)	1.2	(0.1)	1.7	(0.0)	2.2	(0.0)	2.5	(0.1)	0.2	(0.2)	0.9	(0.1)	1.4	(0.1)	2.0	(0.1)	2.5	(0.1)
Sweden	1.5	(0.1)	1.9	(0.1)	2.1	(0.0)	2.3	(0.0)	2.5	(0.0)	1.3	(0.2)	1.6	(0.1)	2.0	(0.0)	2.2	(0.0)	2.4	(0.0)
United States	0.9	(0.2)	2.0	(0.1)	2.3	(0.0)	2.6	(0.0)	2.7	(0.0)	0.9	(0.2)	1.6	(0.1)	2.0	(0.0)	2.3	(0.0)	2.4	(0.1)
Sub-national entities																				
Flanders (Belgium)	1.0	(0.1)	1.4	(0.1)	1.8	(0.0)	2.1	(0.0)	2.3	(0.0)	0.6	(0.2)	1.1	(0.1)	1.6	(0.0)	2.1	(0.0)	2.4	(0.0)
England (UK)	1.3	(0.1)	1.9	(0.1)	2.2	(0.0)	2.5	(0.0)	2.6	(0.0)	0.8	(0.2)	1.6	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.1)
Northern Ireland (UK)	1.0	(0.2)	1.5	(0.1)	1.9	(0.0)	2.3	(0.0)	2.5	(0.1)	0.9	(0.2)	1.3	(0.1)	1.7	(0.1)	2.2	(0.1)	2.4	(0.1)
England/N. Ireland (UK)	1.3	(0.1)	1.9	(0.1)	2.1	(0.0)	2.5	(0.0)	2.6	(0.0)	0.8	(0.2)	1.6	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)
OECD average	0.8	(0.0)	1.5	(0.0)	1.9	(0.0)	2.2	(0.0)	2.5	(0.0)	0.6	(0.0)	1.3	(0.0)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)
Partners																				
Cyprus[1]	1.0	(0.2)	1.2	(0.1)	1.4	(0.0)	1.6	(0.0)	1.8	(0.1)	1.0	(0.4)	1.4	(0.1)	1.5	(0.0)	1.6	(0.1)	2.0	(0.1)
Russian Federation[2]	-0.2	(0.4)	0.6	(0.2)	0.9	(0.1)	1.2	(0.1)	1.6	(0.1)	c	c	1.1	(0.2)	1.2	(0.1)	1.4	(0.1)	1.6	(0.2)

	Mean engagement in writing outside of work										Mean engagement in writing at work									
	Below level 1		Level 1		Level 2		Level 3		Level 4/5		Below level 1		Level 1		Level 2		Level 3		Level 4/5	
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.
Australia	0.9	(0.1)	1.5	(0.1)	1.9	(0.0)	2.2	(0.0)	2.5	(0.0)	0.6	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.3	(0.1)
Austria	1.0	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)	0.5	(0.2)	1.1	(0.1)	1.6	(0.0)	2.0	(0.0)	2.2	(0.1)
Canada	0.9	(0.1)	1.4	(0.0)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)	0.9	(0.1)	1.4	(0.1)	1.7	(0.0)	2.0	(0.0)	2.3	(0.0)
Czech Republic	1.3	(0.2)	1.5	(0.1)	1.8	(0.0)	2.1	(0.0)	2.4	(0.1)	0.7	(0.4)	1.1	(0.1)	1.4	(0.1)	1.8	(0.1)	2.2	(0.1)
Denmark	1.1	(0.1)	1.4	(0.0)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)	0.8	(0.1)	1.3	(0.1)	1.7	(0.0)	1.9	(0.0)	2.0	(0.0)
Estonia	0.7	(0.1)	1.1	(0.0)	1.4	(0.0)	1.8	(0.0)	2.2	(0.0)	0.6	(0.1)	0.9	(0.1)	1.2	(0.0)	1.4	(0.0)	1.8	(0.0)
Finland	1.1	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)	1.2	(0.2)	1.3	(0.1)	1.6	(0.0)	1.9	(0.0)	2.1	(0.0)
France	0.8	(0.1)	1.2	(0.0)	1.6	(0.0)	1.9	(0.0)	2.2	(0.0)	0.6	(0.1)	1.0	(0.1)	1.5	(0.0)	1.8	(0.0)	2.1	(0.0)
