



Adult literacy and economic growth

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Abstract

Developed countries, including New Zealand, used to consider their populations wholly literate, in the sense that almost all adults could read and write. Contemporary definitions expand the concept of literacy to include wider cognitive skills, and extend it across the whole population: people are more or less literate depending on how well they understand and use printed information to solve everyday problems at home and at work. Using this wider definition, the International Adult Literacy Survey found that developed countries contain a considerable number of people who have poor literacy skills. This paper looks at whether an increase in the basic literacy skills of adults would have a positive effect on the New Zealand economy. It finds good evidence for the benefits of literacy: studies consistently find that adults with better literacy skills are more likely to be employed, and to earn more, than those with poorer literacy skills, even when taking account of other factors which affect work performance. There is little rigorous evidence, however, for the benefits of adult literacy *training* and almost no accompanying information on the costs of this training. While there is a good case for an increased focus on adult literacy, and on workplace literacy in particular, these findings suggest a cautious approach to expanding publicly-funded adult literacy programmes. There is a clear need for more and better New Zealand-based research, for piloting innovative literacy programmes and for undertaking good-quality evaluations. A modest increase in literacy training may not materially affect economic performance. It may, however, be a worthwhile investment, but only good-quality research and evaluation will tell us this.

JEL CLASSIFICATION I21, J31, J60, O40

KEYWORDS adult literacy; basic skills; IALS; economic growth; productivity; returns to education; earnings; employment; New Zealand

Adult literacy and economic growth

1 Introduction

This paper looks at whether an increase in the basic literacy skills of adults would have a positive effect on the New Zealand economy, through increased employment and workplace productivity. It contributes to a suite of research projects the Treasury is undertaking on specific contributions of human capital – that is, the knowledge, skills, competencies and attributes embodied in individuals – to economic growth in New Zealand.¹

1.1 The purpose of this paper

Sustained economic growth is a priority for the government. Investments in human capital are seen as making a key contribution to growth. This emphasis on human capital and growth is stated clearly in the most recent Speech from the Throne:

My government sees its most important task as building the conditions for increasing New Zealand's long term sustainable rate of economic growth... Achieving that higher growth will require careful attention and energetic promotion of the key elements of economic transformation: human capital development, investment, innovation, export promotion and business and regional development. Increasing the quality and quantity of our human capital is the highest priority (Clark 2002).

However, while there is good evidence that human capital investments contribute to the level of, or continuing growth in, GDP there is no consensus in the literature on which investments are better than others. One issue is whether investments are better made at the upper reaches of the skills distribution (encouraging more post-graduate study, for example) or at the bottom of the distribution. In New Zealand there has been a persistent concern about the number of poor performers in the 'tail' of the skills distribution compared to other countries, and whether this might be restricting our economic performance.

At the same time, there has been an increased interest in adult literacy in New Zealand and a degree of emphasis placed on adult literacy (sometimes included with other 'foundation skills') within the education sector. This increased interest, which is also

¹ Other papers in this series are Durbin (2004), Frances (2004) and Moody (forthcoming).

mirrored in other countries,² dates from the publication of the International Adult Literacy Survey (IALS) results in the mid- to late-1990s.³ The government's Adult Literacy Strategy (Minister of Education 2001) recognises that basic literacy skills are important for New Zealand's economy and for a well-functioning, inclusive society. It acknowledges that past provision of literacy training for adults has been inadequate.⁴

Adult literacy education has never been well resourced in New Zealand, and past policy has been haphazard. Current provision is heavily focussed in a community-based sector dependent on volunteers. Throughout the adult literacy sector there are inadequate resources to promote provision, train tutors, develop learning resources and provide a flexible range of learning opportunities (p.4).

The Strategy signals a commitment to raise literacy levels in the population through an increase in the number of places in adult literacy programmes,⁵ a broader scope of provision, a professional and qualified workforce, a national system of literacy measures or standards and a quality assurance system for adult literacy. Since 2001, significant additional funding has been invested over successive Budgets to implement the Strategy.

This paper brings these two areas of government activity together and asks whether improvements in literacy would have an effect on the level of, or continuing growth in, GDP. Evidence is obtained mostly from the published literature, although some original descriptive work has been undertaken using the New Zealand IALS data. The paper looks only at direct economic benefits, although considerable social benefits might also accrue from an improvement in literacy, particularly amongst people with very low skills.⁶

1.2 Why look at literacy?

A large number of skills and abilities, of different types and levels, are potentially relevant to people's performance at work. Precise typologies of skills, where they exist, differ from study to study. At a high level, though, it is useful to make a distinction between cognitive skills involving thinking, reasoning and the use of knowledge, and manual skills involving dexterity and control. Most jobs require both of these types of skills, in greater or lesser proportions. These skills can be generic, and used in a large number of different occupations, or they can be specific to certain occupations, industries or firms. Skills are acquired through education and training, but people also possess a wide range of job-relevant abilities, attributes or personality traits such as patience, persistence, self-motivation and reliability.

² The United Kingdom, in particular, has devoted a great deal of attention towards adult literacy (Working Group on Post-School Basic Skills 1999; Department for Education and Skills 2001). McKenna and Fitzpatrick (2004) review adult literacy policy in a number of English-speaking countries.

³ There are three official survey publications, reflecting the three waves of the survey: OECD and Statistics Canada (2000), OECD and Human Resources Development Canada (1997), and OECD and Statistics Canada (1995). An IALS search tool is available on the web at <http://www27.statcan.ca/ialdata/search.asp?lang=1033>.

⁴ For a history of adult literacy in New Zealand see Johnson (2000).

