

International survey on adult literacy

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Industrialized countries are in transition. Information and communications technology, as well as globalization, are forcing economies into an ever growing reliance on well-educated and, perhaps most importantly, adaptable workers.

Literacy skills have never been more important to national economies. Many job skills are becoming obsolete and new ones are evolving, requiring well-trained and versatile workers. As the authors of a recently published report on literacy observe, literacy and lifelong training are inextricably linked (OECD and Statistics Canada, 1995). Yet until recently, most assessments of literacy skills have yielded little information that might help educators and employers to develop a responsive, competitive workforce for the global marketplace. The report, jointly released by Statistics Canada and the Organisation for Economic Co-operation and Development (OECD) in December 1995, provides data that should aid in planning effective, relevant training. It examines links between literacy levels and certain background variables (education, age, sex, immigration status, employment status, occupation, industry, income, and involvement in adult training) that seem to encourage some workers to reinforce and improve their position in the workforce while inhibiting others from doing so.

The publication describes the first International Adult Literacy Survey (IALS), conducted in autumn 1994. The landmark study measured the variation in basic literacy skills of adults across diverse

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How the survey was conducted

The IALS, like two earlier national studies in North America (Kirsch et al, 1993; Statistics Canada, 1991), combined the techniques of household-based surveys with those of educational testing; that is, background questions determined demographic and other characteristics of the respondents, and test questions (also referred to as tasks) provided information about their levels of literacy. Unlike most standardized tests, however, this study used open-ended rather than multiple-choice questions.

To obtain meaningful comparable results for the survey, representative samples of the civilian, non-institutionalized population aged 16 to 65 were drawn from each of the seven participating countries (Canada, Germany, Sweden, the Netherlands, Poland, Switzerland and the United States). To satisfy national needs, some countries, among them Canada, also included older adults. Sample yields ranged from 2,062 (Germany) to 4,500 (Canada). Respondents were surveyed during the autumn of 1994.

A 20-minute background interview provided a means for exploring how literacy is connected to social, educational, economic and other variables and for seeing how these relationships are similar across cultures. In cases where respondents did not speak the official language, an interpreter helped provide the required information.

Respondents were tested in the official language(s) of their country; they were given a choice of using English or French in Canada, and were questioned in French or German in Switzerland, according to the dominant language of the canton in which the interview was conducted. Statis-

tics Canada's experience with bilingual questionnaires proved helpful in the design of this multilingual project. Respondents whose poor grasp of the official language prevented them from completing the test were still included, as the objective of the survey was to determine literacy levels in that language. Their omission would otherwise have distorted the responses and possibly over-represented the literacy profile of a country.

Each participant attempted a set of tasks, having first answered a core booklet to determine whether he or she could proceed with the test. Only those who correctly answered at least 2 of the 6 core questions (some 93% of respondents) were given the full test, which consisted of three sections, and took about 45 minutes to complete. The 15 test questions within each section became progressively more difficult.

In order to guard against cultural bias in the survey, a mathematical technique was employed to select only those tasks shown to be free of such bias. Some 114 tasks of the 175 constructed proved valid across cultures and useful for the main assessment. Of all test items used (for example, labels on medicine bottles, newspaper advertisements, bus schedules, weather charts) about half were drawn from outside North America.

Participating country study teams screened and coded the data, which were then tabulated and scaled by Educational Testing Service of the United States.

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languages and cultures. In addition to developing scales to permit useful comparisons of literacy performance, the study produced

findings that should assist in the construction of statistical models for further research (see *How the survey was conducted*).

The survey involved the efforts of seven governments and three intergovernmental organizations. Both the European Union's statistical office, EUROSTAT, and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) supported the OECD's international focus. In addition to Statistics Canada, Canadian collaborators were the National Literacy Secretariat and Human Resources Development Canada.

This note outlines the aims and methodology of the new survey and introduces the next article in this issue, "The marginally literate workforce." It also provides a snapshot of scores for the general population tested in the three countries – Canada, the United States and Germany – whose workforces are compared in that article.

