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in the OECD Region

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TABLE OF CONTENTS

OECD DIRECTORATE FOR EDUCATION	2
OECD EDUCATION WORKING PAPERS SERIES	2
INTERNATIONAL ADULT LITERACY AND BASIC SKILLS SURVEYS IN THE OECD REGION ...	4
Abstract	4
Résumé	4
1. Introduction	5
2. International adult skills surveys: a brief history	5
3. Measuring literacy: the Conceptual Framework of IALS, ALLS and PIAAC	7
4. Developments between IALS and PIAAC	9
5. The Output of IALS and ALL and how the data have been used?	11
6. Impact on Policy	18
7. Conclusions	19
Annex A: Reports of National Results for IALS and ALL	20
REFERENCES	22
EXISTING OECD EDUCATION WORKING PAPERS	30

INTERNATIONAL ADULT LITERACY AND BASIC SKILLS SURVEYS IN THE OECD REGION

Abstract

Both within and beyond the OECD region, governments and other stakeholders are increasingly interested in the assessments of the skills of their adult populations in order to monitor how well prepared they are for the challenges of the knowledge based society. The current paper provides an overview of the two international assessments of adult literacy which have already taken place in the OECD region – the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL) as well as of the forthcoming OECD Programme for the International Assessment of Adult Competencies (PIAAC). The conceptual framework for the assessments is described with a focus on the links between the different assessments. In addition, the paper provides a survey of the outputs of IALS and ALL including a review of the major themes addressed in the literature which has used data from these surveys as well as a brief discussion of their policy impact.

The author would like to thank his colleagues Stéphan Vincent-Lancrin and Andreas Schleicher as well as Yvan Clermont from Statistics Canada for their useful comments on earlier versions of this paper. Errors and omissions remain the responsibility of the author. Fionnuala Canning and Niccolina Clements provided essential editorial assistance.

Résumé

Au sein et au-delà de la région OCDE, les gouvernements et les autres parties prenantes sont de plus en plus intéressés par l'évaluation des compétences de leur population adulte afin de vérifier si ils sont bien préparés ou non aux défis de la société basée sur la connaissance. Le présent document fournit un aperçu de deux évaluations internationales sur l'alphabétisation des adultes qui ont été effectuées dans la région OCDE : l'Enquête internationale sur l'alphabétisation des adultes (EIAA) et l'Enquête sur la littératie et les compétences des adultes (ELCA) ainsi que le Programme, prochainement disponible, pour l'évaluation internationale des compétences des adultes (PIAAC). La structure conceptuelle des évaluations est décrite comme étant centrée sur les liens entre les différentes évaluations. De plus, le document fournit une enquête sur les résultats de l'EIAA et l'ELCA. Cette dernière comprend une vue d'ensemble des thèmes majeurs de l'alphabétisation et ce, en utilisant les données de ces enquêtes ainsi qu'un bref débat sur l'impact de leur politique.

L'auteur souhaite remercier ses collègues Messieurs Stéphan Vincent-Lancrin et Andreas Schleicher ainsi que Monsieur Yvan Clermont de Statistics Canada pour leurs commentaires utiles sur les versions initiales de ce document. Les erreurs et omissions sont de la responsabilité de l'auteur. Fionnuala Canning et Niccolina Clements ont beaucoup aidé pour l'édition.

1. Introduction

Since the early 1990s, two large scale cross-country assessments of the literacy and basic skills of the adult population have taken place. The first was the International Adult Literacy Survey (IALS) which was implemented over the period 1994-1998. The second, known as the Adult Literacy and Life Skills Survey (ALL), was undertaken over 2002-2006. A successor to IALS and ALL – the Programme for the International Assessment of Adult Competencies (PIAAC) – is currently being developed under the aegis of the OECD¹.

The objective of this paper is to provide an overview of the objectives, design, use and impact of the international adult literacy and basic skills surveys implemented in the OECD region and, more generally, in the advanced economies. Section 2 provides a brief history of the development of international adult skills surveys. Section 3 outlines the conceptual framework underlying IALS, ALL and PIAAC. Section 4 describes the main developments between IALS, ALL and PIAAC. In Section 5, an overview is provided of the use of data from IALS and ALLS. The policy impact of these surveys is briefly covered in Section 6 and some concluding observations are presented in the seventh and final section.

2. International adult skills surveys: a brief history

The origins of the research programme that began with IALS and continues with the development of PIAAC lie to a large extent in pioneering work on the large scale assessment of young people and adults undertaken in the 1980s and early 1990s by the (US) Educational Testing Service (ETS) and Statistics Canada. Surveys conducted in the US such as the 1985 Young Adult Literacy Survey (YALS), a survey of job seekers, and the 1992 National Adult Literacy Survey or (NALS) demonstrated that it was possible to combine advances in psychometrics, reading theory and large scale assessment with household survey methodologies.² The 1989 Canadian Survey of Literacy Skills Used in Daily Activities (LSUDA) extended the methods used in the US assessments to a multi-lingual situation and demonstrated that they were able to provide comparable information regarding the literacy skills of the English and French speaking populations in Canada (Montigny, et al., 1991).

The results of the US and Canadian assessments generated considerable interest in terms of the policy relevance of their findings and the possibilities that they opened regarding the collection of robust empirical data regarding literacy performance at the population level. For example, a 1992 OECD report (Benton & Noyelle, 1992) argued that the findings of the US and Canadian assessments which demonstrated that a large share of the population had low levels of literacy and that the problem was spread across the population had important implications for education and training policy in the advanced economies. It was also noted that the evidence of the scale of the literacy problem in most countries was patchy and that better data was needed for policy analysis. The authors advocated that countries which had not already done so should conduct direct assessments of literacy (1992, p.57) and suggested that international organisations such as the OECD could play a role in promoting cross-national efforts in the analysis and measurement of literacy.