⁵ Training Opportunities and Youth Training programmes currently receive the bulk of the government funding for adult literacy training. These are aimed at helping job-seekers with low skills into employment and literacy training is a key part, although not the only part, of the programmes. Government-funded (or part-funded) adult literacy programmes are also provided in workplaces, in the community, and in prisons. The Ministry of Education has commissioned research to determine the number and type of adult 'foundation skills' programmes in New Zealand and to determine how many adults are engaged in such learning.

⁶ Johnston (2004) reviews the literature on the wider benefits of education, with particular regard to New Zealand. Some of these wider benefits, such as increased health, might in turn have effects on economic performance.

Literacy skills are among the most important generic cognitive skills. Literacy was once considered to be the ability to read and write: people who couldn't meet a very basic standard – writing their own name, for example – were considered illiterate. Contemporary definitions of literacy still include reading and writing, but take the concept a considerable step further and include a range of skills used in work, and at home, which are much broader than the term “literacy” at first suggests. Workbase, the New Zealand Centre for Workplace Literacy Development, considers that literacy covers “not just reading and writing, but speaking, listening, creative thinking, problem solving and numeracy” (Workbase 2000). Wider definitions cover even more generic cognitive skills, such as this one from the Scottish Executive (2001): “the ability to read, write and use numeracy (*sic*), to handle information, to express ideas and opinions, to make decisions and solve problems, as family members, workers, citizens and lifelong learners”. Literacy is also no longer considered to be something a person either does or does not have, but rather to be a continuum upon which every person lies.

Basic literacy skills, as broadly defined above, are at the heart of what studies find to be the “core workplace competencies”, “foundation skills”, “essential skills” or “key competencies” (Kearns 2001; Human Resources Development Canada 2004; Rychen and Salganik 2003; Levy and Murnane 1999).⁷ Literacy skills are used in almost all occupations. They are necessary for performing many tasks at work and are the foundation upon which more job-specific knowledge and skills are built. Human Resources Development Canada (2004), for example, shows how, and to what level of complexity, literacy skills (as well as other “essential skills”) are used in over 150 types of jobs, including all those in the Canadian national classification which require secondary education or less.

Since most of the information in this report comes from IALS, or from very similar surveys, the report broadly follows the IALS definition, which is that literacy is “the ability to understand and employ printed information in daily activities: at home, at work and in the community”.⁸ As with many other definitions, the IALS definition of literacy also includes quantitative applications, so this report does not refer specifically to numeracy, unless there is a good reason to treat it separately from literacy in general.

1.3 Review methods

Publications were found by searching a variety of databases and on-line collections. In particular, an EconLit search was conducted using the terms “literacy”, “numeracy”, “basic skills”, “cognitive skills”, “IALS”, and “NALS”. For Chapter 6, databases with an education and training focus were also used,⁹ and search terms were widened correspondingly. Government websites in New Zealand, Australia, the United Kingdom, Canada, and the United States were searched, as were the websites of literacy organisations and clearinghouses for adult literacy research. A selection of the more helpful websites for this review is given in Table 1.¹⁰ Further literature was found by following up references in publications.

⁷ Other essential skills listed in these reports include working with others, oral communication, computer use, decision making, and planning and organising.

⁸ Literacy should not, however, be interpreted as being a general measure of innate intelligence, like IQ, although literacy and IQ will no doubt be correlated.

⁹ These databases were Eric, Psyclit, Wilson Select Plus, and the British Education Index.

¹⁰ A far more comprehensive list of adult literacy websites is given in the appendix of Brooks, Giles, Harman, Kendall, Rees and Whittaker (2001b).

Table 1 – Websites containing research on adult literacy

Organisation name	URL
New Zealand Literacy Portal	www.nzliteracyportal.org.nz
Ministry of Education	www.minedu.govt.nz
Department of Labour	www.dol.govt.nz
Department for Education and Skills	www.dfes.gov.uk
National Research and Development Centre for Adult Literacy and Numeracy	www.nrdc.org.uk
Basic Skills Agency	www.basic-skills.co.uk
Learning and Skills Development Agency	www.lsda.org.uk
Statistics Canada	www.statcan.ca
Human Resources Development Canada	www.hrdc-drhc.gc.ca
National Adult Literacy Database	www.nald.ca
National Center for Educational Statistics	nces.ed.gov
National Center for the Study of Adult Learning and Literacy	ncsall.gse.harvard.edu
National Institute for Literacy	www.nifl.gov

1.4 How the paper is structured

The paper is set out as follows. Chapter 2 looks at literacy skills in New Zealand, using data from IALS, and includes a comparison with other countries. It also develops a picture of those New Zealanders who have the lowest literacy skills. A detailed description of the IALS results is required since there has been no comprehensive write-up of the New Zealand IALS data. Chapter 3 is an introduction to the economic effects of improving literacy skills. It concludes that the most promising types of studies for these purposes are cross-country growth studies, studies of individual returns to literacy skills, and evaluations of specific literacy programmes. These three types of studies are discussed in detail in Chapters 4, 5 and 6 respectively. Chapter 7 discusses the findings of the paper.

2 Literacy skills in New Zealand

2.1 The IALS survey

IALS is the best source of information on adult literacy skills in New Zealand. IALS was conducted in 22 countries, and was designed to be representative of each country's civilian, non-institutionalised population aged 16-65. Testing took place in either 1994, 1996 or 1998, using a standard questionnaire which was translated into each country's main language or languages. In New Zealand the questionnaire was administered in English. A total of 4,223 respondents (giving a response rate of 74%) were interviewed in the New Zealand round, which took place in 1996.

Survey participants were first asked for background and demographic information and then to complete a core booklet of six tasks, designed to avoid the embarrassment of giving the full test to participants with very low literacy skills. Those who completed the core booklet satisfactorily were asked to complete the main booklet, consisting of a variety of tasks related to common types of written information.