A new measure of literacy

The IALS discarded the popular notion of literacy as a single measurement or standard of reading ability, arguing that it was, rather, "a relative concept that can be given meaning only in relation to the demands of the economy and society." Recognizing the complexity of industrial societies and the need to view literacy as a broad set of skills used in a wide range of settings, the survey adopted the following definition:

Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.

Building on national surveys conducted in Canada and the United States, as well as recent research and methodology in literacy assessment,¹ the IALS experts devised three domains (or scales) in which to assess a common set of skills for various tasks (questions that do not offer a choice of possible answers, but

require a careful reading of the material from which answers must be derived or calculated). They tested people's ability to understand and use increasingly complex information from such items as product labels and owners' manuals (prose literacy); job applications and transportation schedules (document literacy); weather charts and interest tables (quantitative literacy) (Table 1).

The difficulty of prose tasks varied according to the amount of information to be processed, the extent to which information in the question was obviously related to material in the text, the amount and location of information in the text that seemed plausible but did not fully answer the question (called "distractors"), and the length and density of the text.

Success in processing documents appeared to depend at least in part on the ability to locate information in a variety of displays, and to use this information in a number of ways. The survey's authors acknowledge that some procedural knowledge (general familiarity with applications or order forms, for example) was sometimes required.

The difficulty of quantitative tasks depended on the type and number of arithmetic operations needed to perform the task successfully (calculators were not allowed), the extent to which numbers were embedded (that is, scattered throughout the document), and the extent to which an inference had to be made to identify the type of operation required.

The three domains' five corresponding levels of mastery allowed comparison of literacy profiles across countries and cultures, as well as within subgroups. This framework should provide a useful basis for further testing.

How did they do?

Generally, for all three scales, proportions of high and low scores for German adults were smaller than those of their North American counterparts; conversely, their representation in the mid-level range was greater, perhaps a reflection of an education system requiring higher levels of literacy for trades and craft workers than is usually the case in Canada and the United States.

The report's authors caution against the temptation to rank countries as if they were competitors in a horse race. A simple ranking of the seven nations means little, although the overall scores do point roughly to each country's relative advantage in the global marketplace. Where results are similar, however, interpretation becomes more difficult. Of more importance for each nation is the distribution of the various literacy levels within its own population. With this caveat in mind, test scores for the general adult populations of Canada, the United States and Germany are given below.

Many have trouble with complex questions

The tasks in Level 1 for each of the two text-based domains (prose and document) required the respondent simply to match information solicited in each question to the appropriate portion of the material supplied. In Canada, almost 17% of the general adult population performed only at this low level of prose literacy; some 18% fell into this category for document literacy. The United States reported roughly 21% and 24% (Chart).

Quantitative tasks asked participants to perform a single, fairly simple operation using numbers provided in the exercise. In both Canada and the United States,

Table 1
Examples of tasks for each literacy scale, at increasing levels of difficulty

Level	Prose	Document	Quantitative
1	Use the instructions on the bottle to identify the maximum duration recommended for taking aspirin.	Identify the percentage of Greek teachers who are women by looking at a simple pictorial graph.	Fill in the figure on the last line of an order form, 'Total with Handling,' by adding the ticket price of \$50 to a handling charge of \$2.
2	Identify a short piece of information about the characteristics of a garden plant, from a written article.	Identify the year in which the fewest Dutch people were injured by fireworks, when presented with two simple graphs.	Work out how many degrees warmer today's forecast high temperature is in Bangkok than in Seoul, using a table accompanying a weather chart.
3	State which of a set of four movie reviews was the least favourable.	Identify the time of the last bus on a Saturday night, using a bus schedule.	Work out how much more energy Canada produces than it consumes, by comparing figures on two bar charts.
4	Answer a brief question on how to conduct a job interview, requiring the reader to read a pamphlet on recruitment interviews and integrate two pieces of information into a single statement.	Summarize how the percentages of oil used for different purposes changed over a specified period, by comparing two pie charts.	Calculate the final value of a \$100 investment at a rate of 6 percent for 10 years, using a compound interest table.
5	Use an announcement from a personnel department to answer a question that uses different phrasing from that used in the text.	Identify the average advertised price for the best-rated basic clock radio in a consumer survey, requiring the assimilation of several pieces of information.	Use information on a table of nutritional analysis to calculate the percentage of calories in a Big Mac® that comes from total fat.