¹ UNESCO is developing an instrument known as the Literacy Assessment and Monitoring Programme (LAMP) designed for use in less developed economies. Information regarding LAMP can be found at http://www.uis.unesco.org/ev.php?URL_ID=6409&URL_DO=DO_TOPIC&URL_SECTION=201

² See Kirsch and Murray (1998) for a useful summary, and also Benton and Noyelle (1992, pp.23-27).

Statistics Canada and ETS worked together with a group of nine countries and the OECD in the early 1990s to develop IALS instruments and procedures. Data collection took place in 1994³. Two subsequent waves of data collection took place using the IALS instrumentation, the first in 1996 (with five countries taking part) and the second in 1998 (with a further nine countries). In all, 22 countries administered IALS between 1994 and 1998. In addition several countries undertook national surveys based on IALS.

In parallel with the further waves of IALS data collection, Statistics Canada sponsored work on the development of a successor to IALS with the goal of measuring a broader range of adult skills than had been covered in IALS. An ambitious development agenda was proposed for the new survey (ALL) which included the elaboration of conceptual frameworks and possible measures in seven skill domains: prose literacy, document, literacy, numeracy, teamwork, problem-solving, practical cognition, and working with information technology (Murray, et al., 2005, p.14).⁴ While frameworks were developed for all of the proposed skill domains, it did not prove possible to construct measures of sufficient reliability for practical cognition, teamwork, and information and communication technology. Measures of attitudes to teamwork and familiarity and use of ICTs were incorporated into the ALL Pilot background questionnaires but only the questions relating to familiarity with and use of ICT were retained for the main ALL study (2005, p.15).

Seven countries were involved in the initial round of ALL in 2002-2003. A further five countries undertook the assessment in 2006.

In 2003, the OECD began to explore the possibility of developing an international adult skills assessment. Work continued over 2004 and 2005 with the release in October 2005 of a document outlining a strategy for the proposed PIAAC (OECD, 2005; Schleicher, 2008). This proposed an ongoing cycle of assessments starting in 2009 or 2010. The suggested content for the first assessment included measurement of literacy in an ICT context, measurement of basic reading 'component' skills, and (if it proved valid and reliable in a cross-country context) a module concerning skills use in the workplace. In addition, the strategy proposed that there be options for the over-sampling of youth and/or the older (50-65 years of age) population. The assessment was conceived as being computer based. In subsequent cycles it was envisaged that the range of competencies assessed could be broadened and that there could be an option of a linked employee/employer survey.

Work on PIAAC began in earnest in the second half of 2007 with the release, in late November, of a call for tender for a contractor or contractors to undertake the international development component of PIAAC. This was based around a timetable which envisaged a field test in 2010, the main data collection in 2011 and reporting of results in 2013. In early 2008, a steering body for the project was established (the Board of Participating Countries or BPC) and the international contractor for PIAAC was appointed – a

³ This first round of IALS was not without controversy. When results became available in 1995, France was found to have far higher proportions of its population performing at the lowest proficiency levels (with 75 percent of the population estimated to be the two lowest levels in the case of the prose scale) than the other participating countries with the exception of Poland. These results were contested by the French authorities (Bottani & Vrignaud, 2005, p.39; Kirsch & Murray, 1998, pp.20-21). An independent review of the quality of the data in IALS was undertaken which found that problems in the design and implementation of the study threatened 'the validity of any comparisons of literacy levels across countries' (Kalton, et al., 1995, p.14)³. The seriousness of the problems identified by the independent review was contested, however, by the project organisers. Murray, et al., (1998) acknowledge a number of shortcomings with survey processes but find no evidence that these had seriously compromised data quality. Results of the first wave of IALS, including rankings but excluding French data, were published in 1995 (OECD and Statistics Canada, 1995).

⁴ The possibility of including a sample of workers in firms and the use of computer testing in the assessment were initially canvassed, these options were rapidly ruled out on pragmatic grounds (Murray, et al., 2005, p.13).

consortium of US and European organisations led by ETS. As at March 2009, 28 countries intended to participate in PIAAC.

<i>Data collection waves and survey participants by survey</i>		
Survey	Date of data collection	Participants
IALS (wave 1)	1994	Canada, Germany, France, Ireland, the Netherlands, Poland, Sweden, Switzerland (French and German speaking), USA
IALS (wave 2)	1996	Australia, the Flemish Community in Belgium, Great Britain, New Zealand, Northern Ireland
IALS (wave 3)	1998	Chile, Czech Republic, Denmark, Finland, Hungary, Italy, Norway, Slovenia, Switzerland (Italian speaking)
ALLS (wave 1)	2002	Canada, Bermuda, Italy, Mexico (Nuevo Leon) Norway, Switzerland, USA
ALLS (wave 2)	2006	Australia, Netherlands, New Zealand, Korea, Hungary
PIAAC	2011 (planned)	Australia, Austria, Belgium, Canada, Chile, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Korea, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom, USA

3. Measuring literacy: the Conceptual Framework of IALS, ALLS and PIAAC

IALS, ALL and PIAAC share a common conceptual framework and approach to the assessment of literacy skills (conceived broadly) covering the conceptualisation of literacy, the approach to measurement, data quality and reporting of results. The basic elements of this framework are outlined below.

Conceptualising Literacy

Literacy in its relationship to society and the economy

Literacy skills (and basic cognitive skills more generally) are conceived as an important determinant of the life chances of individuals and of social and economic well-being at the level of nations. Beyond providing information on the levels and distribution of skills in the population, the policy focus of these studies has been on the relationship of observed skills to economic and social success, the identification of at risk populations and analysis of the causes and consequences of the observed skill distributions (Murray, et al., 2005, pp.16-17; Schleicher, 2008).