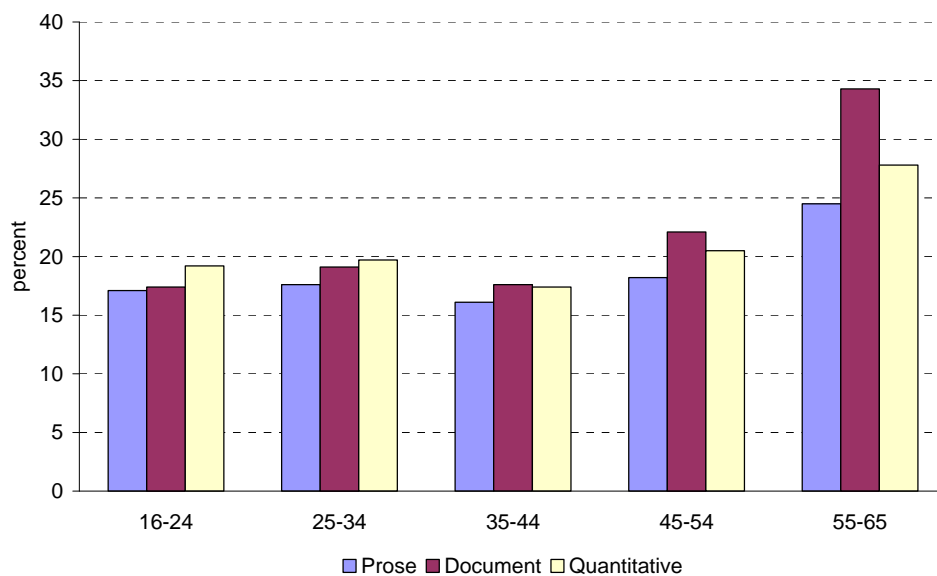
Literacy in IALS was measured on three scales – prose, document and quantitative – where each scale ranged from 0 to 500 points. An individual's score on these scales implied an ability to complete tasks at a particular level of difficulty. People who were estimated to have a score of 280, for example, would be expected to consistently perform tasks – with an 80% probability – like those in the questionnaire with a difficulty value of 280. They might at times be able to do more difficult tasks, but the probability of success would be lower than 80%. Similarly, the probability of them performing easier tasks, with a lower difficulty value, would be greater than 80%.

2.2 Literacy skills at Level 1

Scale scores were grouped into five literacy levels. The lowest level, containing those people with the poorest literacy skills, was Level 1, which on each of the three scales was defined by a score of 225 or less. The IALS report (OECD and Statistics Canada 2000, p.xi) describes people in Level 1 of each scale as having “very poor skills” and people in Level 2 as having a “weak level of skill”, and whose “low level of proficiency makes it difficult for them to face novel demands, such as learning new job skills”. Level 3 is “considered a suitable minimum for coping with the demands of everyday life and work in a complex, advanced society”. Levels 4 and 5 describe people who “demonstrate command of higher-order information processing skills”.

Because of the description of Level 3, people in levels lower than this are frequently considered to be the ‘problem group’ with poor skills below those required to function in a knowledge economy. However, the description of Level 3 also says that attainment of this level “denot[es] roughly the skill level required for successful secondary school completion and college entry”, which seems a unreasonably high standard for a whole population to meet. About 45% of New Zealanders aged 16 to 65 were estimated to be in either in Level 1 or 2 (Figure 1) and to suggest that this whole group is not coping with the demands of everyday life and work is unjustified.

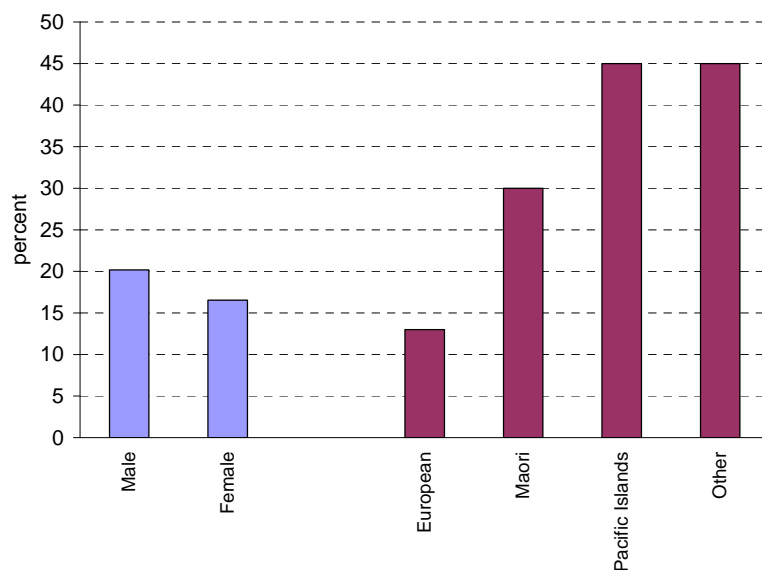
Figure 2 – Percent of New Zealanders aged 16-65 at Level 1 on prose, document and literacy scales, by age group, 1996



Source: New Zealand IALS data.

Men and women also differed in their literacy skills, as did people in different ethnic groups (Figure 3).

Figure 3 – Prose literacy in IALS: proportion of population aged 16 to 65 in Level 1, by gender and by ethnicity



Source: New Zealand IALS data and Minister of Education (2001).

2.3 Level 1 and 2 tasks in IALS

What the people in Level 1 have in common is not the achievement of tasks at the Level 1 standard of difficulty, but that they could not consistently, i.e. 80% of the time, perform tasks with a difficulty value in the Level 2 bracket (226-275). Some groups of people in Level 1 could consistently perform all of the tasks associated with the Level 1 bracket, some could perform some of the tasks, and others could perform almost none of the tasks. In order to see what kinds of tasks these were, it is worth looking in some detail at what the three different scales measure and at what kinds of tasks are associated with Levels 1 and 2.