Source: International Adult Literacy Survey (Technical note no. 4), 1994

scores for quantitative tasks were identical to the prose literacy performances.

In marked contrast, Germany had fewer adults with Level 1 literacy in all three domains (14%, 9% and under 7%).

Prose tasks at Level 2 often asked the reader to select one or more items from several distracting bits of information in the text. Document questions also required some filtering of information. Quantitative tasks typically required a single arithmetic operation (usually addition or subtraction) using numbers easily located in the question.

One-quarter of the North American population achieved Level 2 in prose and document literacy. Roughly one-third of Germans

reached this level on comparable tests. Around 25% of adults in all three countries registered Level 2 scores on the quantitative questions.

As levels progressed, text-based questions became increasingly complex, often asking readers to integrate or contrast items. Some tasks required them to identify several pieces of information located in different sentences or paragraphs. Quantitative operations were also more varied (with some multiplication and division tasks), and numbers needed for the calculations were frequently part of more complex displays.

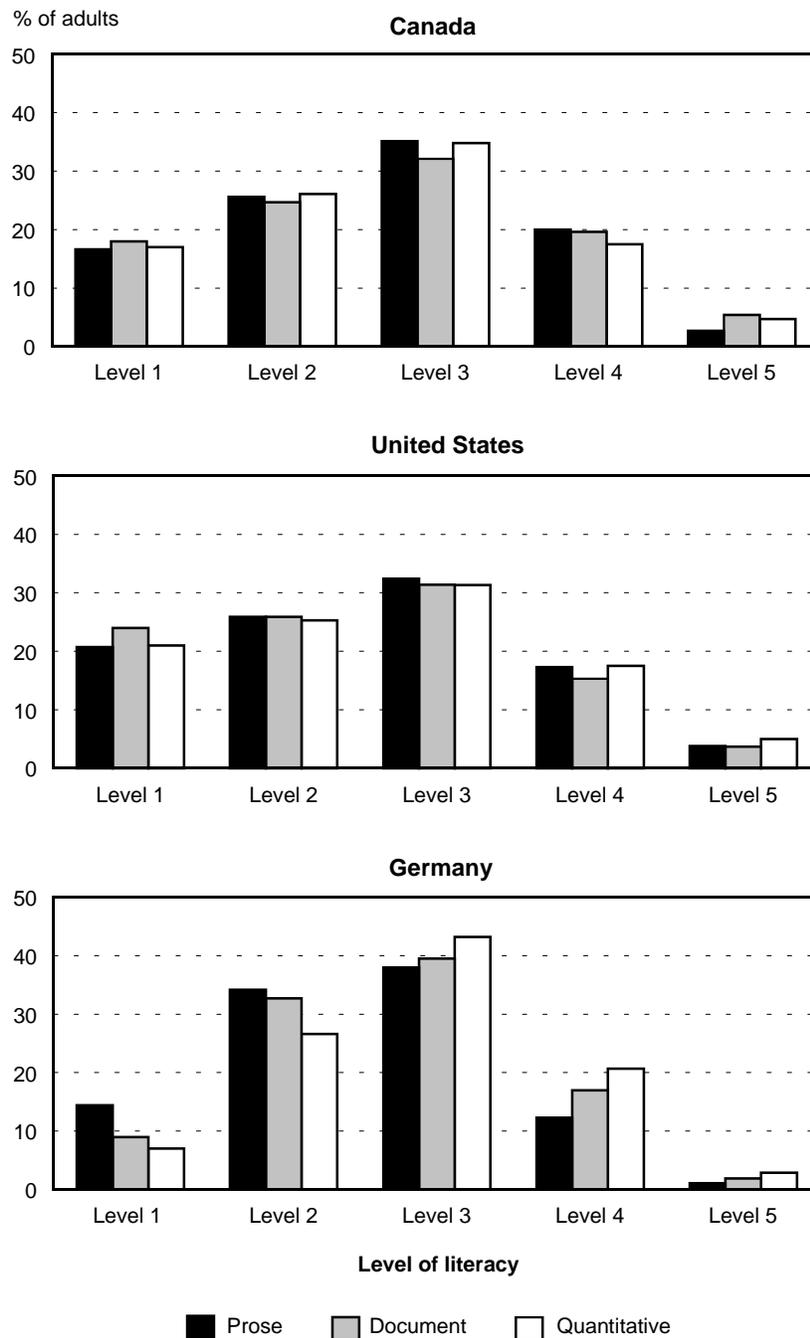
Roughly one-third of Canadian adults achieved Level 3 scores on all three scales. Comparable figures for Americans were slightly lower,