Literacy conceived as a complex mode of adult behaviour

‘Literacy’ and other basic skills are conceived as social practices involving a complex set of cognitive and information processing skills required to use a variety of text types for a range of purposes in a range of contexts. For example, in IALS and ALL, literacy is defined as ‘using printed and written information to function in society, to achieve one’s goals and to develop one’s knowledge and potential’ (OECD & Statistics Canada, 1995, p.14). PIAAC has adopted a similar definition, amended to place greater emphasis on a wider variety of text types.

The consequence of this for the design of assessments in IALS and its successors has been that:

- Each skill domain is conceived as a multidimensional construct
- Assessment tasks cover a broad range of difficulty
- Tasks cover the range of cognitive processes believed to influence task difficulty, and
- Assessment tasks and stimulus materials are drawn from a wide range of life contexts.

It is important to note that the focus of IALS, ALL and PIAAC is on certain *aspects* of literacy, in particular, the understanding and use of texts. Writing skills and the ability to produce or format documents is not assessed. This is not because these skills are not considered as important aspects of literacy considered broadly, but, in large part, because of the practical difficulties associated with the assessment of adults' writing in large scale international surveys.

Measurement

Measuring the skills of the population

The objective of the assessments is to describe the level and distribution of the skills of the adult population, not to test the proficiency of individuals. The total number items used in the assessments is larger than the number taken by any single respondent, each of whom who undertakes a subset of the tasks administered. A rotated block design is used which involves an overlapping subset of items being administered to respondents. At the same time, each separate test item is taken by a representative sample of adults.

Comparability across languages and cultures

The assessments are explicitly developed as international or cross-national assessments designed to provide valid and reliable measures of proficiency across different countries, languages and cultures. A considerable investment is, therefore, made in ensuring that the assessments are, as far as is possible, culturally and linguistically unbiased – in other words, to ensure that a person of the same ability will have the same probability of answering any assessment item successfully independent of his or her linguistic or cultural background. Stimulus materials and ideas for tasks are solicited from as wide a range of contributors as possible. Standards are established regarding the translation and adaptation of items. Translations and adaptations are centrally verified and item performance is rigorously tested.

Linking results over time

IALS, ALLS and PIAAC have all been designed to provide links to previous surveys and thus allow the measurement of changes in the literacy competencies of certain populations over time. IALS was designed to report data on scales that corresponded to the three scales that were used to report the results of the National Adult Literacy Survey (NALS), conducted in the United States in 1992 (Yamamoto, 1998, p.161). ALLS was linked to IALS through the use of a common prose and document scale. PIAAC is being designed to provide links to both ALLS and IALS in the domain of literacy and ALL in the domain of numeracy. Of the countries participating in PIAAC, 20 participated in IALS and nine participated in ALL.

Background information to examine antecedents and outcomes of observed skills

In order to achieve the analytical and policy objectives of the surveys, comprehensive background information is collected regarding respondents. This covers the antecedents of literacy and other skills such

as educational attainment, family background, linguistic background and outcome variables such as labour market status, income, health status, and civic participation. In addition, information is collected on literacy and numeracy practices at home and work as well as participation in ongoing education and training and the use of and familiarity with ICTs.

Ensuring data quality

Compliance with technical standards

The conduct of large scale household based assessments represents a significant operational challenge. One of the major sources of risk to the quality of the data lies in the quality of national administration and variability in implementation between countries. Error may be produced in all phases of survey implementation – e.g. sampling, data collection, scoring and data processing etc. To reduce error and ensure the quality of data, participating countries are expected to comply with standards covering aspects of the survey such as sampling, data collection, scoring, and data preparation. Compliance with standards is monitored.

Reporting

A focus on demonstrating competencies and skills

IALS and its successors have been conceived within a criterion referenced testing framework. Their objective is not just to compare distributions of skills across populations but, most importantly, to provide an insight into what a person who achieves a particular test scores can actually do. Assessment tasks are conceived as representing a dimension of skill as described in the relevant assessment framework. Tasks are grouped by difficulty in proficiency levels. A person with a proficiency score in the range defined by a given level can be regarded as having mastered the skills required to undertake tasks at this level of difficulty – i.e. he or she is able to successfully complete such tasks most of the time.⁵ While she may be capable of successfully complete tasks of a higher level of difficult some of the time, the probability of success is not sufficient to indicate mastery of such tasks.

In IALS, five levels of proficiency were defined for each of the three literacy scales (prose, document and quantitative literacy). ALLS maintained the same five proficiency levels for the prose and document literacy scales as in IALS but made some slight modifications in the descriptions of the levels. Five levels were defined for numeracy and four in the case of problem solving. In practice, levels 4 and 5 in the literacy and numeracy scales are combined in reporting given the relatively low numbers of both individuals and items at the highest level.

4. Developments between IALS and PIAAC

Skills Assessed

One of the major areas in which there has been change between assessments concerns the skill domains assessed. This can be seen from Table 1 below which presents the skills domains assessed in IALS, ALL and those planned for PIAAC. Shading indicates that the skill domains concerned are measured on comparable scales.

⁵ A person with a proficiency score at the mid-point of the level will have, on average an 80 percent chance of successfully completing tasks at that level.

Table 1: Skills Assessed in IALS, ALL and PIAAC

IALS	ALL	PIAAC
Prose literacy	Prose literacy	Literacy (combined prose and document)
Document literacy	Document literacy	
		Reading components
Quantitative literacy		
	Numeracy	Numeracy
	Problem solving	
		Problem solving in technology rich environments

IALS assessed three separate domains of literacy, prose literacy, document literacy and quantitative literacy. *Prose literacy* was defined as the knowledge and skills needed to understand and use continuous texts – information organised in sentence and paragraph formats. *Document literacy* represented the knowledge and skills needed to process documents, or information organized in matrix structures (i.e. in rows and columns). The type of documents covered by this domain included tables, signs, indexes, lists, coupons, schedules, charts, graphs, maps, and forms. *Quantitative literacy* covered the skills needed to undertake arithmetic operations such as addition, subtraction, multiplication, or division either singly or in combination using numbers or quantities embedded in printed material.