Prose literacy refers to the knowledge and skills needed to understand and use information from texts including newspaper and magazine articles, brochures and instruction manuals. People operating at Level 1 on the prose literacy scale were, at best, able to locate one piece of information in a given text that was identical to or synonymous with the information provided in the accompanying question. The easiest task in Level 1 of the prose literacy scale (with a difficulty of 188) asked respondents to look at a medicine label to determine the “maximum number of days you should take this medicine” (Box 1). The reader needs to be able to find where the information is located and to understand that the term “maximum” relates to “not longer than”. In New Zealand about half the people in prose literacy Level 1 were able to do this task.

Box 1

MEDCO ASPIRIN **500**

INDICATIONS: Headaches, muscle pains, rheumatic pains, toothaches, earaches.
RELIEVES COMMON COLD SYMPTOMS.

DOSAGE: ORAL. 1 or 2 tablets every 6 hours, preferably accompanied by food, for not longer than 7 days. Store in a cool, dry place.

CAUTION: Do not use for gastritis or peptic ulcer. Do not use if taking anticoagulant drugs. Do not use for serious liver illness or bronchial asthma. If taken in large doses and for an extended period, may cause harm to kidneys. Before using this medication for chicken pox or influenza in children, consult with a doctor about Reyes Syndrome, a rare but serious illness. During lactation and pregnancy, consult with a doctor before using this product, especially in the last trimester of pregnancy. If symptoms persist, or in case of an accidental overdose, consult a doctor. Keep out of reach of children.

INGREDIENTS: Each tablet contains
500 mg acetylsalicylic acid.
Excipient c.b.p. 1 tablet.
Reg. No. 88246

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An example of a harder, Level 2 task (with a difficulty of 230) is to read the article shown in Box 2 about the impatiens plant and describe what happens when the plant is exposed to temperatures of 14°C or lower. What makes this task slightly harder than the Level 1 tasks is that the key sentence in the text is preceded by some potentially distracting information about other temperatures.

Box 2

IMPATIENS

Like many other cultured plants, impatiens plants have a long history behind them. One of the older varieties was sure to be found on grandmother's windowsill. Nowadays, the hybrids are used in many ways in the house and garden.

Origin: The ancestors of the impatiens, *Impatiens sultani* and *Impatiens holstii*, are probably still to be found in the mountain forests of tropical East Africa and on the islands off the coast, mainly Zanzibar. The cultivated European plant received the name *Impatiens walleriana*.

Appearance: It is a herbaceous bushy plant with a height of 30 to 40 cm. The thick, fleshy stems are branched and very juicy, which means, because of the tropical origin, that the plant is sensitive to cold. The light green or white speckled leaves are pointed, elliptical, and slightly indented on the edges. The smooth leaf surfaces and the stems indicate a great need of water.

Bloom: The flowers, which come in all shades of red, appear plentifully all

year long, except for the darkest months. They grow from "suckers" (in the stem's "armpit").

Assortment: Some are compact and low-growing types, about 20 to 25 cm. high, suitable for growing in pots. A variety of hybrids can be grown in pots, window boxes, or flower beds. Older varieties with taller stems add dramatic colour to flower beds.

General care: In summer, a place in the shade without direct sunlight is best; in fall and spring, half-shade is best. When placed in a bright spot during winter, the plant requires temperatures of at least 20°C; in a darker spot, a temperature of 15°C will do. When the plant is exposed to temperatures of 12-14°C, it loses its leaves and won't bloom anymore. In wet ground, the stems will rot.

Watering: The warmer and lighter the plant's location, the more water it needs. Always use water without a lot of minerals. It is not known for sure whether or not the plant needs humid air. In any case, do not spray water directly onto the leaves, which causes stains.

Feeding: Feed weekly during the growing period from March to September.

Repotting: If necessary, repot in the spring or in the summer in light soil with humus (prepacked potting soil). It is better to throw the old plants away and start cultivating new ones.

Propagating: Slip or use seeds. Seeds will germinate in ten days.

Diseases: In summer, too much sun makes the plant woody. If the air is too dry, small white flies or aphids may appear.

Document literacy refers to the knowledge and skills required to locate and use information contained in formats such as requisition forms, bus timetables, maps and charts. People operating at Level 1 on this scale were, at best, able to locate a piece of information based on a literal match where distracting information, if present, was typically located away from the correct answer. Some tasks at Level 1 also direct the reader to enter personal information onto a form. One of the tasks at Level 1 (again with a difficulty of 188) directs the reader to identify from a chart – shown in Box 3 below – the percentage of teachers from Greece who are women.

Box 3

FEW DUTCH WOMEN AT THE BLACKBOARD

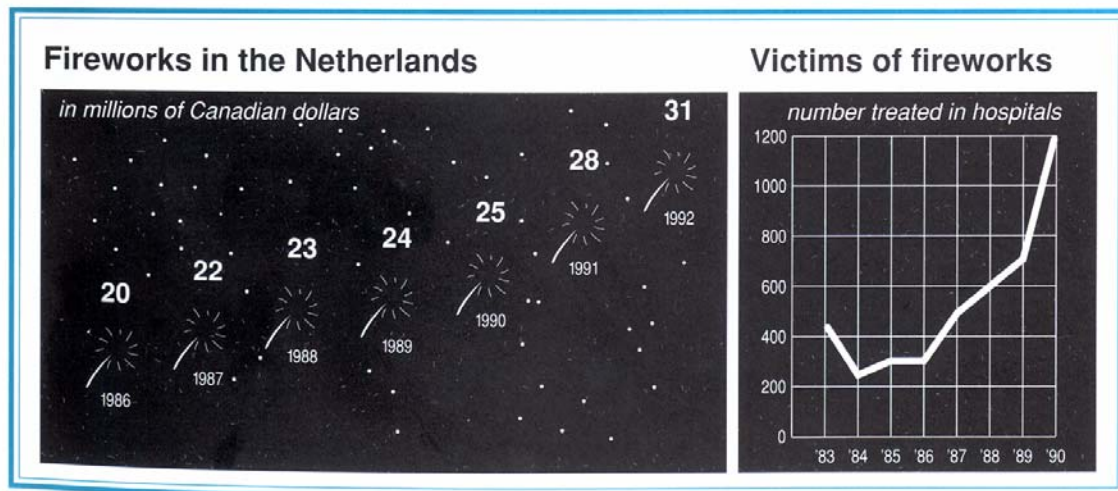
There is a low percentage of women teachers in the Netherlands compared to other countries. In most of the other countries, the majority of teachers are women. However, if we include the figures for inspectors and school principals, the proportion shrinks considerably and women are in a minority everywhere.