Germany	1.1	(0.1)	1.7	(0.1)	2.0	(0.0)	2.3	(0.0)	2.4	(0.0)	0.9	(0.2)	1.3	(0.1)	1.7	(0.0)	2.0	(0.0)	2.2	(0.1)
Ireland	0.9	(0.1)	1.4	(0.1)	1.7	(0.0)	2.0	(0.0)	2.3	(0.1)	0.7	(0.2)	1.3	(0.1)	1.6	(0.0)	2.0	(0.0)	2.2	(0.1)
Italy	0.7	(0.1)	0.9	(0.0)	1.2	(0.0)	1.8	(0.1)	2.2	(0.1)	0.4	(0.1)	0.7	(0.1)	1.1	(0.0)	1.7	(0.0)	2.1	(0.1)
Japan	c	c	1.3	(0.1)	1.6	(0.0)	1.8	(0.0)	2.0	(0.0)	c	c	1.4	(0.2)	1.8	(0.1)	2.1	(0.0)	2.3	(0.0)
Korea	0.5	(0.1)	0.8	(0.1)	1.3	(0.0)	1.9	(0.0)	2.2	(0.1)	0.4	(0.1)	0.9	(0.1)	1.6	(0.0)	2.1	(0.0)	2.4	(0.1)
Netherlands	1.1	(0.1)	1.5	(0.1)	2.0	(0.0)	2.3	(0.0)	2.5	(0.0)	0.7	(0.2)	1.2	(0.1)	1.6	(0.0)	2.0	(0.0)	2.2	(0.0)
Norway	1.4	(0.1)	1.5	(0.1)	1.9	(0.0)	2.1	(0.0)	2.3	(0.0)	1.0	(0.2)	1.5	(0.1)	1.8	(0.0)	2.1	(0.0)	2.2	(0.0)
Poland	0.5	(0.1)	0.9	(0.0)	1.2	(0.0)	1.7	(0.0)	2.0	(0.1)	0.6	(0.1)	0.9	(0.1)	1.2	(0.1)	1.7	(0.0)	2.0	(0.1)
Slovak Republic	0.6	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.5	(0.1)	0.5	(0.2)	1.1	(0.1)	1.4	(0.1)	1.8	(0.0)	2.0	(0.1)
Spain	0.6	(0.1)	1.0	(0.0)	1.4	(0.0)	1.9	(0.0)	2.3	(0.1)	0.6	(0.1)	1.0	(0.1)	1.4	(0.0)	1.9	(0.0)	2.3	(0.1)
Sweden	1.2	(0.1)	1.3	(0.1)	1.6	(0.0)	1.9	(0.0)	2.2	(0.0)	0.8	(0.2)	1.1	(0.1)	1.5	(0.0)	1.7	(0.0)	2.0	(0.0)
United States	0.9	(0.1)	1.5	(0.1)	1.9	(0.0)	2.3	(0.0)	2.6	(0.0)	0.7	(0.2)	1.4	(0.1)	1.8	(0.0)	2.1	(0.0)	2.3	(0.1)
Flanders (Belgium)	1.0	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.3	(0.0)	1.0	(0.2)	1.2	(0.1)	1.6	(0.0)	2.1	(0.0)	2.3	(0.0)
England (UK)	1.0	(0.1)	1.6	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)	1.0	(0.2)	1.4	(0.1)	1.8	(0.0)	2.1	(0.0)	2.4	(0.0)
Northern Ireland (UK)	1.0	(0.2)	1.3	(0.1)	1.6	(0.0)	2.1	(0.0)	2.4	(0.1)	0.8	(0.2)	1.1	(0.1)	1.6	(0.1)	2.1	(0.1)	2.2	(0.1)
England/N. Ireland (UK)	1.0	(0.1)	1.6	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.0)	1.0	(0.2)	1.4	(0.1)	1.8	(0.0)	2.1	(0.0)	2.4	(0.0)
OECD average	0.9	(0.0)	1.3	(0.0)	1.7	(0.0)	2.1	(0.0)	2.3	(0.0)	0.7	(0.0)	1.2	(0.0)	1.6	(0.0)	1.9	(0.0)	2.2	(0.0)
Cyprus[1]	0.9	(0.2)	1.1	(0.1)	1.3	(0.0)	1.4	(0.0)	1.5	(0.1)	0.9	(0.3)	1.2	(0.1)	1.3	(0.1)	1.5	(0.0)	1.9	(0.1)
Russian Federation[2]	0.4	(0.2)	0.7	(0.1)	0.9	(0.1)	1.1	(0.1)	1.5	(0.2)	c	c	1.0	(0.2)	1.1	(0.1)	1.4	(0.1)	1.6	(0.1)

	Mean engagement in numeracy outside of work										Mean engagement in numeracy at work									
	Below level 1		Level 1		Level 2		Level 3		Level 4/5		Below level 1		Level 1		Level 2		Level 3		Level 4/5	
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.