The major change between IALS and ALL was the replacement of the assessment of quantitative literacy with that of numeracy and the introduction of the assessment of problem solving. *Numeracy*⁶ represented a broader domain than that of quantitative literacy, covering a wider range of skills and knowledge (not only computational operations) as well as a broader range of situations in which actors had to deal with mathematical information of different types (not only situations involving *numbers* embedded in *printed* materials) (Gal, et al., 2005, p.151). *Problem solving* was defined as ‘goal-directed thinking and action in situations for which no routine solution procedure is available’ (Statistics Canada & OECD, 2005, p.16).

PIAAC will differ from ALL in that (reading) literacy will be assessed on a single scale rather than on two separate (prose and document literacy) scales. The measurement framework for literacy in PIAAC draws heavily on those used in IALS and ALL but has expanded the kinds of texts covered to include electronic texts in addition to the continuous (prose), non-continuous (document) and combined texts of the IALS and ALL frameworks. In addition, the assessment of literacy will be extended to include a measure of reading component skills. This is designed for people with low levels of literacy competence and will focus on assessment of the foundational skills needed to gain basic meaning from texts. The skills tested will include print vocabulary, sentence processing, and passage fluency.

Problem solving in technology rich environments constitutes a new domain. While it has some relationship to problem solving as conceived in ALL, the emphasis is on the skills necessary to solve ‘information problems’. These cover the specific class of problems people deal with when using ICT which share the following characteristic: the existence of the problem is mostly a consequence of the availability of new technologies; the problem solution requires the use of computer-based artifacts (tools, representational formats, computational procedures); and/or the problems are related to the handling and maintenance of technology rich environments themselves. Problem solving in technology rich environments is defined as the use of ‘digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks’. The first PIAAC

⁶ Defined as “the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations” (Gal, et al., 2005, p.151).

assessment will focus on the ability to solve problems using a restricted range of applications – the world-wide web, spreadsheets and email.

The other area in which PIAAC will broaden the amount of information collected regards skills use. The so-called *Job Requirements Approach* (JRA) will be used to gain information on the incidence and intensity of the use of a broad range of generic skills in the workplace extending beyond the use of literacy, numeracy and problem solving skills. The JRA method consists of asking individuals about the importance of different types of tasks that they may be performing in their jobs and subsequently inferring the types of skills that are required from their answers. This approach has been used in the UK Skills Survey (Felstead, et al., 2007).

Assessment technology

PIAAC also differs from IALS and ALL in that it is being developed as an integrated computer-based assessment. The background information, including information on skills use will be collected on a specially developed CAPI application. The majority of respondents in the majority of participating countries will undertake the direct assessment on a laptop computer. The assessment will maximise use of the functionality available with computer based testing, particularly the possibility of adaption of testing to individual performance and automatic scoring. A pen and paper version of the literacy and numeracy assessment will be available for respondents who have insufficient familiarity with computers to successfully undertake the test on a computer.

5. The Output of IALS and ALL and how the data have been used?

International project literature

Results from IALS were released in three reports between 1995 and 2000 corresponding to the three waves of data collection (OECD & Statistics Canada, 1995, 2000; OECD & Human Resources Canada, 1997). In addition, a Technical Report (Murray, et al., 1998), documenting and evaluating survey methods and operations was also published. A report on the first wave of ALL was published by the OECD and Statistics Canada (2004) in two volumes and a volume describing the background and conceptual basis of the assessment was published by Statistics Canada (Murray, et al., 2005). Results from the second wave of data collection for ALL are available for Australia (ABS, 2008) and New Zealand (Satherley, et al., 2008). The ALL Technical Report remains as yet unreleased. Public use data sets were released for both IALS and the first round of ALL (Statistics Canada, 2007, 2006).

National project literature

Reports and studies presenting national level results in IALS and ALL have been published in most of the countries that participated in these surveys. These range from the descriptive to the more analytical. While many of these publications have been either prepared or commissioned by national authorities, some have been written by independent researchers. A list of reports which provide national results is provided in Annex A.

Canada has been particularly active in exploiting the data from IALS and ALL. A number of studies concentrating either exclusively on Canadian data or comparing Canada with selected other countries have been undertaken by Statistics Canada⁷. New Zealand⁸, Switzerland⁹, Norway and Slovenia have also been active in analyzing data from one or both of these studies.

⁷ Most can be accessed using the Statistics Canada website: <http://www.statcan.ca>.

International Project Reports and Documentation

OECD and Statistics Canada (1995), *Literacy, Economy and Society: Results of the First International Adult Literacy Survey*, Paris and Ottawa.

OECD and Human Resources Development Canada (1997), *Literacy Skills for the Knowledge Society: Further Results from the International Adult Literacy Survey*, Paris.

OECD and Statistics Canada (2000), *Literacy in the Information Age: final report of the International Adult Literacy Survey*, OECD and Statistics Canada, Paris and Ottawa

Statistics Canada and OECD (2004), *Learning a Living: First results of the Adult Literacy and Life Skills Survey*, 2 Volumes, Statistics Canada and OECD, Ottawa and Paris

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

Murray, S., Y. Clermont, and M. Binkley (eds) (2005). *Measuring Adult Literacy and Life Skills: New frameworks for assessment*, Statistics Canada, Ottawa.

Research Literature

There is a reasonably large research literature which uses IALS and ALL. This covers studies undertaken by public agencies as well academic researchers on a commissioned or independent basis. The release of IALS results also stimulated a number of articles reviewing the methodology and implementation of the survey. Overall, the data from IALS have been exploited to a greater extent than has ALL. This is probably a function of the fact that more countries participated in IALS than ALL as well as the lengthier period over which data from IALS has been available to researchers.