Percentage of women teachers (kindergarten, elementary, and secondary).

Again about half of the people in document literacy Level 1 (in New Zealand) were able to do this task. One of the Level 2 tasks on the document scale (difficulty of 242) is similar to this, but presents two charts instead of just one, therefore potentially distracting readers (Box 4). It asks the reader to identify the year in which the fewest people in the Netherlands were injured by fireworks. Neither graph contains the label “number injured by fireworks” and the reader needs to infer that “victims” or “number treated” equates to injuries (which in fact, strictly speaking, it doesn’t).

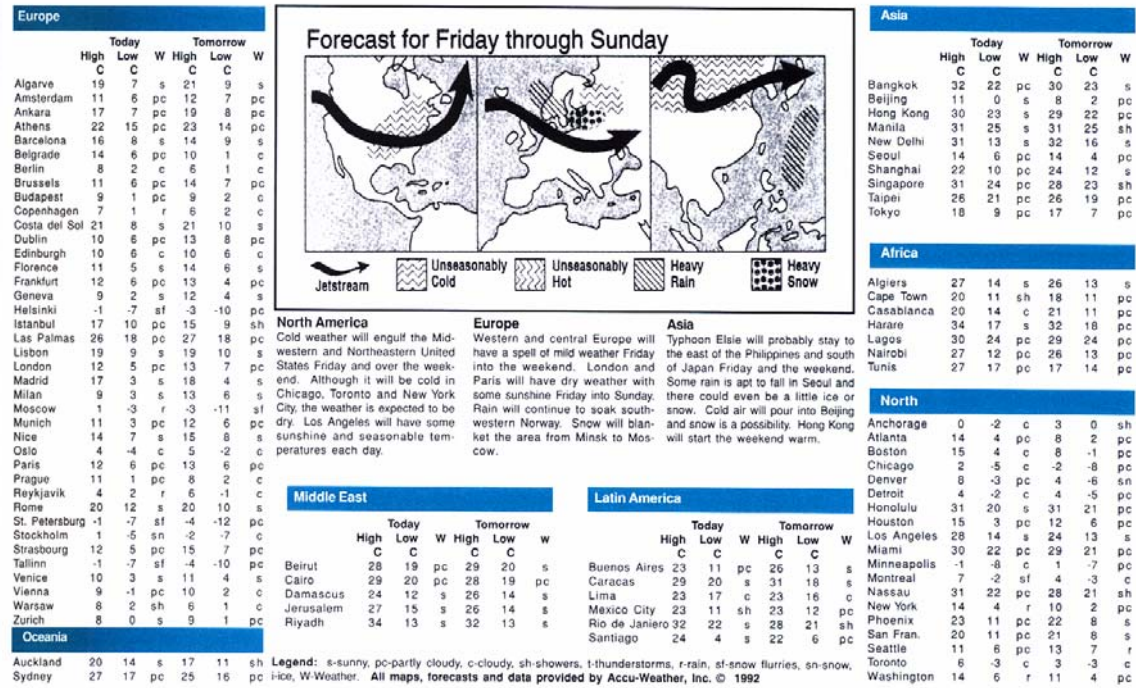
Box 4



Quantitative literacy refers to the knowledge and skills required to apply arithmetic operations to numbers found in printed materials, in contexts such as balancing a chequebook, figuring out a tip or determining the size of changes over time. The easiest quantitative task in IALS (difficulty of 225) directs the reader to complete an order form. The last line on this form says “Total with Handling.” The line above it says “Handling Charge \$2.00.” To answer correctly, the reader had to add the \$2.00 to the \$50.00 they had entered on a previous line to indicate the cost of the tickets.

Although no other quantitative tasks fell into Level 1, the survey organisers felt that people at this level would be able, at best, to perform a single, relatively simple arithmetic operation (usually addition) where both the numbers and the operation are given. People at this level were not consistently able to perform a single arithmetic operation where the operation was not stipulated or where the numbers need to be located in the document. For example, one of the Level 2 tasks on the quantitative scale asks to reader to use a newspaper weather chart (shown below) to determine how many degrees warmer today’s high temperature is expected to be in Bangkok than in Seoul (Box 5). The reader has to locate where information is found, which set of numbers to use (the today-high) and subtract one from the other.

WEATHER



This weather chart question relates to quantitative literacy but is also similar to the document literacy questions in IALS since it involves retrieving information from a table. There is in fact a considerable overlap in measurement across the three scales. In New Zealand the correlation between the scales was 0.93 between prose and document scores, 0.90 between prose and quantitative scores, and 0.95 between quantitative and document scores. It seems likely that all three scales are measuring some underlying ability in literacy, where the skills of literacy used in daily life are the same for prose as for document and quantitative problems. The scales are also clearly measuring the sorts of wider problem solving and information processing skills covered by contemporary definitions of literacy.