Australia	1.0	(0.1)	1.4	(0.1)	1.8	(0.0)	2.2	(0.0)	2.5	(0.0)	1.0	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.1)
Austria	1.0	(0.1)	1.4	(0.1)	1.7	(0.0)	2.1	(0.0)	2.5	(0.0)	0.4	(0.1)	0.8	(0.1)	1.2	(0.0)	1.7	(0.0)	2.2	(0.1)
Canada	1.1	(0.1)	1.6	(0.0)	1.9	(0.0)	2.3	(0.0)	2.6	(0.0)	0.9	(0.1)	1.4	(0.0)	1.7	(0.0)	2.0	(0.0)	2.5	(0.1)
Czech Republic	1.5	(0.2)	1.8	(0.1)	2.1	(0.0)	2.4	(0.0)	2.6	(0.1)	0.9	(0.3)	1.3	(0.1)	1.7	(0.1)	2.1	(0.1)	2.4	(0.1)
Denmark	1.0	(0.1)	1.3	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)	0.8	(0.1)	0.9	(0.1)	1.2	(0.0)	1.7	(0.0)	2.2	(0.0)
Estonia	1.0	(0.1)	1.5	(0.0)	1.8	(0.0)	2.2	(0.0)	2.6	(0.0)	0.6	(0.1)	1.1	(0.1)	1.4	(0.0)	1.8	(0.0)	2.3	(0.1)
Finland	1.5	(0.1)	1.8	(0.0)	2.1	(0.0)	2.5	(0.0)	2.8	(0.0)	0.7	(0.2)	1.3	(0.1)	1.6	(0.0)	2.0	(0.0)	2.4	(0.0)
France	0.8	(0.0)	1.2	(0.0)	1.6	(0.0)	2.0	(0.0)	2.3	(0.0)	0.4	(0.1)	0.8	(0.0)	1.3	(0.0)	1.9	(0.0)	2.4	(0.1)
Germany	1.0	(0.1)	1.3	(0.1)	1.7	(0.0)	2.2	(0.0)	2.6	(0.0)	0.6	(0.1)	0.9	(0.1)	1.4	(0.0)	1.9	(0.0)	2.3	(0.1)
Ireland	0.8	(0.1)	1.3	(0.1)	1.5	(0.0)	1.9	(0.1)	2.3	(0.1)	0.7	(0.1)	1.0	(0.1)	1.4	(0.0)	1.9	(0.0)	2.3	(0.1)
Italy	0.5	(0.1)	0.8	(0.1)	1.1	(0.0)	1.6	(0.1)	2.2	(0.1)	0.4	(0.1)	0.7	(0.1)	1.1	(0.1)	1.7	(0.1)	2.4	(0.2)
Japan	0.5	(0.1)	0.8	(0.1)	1.1	(0.0)	1.3	(0.0)	1.7	(0.0)	0.6	(0.2)	0.9	(0.1)	1.3	(0.0)	1.7	(0.0)	2.2	(0.0)
Korea	0.6	(0.1)	1.2	(0.0)	1.7	(0.0)	2.0	(0.0)	2.4	(0.1)	0.5	(0.1)	1.1	(0.1)	1.6	(0.0)	1.9	(0.0)	2.2	(0.1)
Netherlands	0.5	(0.1)	0.7	(0.1)	1.2	(0.0)	1.7	(0.0)	2.2	(0.0)	0.2	(0.1)	0.7	(0.1)	1.1	(0.0)	1.6	(0.0)	2.1	(0.1)
Norway	1.4	(0.1)	1.4	(0.1)	1.7	(0.0)	2.0	(0.0)	2.4	(0.0)	0.7	(0.1)	0.9	(0.1)	1.2	(0.0)	1.6	(0.0)	2.1	(0.0)
Poland	0.9	(0.1)	1.4	(0.1)	1.8	(0.0)	2.2	(0.0)	2.6	(0.1)	0.7	(0.1)	1.0	(0.1)	1.3	(0.0)	1.8	(0.1)	2.3	(0.1)