Issues addressed

The remainder of this section provides an overview of the range of studies which have used data from IALS and ALL and the kinds of issues that have been investigated.

Distribution of Skills

The distribution of skills both between and within countries is a key focus of the international comparative reports and national reports¹⁰. Considerable variation is found in the mean scores on the literacy, numeracy and problem solving scales as well as in the distribution of the population across proficiency levels. In most participating countries, significant proportions of the population are found to

⁸ See Johnston (2004), Satherley and Lawes (2007, 2008a and 2008b) and Satherley, Lawes and Sok (2008a and 2008b). The publications relating to ALL can be accessed at <http://www.educationcounts.govt.nz/publications/assessment> .

⁹ <http://www.adult-literacy.admin.ch/bfs/all/fr/index/02.html>

¹⁰ See, for example, Tuijnman (2001) which benchmarks IALS results for the US and Canada against those of other countries participating in IALS.

have low levels of skill. For example, in all but three of the countries participating in IALS, over 40 percent of the population is assessed to possess document literacy skills which place them in the two lowest levels of proficiency. In five countries the proportion of the population with skills at this level rises to over 60 percent (OECD and Statistics Canada, 2000, p. 17).

For those countries which participated in both IALS and ALL, it is possible to look at change in both the level and distribution of prose and document literacy proficiency of the population. Growth in prose and documents proficiency is found for German speaking Switzerland and a decline in the case of the US for prose literacy and Italian speaking Switzerland for both prose and document literacy (OECD and Statistics Canada, 2000, pp. 40-41). New Zealand (Satherley, *et al.*, 2008a) also improved its scores in both prose and document literacy between IALS and ALL. Reductions in the range of scores from the 5th to the 95th percentiles are substantial in all countries and regions, except in Norway.

Antecedents of Skills

The relationship between background and other variables which are considered to influence performance in literacy numeracy and problem solving and measured performance is examined in many studies either as an issue in its own right or in conjunction with other analyses.

The final summary report of the IALS study (OECD and Statistics Canada, 2000) devotes a chapter to a discussion of how literacy is developed and sustained. The relationships between variables considered to be determinants of literacy competency and literacy outcomes are explored firstly in isolation and, secondly, as part of a multivariate model. In summary, the main findings are the following. Formal educational attainment is the main determinant of literacy proficiency. Age, occupation and using a language other than the one used for testing are also major determinants of performance. White-collar high skilled occupational categories correspond with high literacy, but the higher the age of the respondent, other variables equal, the lower the level of literacy. Labour force participation, formal adult education and informal learning at work measured by reading practices are associated with literacy proficiency in most countries, but compared with the previously mentioned variables, their impact is relatively modest.

An analysis of the determinants of literacy using data for 18 countries using IALS data is also undertaken by Desjardins (2003b). He uses a structural model to investigate the predictive capacity of determinants of literacy proficiency related to home background, education, labour force status and literacy behaviours. Other things being equal, education is found to be the strongest predictor but its effect is mediated through further learning occurring at work, home and in the community.

Similar outcomes are found for ALL (Statistics Canada and OECD, 2005). In particular, educational attainment has a strong positive relationship with literacy, and age has a negative relationship with literacy skills which remains when educational attainment is taken into account. Literacy skills are also found to be positively related to parental background, engagement in literacy related activities and undertaking the assessment in one's mother tongue.

Literacy and economic (and other) outcomes

The relationship between literacy, education and labour market outcomes particularly income is an issue that receives considerable attention in the literature analysing data from IALS and ALLS. In addition to the project reports, analyses which have looked at the relationship between education, literacy and employment, unemployment and earnings outcomes include studies using Australian data (Chisick, Lee and Miller, 2002), Canadian data (Bonikowska *et al.*, 2008, Green and Ridell, 2003, 2007, Osberg, 2000), Irish data (Denny, *et al.*, 2000), Swiss data (Falter, Pasch and Hertig, 2007) and UK data (McIntosh and Vignoles). Other authors have investigated similar issues using data from several countries (Barone and

Van de Werfhorst, 2008, Denny, et al., 2004). Literacy skills are found to be positively related to chances of employment, the probability of leaving unemployment and to wages. The size of the wage premium accruing to literacy proficiency varies between countries (and between studies). In addition, where the issue is investigated, a large component of the financial return to education is found to be related to literacy levels in most cases. An exception is Switzerland where literacy and numeracy competencies are found to have only a small impact on wages.

IALS data have also been used to examine the role of basic skills in the explanation of differences in the levels of earnings inequality between countries. Freeman and Shettkat (2000) combine information from the Comparable German American Sectoral Database (CGAS) with data from IALS to examine the relation between wages, skills and employment in the US and Germany. Devroye and Freeman (2002) examine the possibility that cross-country differences in the distribution of skills determine cross-country differences in earnings inequality using IALS data. They find that skill inequality explains only about 7% of the cross-country difference in inequality. Blau and Kahn, (2005) use data from IALS for nine countries to examine the role of cognitive skill in explaining higher wage inequality in the United States than other advanced economies. They find that while performance on cognitive tests plays a role in explaining greater U.S. wage inequality, higher labor market prices (i.e., higher returns to measured human capital and cognitive performance) are quantitatively considerably more important than differences in the distribution of test scores in the US. A much greater role is attributed to the supply of skills in explaining relative wages by Leuven et al. (2005) who find that about one third of the variation in relative wages between skill groups across countries is explained by differences in net supply of skill groups.