The Level 2 tasks in IALS, and some of the Level 1 tasks, are by no means trivial and it is not surprising that some people found these difficult to complete. Many of the people with Level 1 skills, however, could do more advanced literacy tasks some of the time, depending on their experience and the particular features of the text and the tasks. In particular, people might have been able to do familiar things, required for their jobs or home life, and yet found some of the tasks in IALS, such as reading from graphs, quite unfamiliar.¹¹ Blum, Goldstein and Guérin-Pace (2001) construct an alternative scale to that reported in the official IALS publications. They classify a person as having Level 3 literacy skills, for example, if they could answer at least one question with a difficulty level in the Level 3 range (and so on for the other levels). This produced an entirely different pattern of results. In the United Kingdom, for example, the proportion of people in Levels 1 and 2 fell from around 50% to only 3%. Similarly, Kolstad (2000) argues that the 80% probability convention used for scoring in IALS (discussed above) is essentially arbitrary and that the proportion of people judged to be in Level 1 is sensitive to changes in this probability. Using a 50% probability convention, for example, more than halves the proportion of

¹¹ Even the more obviously 'everyday' tasks in IALS are abstractions and respondents used to particular documents might struggle with slightly unfamiliar ones. Hamilton and Barton (2000), for example, point out that the bus timetable used in the IALS test is quite different from British timetables, and follows a United States format.

people in prose Level 1 in Canada, the United States and the United Kingdom (Sticht 1999).

Pryor and Schaffer (1999) make the point that literacy tests like IALS might not in fact measure many of the skills used in everyday life, since competency in these skills are based on 'field methods' or 'methods derived from context'. That is, people develop *ad hoc* methods to get by on. However, Pryor and Schaeffer do consider that the literacy skills measured by tests such as IALS are directly related to job performance when the nature of the work is sufficiently varied or changing so that the employee does not have time to develop field methods for solving the problems at hand. IALS therefore measures how adaptable people's literacy skills are to other contexts.

2.4 New Zealanders with Level 1 skills

This section provides a picture of New Zealanders who have literacy skills at Level 1: their characteristics, employment status, and the uses they make of printed information at home and at work. Since the people with skills at Level 1 on each of the three literacy scales are very similar, we concentrate here on people with skills at Level 1 of the prose literacy scale.

Level 1 is defined as a score of 225 or less, and people with skills at Level 1 had scores ranging from 56 to 225.¹² People with skills at this Level will therefore differ considerably in their ability to perform particular tasks. Men and women are represented more or less equally in Level 1, as are people from different age groups. Level of education is, on the other hand, a defining feature of people in Level 1. The highest level of education for over three-quarters of the people in Level 1 was the fifth form. Some of the older people in Level 1 had not attended secondary school at all.

A total of 19% of people in Level 1 spoke a language other than English most often at home. Many of these people may have a reasonable standard of literacy in their home language, but struggle in understanding written English. Another 21% of the people in Level 1 said they had had a learning disability.¹³ A significant proportion of people in Level 1 might therefore have quite specialised learning needs, different to those of other people with low literacy skills.¹⁴

People with literacy skills at Level 1 did read at home and many rated their own reading skills highly. Although it is hard to know how accurately people reported their own behaviours, a total of 57% said they read the newspaper every day (only 5% never read the newspaper), and 48% said they read books at least weekly (23% never read books). In addition, most people with skills at Level 1 rated their literacy skills as either excellent or good (Table 2). People who did not speak English as their main language at home or

¹² The mean score in Level 1 is 181, the median 191 and the interquartile range from 160 to 212.

¹³ Compared to other estimates of the prevalence of learning disabilities in New Zealand (Health Funding Authority and Ministry of Health 1998) the reports of learning disability in IALS seem slightly high. On the other hand, the IALS background questionnaire did not ask whether respondents had an intellectual disability. Since people with an intellectual disability would almost certainly have literacy skills at Level 1, about 4% of people with Level 1 literacy skills will have an intellectual disability (based on prevalence data from the Health Funding Authority and Ministry of Health 1998).

¹⁴ The teaching of English as a second language is conducted quite differently from the teaching of adult literacy. Dyslexia is by far the most common learning disability. It is thought to be caused by a neurological impairment which specifically interferes with the acquisition of literacy skills but does not directly impede learning in other areas. The orthodox view is that people with dyslexia need to be taught in different ways than 'ordinary' poor readers, although this has been challenged, e.g. by Fowler and Scarborough (1993). Chapman, Tunmer and Allen (2003) discuss learning disabilities in the context of the New Zealand IALS results.

who reported having a learning disability were much more likely to rate their literacy as moderate or poor, especially their reading skills.

Table 2 – Self-rated literacy skills of people at Level 1 on the prose literacy scale

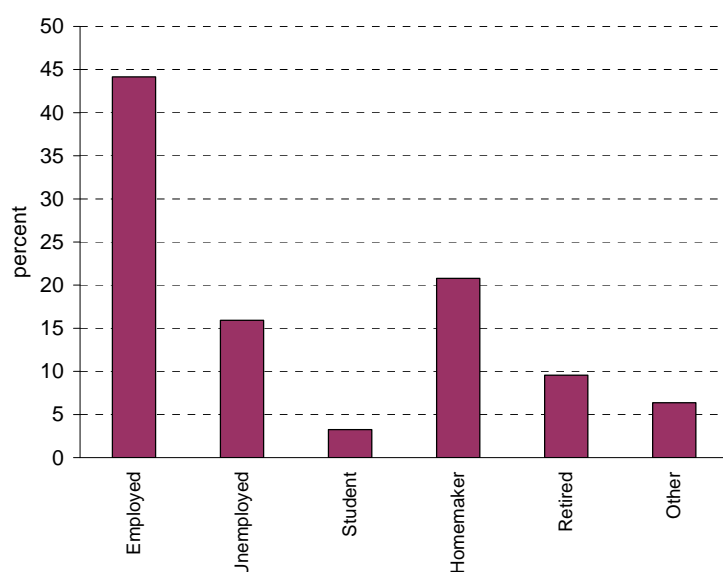
How would you rate your ___ skills in English needed in daily life?