while those for the German population were higher.

Level 4 prose tasks often asked that information from relatively lengthy texts be integrated or contrasted. (Some studies have shown that tasks requiring the reader to contrast information are generally more difficult than those asking for similarities.) Requested information was sometimes more abstract than that required at lower-level tests. Readers often needed to make a series of matches and to infer from the text certain requirements not explicitly stated by the question. Quantitative questions called for a single operation where either the operation or the quantities were not easily determined.

One-fifth of Canadians reached Level 4 in both text-based domains;

Chart
Marginal * levels of literacy remain widespread.



Source: International Adult Literacy Survey, 1994

* Bottom two literacy levels (1 and 2) combined.

18% scored this well on quantitative tasks. American proportions for the first two domains were slightly lower (17% on prose tests, 15% on document tests), but identical on quantitative questions. Comparable results for the German survey were 12%, 17% and 21%.

Few reach the top

Some prose tasks at Level 5 sought information in dense text that contained a number of plausible distractors. Specialized knowledge and inferences were also called for in a few questions. Similar requirements existed for document tasks. Most quantitative questions at this level asked for multiple operations using embedded numbers, and readers sometimes needed to rely on background knowledge to determine the quantities or operations required. (A Level 5 quantitative task is reproduced in Table 2.)

Nearly 3% of Canadians achieved Level 5 for prose literacy, and around 5% did for both document and quantitative questions. American figures were slightly higher for prose and quantitative, but lower for document tasks; German proportions were slightly lower in all three domains.

Other observations

The report concludes that the mental processes used in reading are independent of language and culture. Furthermore, its authors argue that tested abilities are closely linked to the use of literacy skills in daily life; that practice makes perfect, so to speak. For example, occupations requiring high levels of literacy for entry tend to provide practice in using written material, which sustains those levels. Some people, however, may make little effort to reinforce reading skills obtained through higher education,

Table 2
Example of a Level 5 quantitative literacy task (nutritional analysis)