Slovak Republic	0.6	(0.1)	1.2	(0.1)	1.7	(0.0)	2.1	(0.0)	2.4	(0.0)	0.4	(0.2)	0.9	(0.1)	1.4	(0.0)	1.8	(0.0)	2.2	(0.1)
Spain	0.7	(0.1)	1.2	(0.0)	1.6	(0.0)	2.0	(0.0)	2.5	(0.1)	0.5	(0.1)	1.0	(0.1)	1.4	(0.0)	1.9	(0.1)	2.6	(0.1)
Sweden	1.4	(0.1)	1.5	(0.1)	1.8	(0.0)	2.1	(0.0)	2.4	(0.0)	0.8	(0.1)	0.9	(0.1)	1.2	(0.0)	1.6	(0.0)	2.1	(0.0)
United States	1.4	(0.1)	2.0	(0.1)	2.2	(0.0)	2.5	(0.0)	2.8	(0.0)	1.0	(0.1)	1.6	(0.1)	1.8	(0.0)	2.2	(0.0)	2.4	(0.1)
Flanders (Belgium)	0.8	(0.1)	0.9	(0.0)	1.2	(0.0)	1.6	(0.0)	2.1	(0.0)	0.4	(0.1)	0.6	(0.1)	1.0	(0.0)	1.6	(0.0)	2.2	(0.0)
England (UK)	0.9	(0.1)	1.3	(0.1)	1.6	(0.0)	1.9	(0.0)	2.3	(0.1)	0.6	(0.1)	1.1	(0.1)	1.5	(0.1)	1.9	(0.0)	2.3	(0.1)
Northern Ireland (UK)	0.9	(0.2)	1.1	(0.1)	1.4	(0.0)	1.8	(0.1)	2.2	(0.1)	0.7	(0.2)	1.0	(0.1)	1.4	(0.1)	1.9	(0.1)	2.2	(0.1)
England/N. Ireland (UK)	0.9	(0.1)	1.3	(0.1)	1.6	(0.0)	1.9	(0.0)	2.3	(0.1)	0.6	(0.1)	1.1	(0.1)	1.5	(0.0)	1.9	(0.0)	2.3	(0.1)
OECD average	1.0	(0.0)	1.3	(0.0)	1.7	(0.0)	2.0	(0.0)	2.4	(0.0)	0.6	(0.0)	1.0	(0.0)	1.4	(0.0)	1.8	(0.0)	2.3	(0.0)
Cyprus[1]	1.3	(0.1)	1.4	(0.1)	1.5	(0.0)	1.7	(0.0)	2.0	(0.1)	0.7	(0.2)	1.2	(0.1)	1.4	(0.0)	1.5	(0.1)	2.1	(0.1)
Russian Federation[2]	0.4	(0.3)	1.0	(0.1)	1.4	(0.1)	1.7	(0.1)	2.1	(0.1)	c	c	1.2	(0.1)	1.3	(0.1)	1.4	(0.1)	1.8	(0.2)

1. Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".
Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.
2. Readers should note that the sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in Russia but rather the population of Russia excluding the population residing in the Moscow municipal area.

Notes: Engagement in reading and writing practices are broken by literacy proficiency level, whereas engagement in math practices is borken by numeracy proficiency level.

Source: Survey of Adult Skills (PIAAC) (2012)