	Reading	Writing	Maths
Excellent	26%	14%	12%
Good	44%	44%	45%
Moderate	21%	28%	31%
Poor	9%	14%	12%

Source: New Zealand IALS data.

Of people with literacy skills in Level 1, and who were aged 22 or over, 44% were employed and 15% were unemployed. A further 40% of people in Level 1 were not in the labour force (Figure 4). Of people who were not currently working (either unemployed or not in the labour force), a quarter had worked at some time in the previous year. Employment information in this section is restricted to people aged 22 or over, as many younger people would still have been in full-time or part-time education

Figure 4 – Labour force status of people aged 22-65, at Level 1 on the prose literacy scale



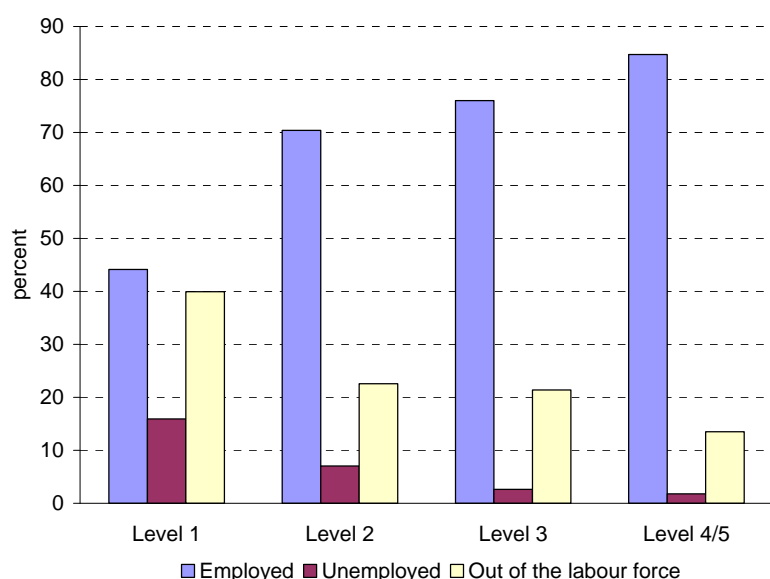
Source: New Zealand IALS data.

People in Level 1 who were employed or who were retired had a significantly higher mean score on the prose scale than people who were unemployed, students, homemakers or otherwise out of the labour force.

Figure 5 shows that there is a considerable rise in the probability of employment between people with literacy skills at Level 1 and those with literacy skills at Level 2: a rise which is greater than that between Levels 2 and 3 or between Level 3 and Level 4/5. Correspondingly, there is a marked decrease between Levels 1 and 2 in the probability of being unemployed or out of the labour force. There is also an association in New Zealand

between literacy level and income: full-time workers with good literacy skills were much more likely to have high incomes than full-time workers with Level 1 skills.

Figure 5 – Labour force status of people in Levels 1 to 5 on the prose literacy scale



Source: New Zealand IALS data.

Workers with Level 1 literacy skills can be found in almost all occupational groupings (Table 3). They are much more likely than people with higher literacy skills to be agriculture and fishery workers (e.g. farmers, gardeners, foresters and fishermen), plant and machine operators (e.g. welders, sewing machinists, meat processing workers and taxi drivers) and, especially, to work in elementary occupations (e.g. cleaners, couriers, labourers and rubbish collectors).

Table 3 – Employed people at Level 1, and Levels 2-5, on the prose literacy scale by occupational grouping

	Level 1 (%)	Levels 2-5 (%)
Armed Forces	0.0	0.1
Legislators, Senior Officials and Managers	6.8	13.1
Professionals	3.0	13.0
Technicians and Associate Professionals	5.7	12.4
Clerks	6.7	15.4
Service Workers and Shop and Market Sales Workers	11.6	14.3
Agricultural and Fishery Workers	14.6	7.9
Craft and Related Trades Workers	10.2	9.1
Plant and Machine Operators and Assemblers	24.9	11.2
Elementary Occupations	16.6	3.5

Source: New Zealand IALS data.

Turning to industry rather than occupational groupings, workers with Level 1 literacy skills were twice as likely as people with higher literacy skills to be part of the manufacturing industry. They were also more likely to work in the agricultural, mining and transport sectors.

A good proportion of Level 1 workers report that they perform literacy-related tasks daily (Table 4). A quarter of Level 1 workers, for example, said that they read letters or memos every day. A third said they use mathematics to measure or estimate the size or weight of objects, although this may relate only to tasks such as weighing objects. Many people in Level 1, however, perform no, or very few, literacy-related tasks as part of their jobs. It might be expected that the Level 1 workers who perform literacy tasks at work most often would have the highest literacy scores but, interestingly, this was not the case. There was in fact no consistent pattern relating frequency of tasks to scale scores and most the differences were not statistically significant.

Table 4 – Literacy aspects of people’s jobs, for people in Level 1 of the prose literacy scale

	Every day (%)	A few times a week (%)	Once a week (%)	Less than once a week (%)	Rarely or never (%)
Read or use as part of main job:					
Letters or memos	24	12	6	10	48
Reports, articles, magazines, journals	12	13	9	10	56
Manuals, reference books, catalogues	12	13	11	11	53
Diagrams or schematics	26	5	10	7	52
Bills, invoices, spreadsheets, budgets	13	6	8	6	68
Directions for medicines, recipes etc	15	9	9	9	59
Write or fill out as part of main job:					
Letters or memos	15	7	5	8	65
Forms, bills, invoices, budgets	16	4	6	9	65
Reports or articles	8	3	7	8	74
Estimates or technical specifications	6	4	5	6	78
Use mathematics as part of main job to:					
Measure or estimate the size or weight of objects	35	9	3	7	46
Calculate prices, costs or budgets	12	8	5	9	66

Source: New Zealand IALS data.