	Serving size	Calories	Protein (g)	Carbohydrates (g)	Total fat (g)	Saturated fat (g)	Monounsaturated fat (g)	Polyunsaturated fat (g)	Cholesterol (mg)	Sodium (mg)		
Sandwiches												
Hamburger	102 g	255	12	30	9	5	1	3	37	490		
Cheeseburger	116 g	305	15	30	13	7	1	5	50	725		
Quarter Pounder®	166 g	410	23	34	20	11	1	8	85	645		
Quarter Pounder® w/Cheese	194 g	510	28	34	28	16	1	11	115	1110		
McLean Deluxe™	206 g	320	22	35	10	5	1	4	60	670		
McLean Deluxe™ w/Cheese	219 g	370	24	35	14	8	1	5	75	890		
Big Mac®	215 g	500	25	42	26	16	1	9	100	890		
Filet-O-Fish®	141 g	370	14	38	18	8	6	4	50	730		
McChicken®	187 g	415	19	39	19	9	7	4	50	830		
French Fries												
Small French Fries	68 g	220	3	26	12	8	1	2.5	0	110		
Medium French Fries	97 g	320	4	36	17	12	1.5	3.5	0	150		
Large French Fries	122 g	400	6	46	22	15	2	5	0	200		
Salads												
Chef Salad	265 g	170	17	8	9	4	1	4	111	400		
Garden Salad	189 g	50	4	6	2	1	0.4	0.6	66	70		
Chunky Chicken Salad	255 g	150	25	7	4	2	1	1	78	230		
Side Salad	106 g	30	2	4	1	0.5	0.2	0.3	33	35		
Croutons	11 g	50	1	7	2	1.3	0.1	0.5	0	140		
Bacon Bits	3 g	15	1	0	1	0.3	0.2	0.5	1	95		
Soft Drinks												
	Coca-Cola Classic®				diet Coke®				Sprite®			
	Small	Medium	Large	Jumbo	Small	Medium	Large	Jumbo	Small	Medium	Large	Jumbo
Calories	140	190	260	380	1	1	2	3	140	190	260	380
Carbohydrates (g)	38	50	70	101	0.3	0.4	0.5	0.6	36	48	66	96
Sodium (mg)	15	20	25	40	30	40	60	80	15	20	25	40

Source: International Adult Literacy Survey, 1994

Note: Readers were asked to calculate the percentage of calories in a Big Mac® coming from total fat. (They were told that a gram of fat had 9 calories.)²

while others may work independently to acquire and maintain reasonable levels of literacy without the reinforcement of a reading-intensive occupation. So, although positive correlations exist between literacy and education, income, and occupation, some surprising results exist, demonstrating that it is pos-

sible to overcome relative disadvantages or, conversely, to lose abilities assumed to be permanent.

This finding invites an assessment of individual practices (reading habits, use of libraries), as well as workplace policies (fostering an atmosphere that encourages

improvement of literacy skills) and government initiatives (sponsoring further study, remedial training or skills upgrading). Of particular concern is the large percentage of adults who may not acknowledge their performance as inadequate and therefore do not recognize it as a barrier to advancement in the

workplace and community (specifically, those who have Level 2 literacy, roughly 25% of Canadians). Because there will be relatively few young workers to replace the more numerous baby boomers in the coming years, employers will need to train, or retrain, persons already in the labour force, rather than continue to look to the educational system to fill all of their needs. Therefore, the workforce in place now may find itself dealing with dramatic changes in the next few years for which it may not be prepared. Literacy skills are a core indicator of the calibre of human capital currently available in different societies.

The authors of the report suggest that questions could be administered to samples of workers in individual firms over time. They also speculate that, eventually, micro-level findings on relationships between workers' skills, job performance and company health may lead to policies, programs and workplace practices that will yield broad returns for the economies of participating countries.

Future use of the survey

The survey technology used in the International Adult Literacy Survey is a novel and useful approach that has attracted the interest of several other countries. The European Union may commission another European data collection and the United Kingdom, Australia and New Zealand are interested in obtaining comparable information. Follow-up international surveys are likely, possibly including data from countries outside the OECD.

To order the report on IALS

Literacy, Economy and Society: Results of the first International Adult Literacy Survey (Catalogue no. 89-545-XPE) is available for \$50 from any Statistics Canada Regional Reference Centre, or from Statistics Canada, Operations and Integration Division, Circulation Management, 120 Parkdale Avenue, Ottawa, Ontario K1A 0T6; fax (613) 951-1584 or call toll free 1 800 267-6677.



Notes

1 See the reference section provided in each chapter of the report (OECD and Statistics Canada, 1995). See also Montigny and Jones (1990).

2 Answer: 46.8%.

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