Desjardins (2003a) investigates the relationship of formal education and other factors (including literacy skills) with wages and civic participation in Canada using a structural equation model. He finds that initial education has the strongest effect on outcomes, but that this is mediated by a complex set of inter-relationships. Formal learning induces individuals to 'participate in the labour market, improving access to highly skilled occupations, engaging in more informal job-related learning and, in turn, developing and maintaining skills' (Desjardins, 2003a, p.30).

In an example of how data from these surveys can be used in macro-level analysis, Coulombe, Tremblay and Marchand (2004) use data from IALS to investigate the relationship between human capital and growth across 14 OECD countries. They use the age distribution of the test results to construct a synthetic time series, over the period of 1960–1995, of the literacy level of the youth cohort entering the labour market in each period. The relative literacy level of these cohorts is seen as an indicator of a country's investment in human capital. They argue that that direct measures of human capital based on literacy scores outperform measures based on years of schooling in growth regressions and that human capital indicators based on literacy scores have a positive and significant effect on the transitory growth path, and on the long run levels of GDP per capita and labour productivity.

The relationship of literacy to other outcomes such as health and civic and social participation is investigated by several authors. The ALL report undertakes a preliminary discussion of the relationships between literacy and health status (Statistics Canada and OECD, 2005, pp 249-261). Denny (2003) explores the relationship of participation in civic activities with both educational attainment and literacy proficiency using IALS data. He finds that both education and literacy have direct effects on participation in these activities and that about half of the effect of education is accounted for by literacy performance. Roberts and Fawcett (1998) explore the role of literacy in the relationship between the socio-economic environment and health status in Canada using data from IALS. People with lower literacy levels are found to be more likely to be at highest health risk, with an increased effect in the case of senior citizens.

Murray *et al* (2007) develop a health literacy scale using items from the ALL study to describe the distribution of health literacy across regions and demographic groups in Canada as well as to provide comparisons with the US. Health literacy is also found to be positively linked to self reported health status.

Education and Skills Mismatch

Data from IALS and ALL on measured literacy skills and the use of these skills at work has been used to examine issues of skills match and mismatch – i.e. the extent to which the skills individuals possess are utilised or not in their work. In particular, these surveys have allowed researchers to extend the mismatch literature beyond education mismatch to skills mismatch more generally and using more objective measures of literacy skills possessed by individuals versus the literacy skill requirements of their jobs. The ALL report devotes a section to skills match and mismatch (Statistics Canada and OECD, 2005, pp. 142-146) and Falter, Pasch and Hertig (2007, pp. 31-47) use ALL data to examine the issue in Switzerland. Green, Macintosh and Vignoles (1999 and 2002), and Boothby (2002) also examine issues of skills match and mismatch using IALS data.

Statistics Canada and OECD (2005) report that, in six of the countries participating in the first round of ALL, around 60 percent of workers have skills which match their level of engagement with literacy and numeracy in their work. A similar figure is reported for Switzerland (Falter, Pasch and Hertig, 2007, p. 46) with individuals with intermediate qualifications most likely to be in a situation of mismatch. Green, Macintosh and Vignoles (1999) find that 20 percent of IALS respondents in Britain had literacy skills which appeared to be underused in their jobs. In a later (2002) article, the same authors further explore mismatches and returns to over and under-education and basic skills. They find that, in Britain, women are more likely to over-skilled than men, that part-time workers are more likely to be over-skilled than full-timer workers and there is a significant wage penalty associated with over-skilling. Boothby (2002) also explores the relationship between over- and under-education and literacy skills in Canada on the basis of IALS data. He finds while schooling has the largest effect on occupational assignment, literacy skills are also important determinant (e.g. a person with high literacy skills is more likely to be in a job for which he/she is ‘under-qualified’ from the point of view of his/her qualifications).

Adult learning

Data from both IALS and ALL has been used to analyse the incidence and distribution of adult learning. One of the major strengths of IALS and ALL is that they provide one of the few sources of harmonised data available on participation by adults in education and training. O’Connell (1999) uses IALS to undertake a comparative analysis of participation in continuing education and training by adults in 11 OECD countries with a focus on the incidence and duration of involvement in education and training and its relationship to factors such as country, gender, prior educational attainment, and occupation. Tuijnman and Boudard (2001) present 15 indicators of participation in adult education comparing the functioning of training markets in Canada and the US with those of other advanced countries.

The determinants of participation in adult education and training are examined by Boudard and Rubenson (2003) and Boudard and Mourlaix (2003). Rubenson, et al. (2007) undertake a similar exercise drawing on ALL data to look at participation in adult learning, inequality in adult learning and the factors determining participation in adult learning both across countries (Canada, Norway, Switzerland and the US) and between provinces within Canada. Rates of participation in adult learning are found to vary between countries with educational attainment and literacy scores being positively related to participation. Initial and continuing education are found to be complements rather than substitutes. Engagement in

literacy related activities is also found to be a strong predictor of participation by Boudard and Mourlaix.¹¹ Coulombe and Tremblay (2007) approach the issue from a different angle, using IALS data on training and literacy in an analysis of the macroeconomic determinants of job-related training activity in fourteen OECD countries. They find, consistent with the microeconomic evidence, that average literacy skills in a country have a positive effect on the proportion of workers trained.

Skills gain and loss over the life cycle

Age is found to be closely related to literacy performance in both IALS and ALL. Particularly after the age of 45, performance in basic skills declines rapidly in all participating countries even with controls for educational attainment. Individually these surveys do not allow investigation of the extent to which the observed relation is linked to cohort period or aging effects. The fact that several countries administered both IALS and ALL and that the literacy scales are linked allows a deeper analysis of the effects of aging.

Willms and Murray (2007) use data from IALS and ALL to explore how Canada's stock of literacy skills evolved between 1994 and 2003. They employ a synthetic cohort analysis¹² to document net changes in literacy skills for various demographic groups for Canada and the provinces and to explore the individual characteristics that influence whether a particular group has gained or lost skill on average over the nine year period between surveys. They find evidence of significant literacy skill loss in adulthood, in particular, concentrated in adults from lower socio-economic backgrounds.

Green and Ridell (2007) also look at the effects of age on literacy by following cohorts in IALS and ALL for Canada. In line with Willms and Murray, Green and Ridell find that between 1993 and 2003, successive birth cohorts in Canada have had poorer literacy outcomes at the top of the distribution. They suggest that this potentially points to 'an education system that is doing better for those at the low end but doing a poorer job of generating literacy for those at the top (2007, p.41). They also find that literacy tends to decline with age after leaving formal schooling and that schooling itself is the prime driver of literacy.

Different patterns of growth and decline in attainment are evident in Australia New Zealand and Switzerland. Australian data (ABS, 2008), suggests a decline in literacy skills in the period between 1996 and 2006 for cohorts aged 34 and over in 1996. In New Zealand, Satherley and Lawes (2008a) report growth in the literacy attainment between 1996 and 2006 for all birth cohorts studied. In the case of Switzerland (Notter et al., 2006, pp. 36-37), growth in attainment between 1994 and 2003 is observed for cohorts other than the youngest (aged 17-24 in 1994) and the oldest (aged 49-56 in 1994).

Van der Kamp and Boudard (2003) compare the literacy skills of older adults in the Netherlands with other age groups, and present an analysis of the determinants of literacy proficiency of older adults. Results from follow-up interviews conducted with 40 older Dutch adults who had low proficiency scores in IALS are also presented with a focus on the problems they experience in daily life, the coping strategies they develop, and their attitude towards educational interventions. They conclude that the lower literacy proficiency of older adults gives reasons for concern but that many older adults develop practical coping strategies to compensate.

¹¹ They argue that 'ces résultats remettent en question l'idée reçue selon laquelle le niveau d'instruction constitue à lui seul la variable la plus importante expliquant la participation à l'éducation des adultes' (2003, p. 520). ['These findings put in question the commonly held idea that educational attainment is by itself the most important variable explaining educational participation by adults.']

¹² The evolution of the literacy scores of an age cohort over time is examined by comparing the scores of respondents aged x years when surveyed in 1994 in IALS with those of respondents aged x+9 years when surveyed in 2003 in ALL.

Immigration

The cognitive skills and labour market performance of persons with immigration backgrounds is examined in several studies. Statistics Canada and OECD (2005) present results for the countries in the first round of ALL. Having a mother tongue other than the official language of the receiving country is negatively associated with measured literacy. However, both the skill composition of the migrant population and their labour market outcomes vary between countries. Looking at IALS data from Canada, New Zealand, Switzerland, and the United States Kahn (2004) finds that immigrants have lower literacy test scores than natives with considerable variation in the immigrant/native skill gap between countries. The largest gap is found in the US with smaller skill gaps existing in Canada and New Zealand. Analyses of Canadian data from IALS (Ferrer, Green and Riddell, 2004) and ALL (Bonikowska, Green and Riddell, 2008) conclude that immigrants have lower test scores than the native born but find no evidence to support the hypothesis that immigrants receive lower returns to literacy skills than non-migrants. Low literacy among immigrants is acknowledged as an important factor in understanding immigrant-native born earnings differentials in Canada but is not the dominant explanation.

ICT usage

The relationships between literacy, ICT use and outcomes in countries participating in ALL are explored in Statistics Canada and OECD (2005) and in more depth by Veenhof, Clermont and Sciadas (2005). Literacy skills are found to be positively related to computer use and combined literacy and computer use profiles were strongly related to the likelihood that respondents had higher incomes.

Aspects of low skill

Issues relating to the population with low levels of literacy and numeracy skill have been examined in several studies.

Learning difficulties

Two special issues of the journal *Dyslexia* (Vol. 2003/9, No. 2 and 4) are devoted to papers using IALS data to examine issues related to learning difficulties (see Chapman, et al., 2003; Magajna, et al., 2003; Ruijsenaars and Ghesquière, 2003; Vogel, 2003; and Vogel and Holt, 2003). In particular, the characteristics and performance of respondents reporting learning difficulties are compared with those of respondents without such difficulties in the a number of countries participating in IALS including the Netherlands, New Zealand, Slovenia and the US.

The characteristics of the population with low skills

The characteristics of the 22 percent of the Swiss population with skills at levels 1 and 2 in ALL are investigated by Zuchuat (2007). This group is found to come from a diversity of socio-economic backgrounds and, contrary to expectations, the majority of individuals in this group do not belong to 'at risk' categories. The low skilled are classified into four sub-groups 'light users', 'functional users', well 'educated literate people' and 'allophones' (people whose native language is not the test language). The latter group, in particular, is constituted by individuals cumulating a number of disadvantages.

Literacy component skills

Studies have been undertaken in Canada and the US to more fully investigate the skills of people with low levels of literacy proficiency as measured in IALS and ALL. The Canadian study which administered

a number of tests to measure basic reading related skills¹³ (reading components) to samples of English and French speakers who had participated in the ALL assessment is reported in Grenier et al., (2008). The US study, which administered the same set of tests together with items from IALS to a sample of students in adult education classes, is described in Strucker, Yamamoto and Kirsch (2007). In both studies, strong relationships are found between reading component skills and literacy proficiency. The US study also concludes that components proficiencies can be used to create meaningful classes or profiles of low skilled readers.

Methodological issues

There is a reasonably large body of literature which examines the objectives, methodology and implementation of IALS.¹⁴ This was, in part, stimulated by attempts to understand the French results. Studies were commissioned by the French government (Dickes & Flieller, 1997; Dickes & Vrignaud, 1995; Rédmond, 1995). The European Commission funded a study examining the methodology and implementation of IALS (Carey, 2000) which, in addition to chapters reviewing various aspects of the methodology used in IALS, reported the results of an experiment in which a sample of participants in the original IALS round in several countries were retested to examine the impact of testing protocols on results. In addition, the release of the findings from IALS led to critical assessment of its objectives and theoretical framework (Darville, 1999; Hamilton & Barton, 2000; Levine, 1998) as well as to an evaluation of various aspects of the methodology and implementation of the survey (Blum, et al., 2001; Sticht, 2001).

6. Impact on Policy

Leaving aside the problems of evaluating the impact on public policy of surveys such as IALS and ALL under any conditions,¹⁵ the fact that so many countries were involved in one or other or both of these surveys means that a global assessment of their impact is well beyond the scope of this paper. It is clear, however, that results from IALS influenced policy regarding adult literacy in a number of English speaking countries, such as England, Ireland, New Zealand, Northern Ireland and Scotland.

In England, results from IALS played an important role in raising awareness of the low levels of literacy and numeracy among the adult population and contributed to the development of the national strategy for improving adult literacy and numeracy skills known as 'Skills for Life' (Department for Education and Employment, 2001). One commentator (Fawcett, 2003, p.119) goes so far as to claim that 'the IALS played a seminal role in shaping policy and practice for adults in the UK'. Poor results in IALS formed the basis as a call for action by the Working Group headed by Sir Claus Moser¹⁶ which had been asked by the government to advise on ways in which the English Government's plans for basic skills provision for adults could be supported and developed (Working Group on Post-School Basic Skills, n.d.). The Moser report went on to recommend the establishment of a national literacy strategy. In Ireland, IALS

¹³ The tests assessed oral vocabulary, real word reading for speed and accuracy, pseudo-word reading for speed and accuracy, spelling, short-term memory.

¹⁴ Some of this literature is surveyed in OECD (2008) which includes an extensive bibliography.

¹⁵ As an example of the range of possible effects, the experience of IALS in France appears to have stimulated the development of expertise in large scale assessment methodology which was previously lacking (Bottini & Vrignaud, 2005, pp.39-40).

¹⁶ Moser described the fact that just over 22 percent of English adults were at level 1 on the IALS literacy and numeracy scales and that England had one of the highest proportions of the population at this level among the countries participating in IALS as 'a shocking state of affairs in this rich country, and a sad reflection on past decades of schooling and policy priorities over the years' (Moser, 1999).

'elevated concerns about the adult literacy problem to centre stage in educational policy' (Government of Ireland, 2000, p.86) and led to the development of a National Adult Literacy Programme. IALS results also played a role in stimulating the development of New Zealand's adult literacy strategy 'More than Words' (Office of the Ministry of Education, 2001), the 'Essential Skills for Living' strategy in Northern Ireland (Department for Employment and Learning, 2002) as well as the Scottish adult literacy and numeracy strategy (Scottish Executive, 2001).

7. Conclusions

In conclusion, two observations are offered. The first is that the history of international adult skills surveys in the OECD area is one of the adaptation of a common measurement approach to changing policy needs as well as reflection on the successes and failures of individual assessments within a context of tight constraints. In large part, the motivation behind the development of both ALL and PIAAC has been an interest in extending the range of skills assessed and/or to improve the policy relevance of the measures compared to previous surveys. However, the capacity to innovate in this direction has been limited by both costs and considerations of feasibility (particularly respondent burden). The outcome is a compromise between what can be imagined and what is possible. ALL represents a good illustration of this point. Of the seven assessment domains initially considered for inclusion in ALL (prose literacy, document literacy, numeracy, problem solving, practical cognition, teamwork and information and communication technology), four were maintained and one was redeveloped as an indirect measure of the use of, attitudes to and familiarity with ICTs included as part of the background questionnaire.

The second is that when PIAAC data becomes available in 2013, researchers and policy makers will have access to an unprecedented amount of information regarding basic cognitive skills, skills use and individuals' background characteristics and outcomes extending over the period 1993 to 2011. In particular, with 29 countries involved, PIAAC will provide an unparalleled comparative data set, the power of which will be increased by the fact that it will have links back to IALS and/or ALL in the case of many participating countries.

Annex A: Reports of National Results for IALS and ALL

The following table provides bibliographic references to reports and monographs which report on national results for countries participating in IALS and/or ALL. There are a range of other publications which look at specific issues in particular countries. Some of these (in English or French) are mentioned in the text of this paper.

Country	Survey	
	IALS	ALL
Australia	ABS, 1997	ABS, 2008
Belgium (Flemish Community)	Van Damme et al., 1997 Verhasselt, 2002	
Canada	Jones, 1996	Statistics Canada, 2005
Chile	Bravo and Contreras, 2000	
Denmark	Jensen et al., 2000	
Finland	Linnakylä et al., 2000	
Hungary (1)	Köllő, 2009	
Ireland	Morgan, et al., 1997	
Italy	Gallina, 2001	Gallina (ed), 2006a and 2006b.
The Netherlands	Houtkoop, 2000 Verhasselt, 2002	
New Zealand	Culligan, n.d	Satherley, et al., 2008a
Norway	Gabrielsen, 2000	Gabrielsen, et al. 2005
Northern Ireland	Sweeney, et al., 2006	
Portugal(2)	Fundação Calouste Gulbenkian, 1996	
Scotland	Scottish Executive, 2001	
Slovenia	Mozina, et al. 1998	

Sweden	Skolverket, 1996	
Switzerland	Notter et al., 1997	Notter et al., 2006
UK	Carey, 1997	
USA	Binkley et al., 1997 Sum et al., 2002	

(1) No Hungarian national report was produced. However, Köllő (2009) devotes a chapter to the Hungarian IALS survey and IALS data are used throughout the book.

(2) Portugal did not formally participate in IALS. However, it undertook an assessment using IALS instruments in 1998 as part of an EU sponsored research project.

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