Workers in IALS were asked to rate their reading skills, writing skills and mathematical skills as they applied to their jobs. Almost exactly the same pattern of answers was given to the ‘work’ self-rating as was given to the ‘life’ self-rating in Table 2 above. Most people with skills at Level 1 rated their literacy skills for their job as either excellent or good. In part, this may be because many people had no need to use more than very basic reading, writing or mathematical skills in their work, as Table 4 indicates. Again, people who did not speak English as their main language at home or who reported having a learning disability

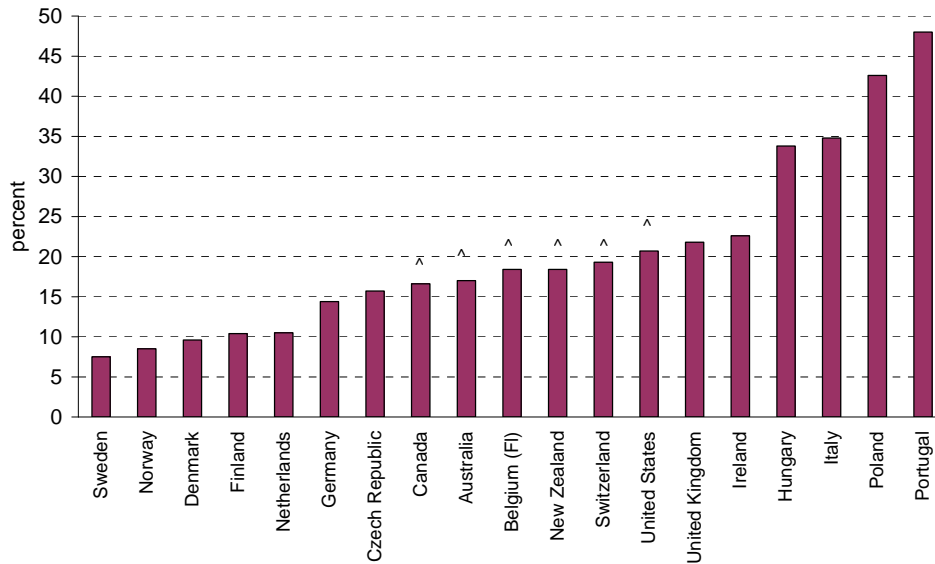
were much more likely to rate their literacy skills at work as moderate or poor, especially their reading skills.

Respondents were also asked to what extent their reading skills, writing skills and mathematical skills limited their job opportunities, for example in advancement or in getting another job. Almost two-thirds of workers thought that their reading, writing or maths skills were not at all limiting their job opportunities, while only around 7% thought their skills, or lack of them, were greatly limiting their job opportunities.

2.5 International comparisons

Countries differ markedly in the prevalence of Level 1 literacy skills, as Figure 6, Figure 7 and Figure 8 show.¹⁵ The proportion of New Zealanders at Level 1 was more than double that of the best performing countries but less than half that of the poorest performing countries. Given the high correlation between scores on each of the three scales it is not surprising that the relative positions of countries change little between the prose, document and literacy scales. The best performing countries, consistently, were the four Nordic countries – Sweden, Denmark, Norway and Finland – together with the Netherlands, Germany and the Czech Republic. The poorest performing countries were Hungary, Poland, Italy and Portugal. New Zealand was part of a group of countries, mainly English-speaking, in the middle of the distribution. The proportion of the population with Level 1 literacy skills differed little between these countries.

Figure 6 – Prose literacy in IALS: percent of population aged 16-65 at Level 1, by country



^ = not significantly different from New Zealand

Source: OECD and Statistics Canada (2000).

¹⁵ Results from 19 countries are reported here. Chile and Slovenia, which took part in IALS, are excluded here as they are not in the OECD. Total country results, rather than results for different language or geographical groups, are reported for Canada, Switzerland and the United Kingdom.

results from IALS, should urge caution in making judgements about inter-country differences in literacy skills.

2.6 Conclusion

According to the IALS survey, around 1 in 5 working-age New Zealanders (currently about 530,000 people) has Level 1 literacy skills. People with Level 1 skills will differ considerably in their ability to perform particular tasks. Most, however, are able to read, and to locate and use information from a straightforward text, but cannot consistently perform more difficult or sophisticated tasks especially those involving unfamiliar types of texts. Many can perform tasks which IALS rated at Levels 2, 3, 4 or even 5, but cannot do these consistently.

Most New Zealanders with Level 1 literacy skills have completed the bare minimum of schooling. This relationship is likely to be complex, though, with poor literacy both the cause and the result of low achievement at school, and with schooling and literacy both influenced by common factors such as innate ability. Some of the reading problems experienced by people in Level 1 are almost certainly related to language barriers, rather than to literacy issues: 19% of the people in Level 1 did not use English as their main language at home.

In 1996, when IALS was conducted, 45% of working-age New Zealanders with Level 1 literacy skills were employed either full-time or part-time. Most were employed as either agricultural and fishery workers, plant and machine operators, or in elementary occupations. Looking only at simple correlations, people with Level 1 skills were much less likely to be employed than people with higher skills and people who were employed tended to have lower earnings.

The introduction to the official IALS report states that Level 3 literacy skills are “considered a suitable minimum for coping with the demands of everyday life and work in a complex, advanced society”. A host of commentators use this comment, unsubstantiated anywhere in the body of the IALS report, to identify everyone with Level 1 and 2 skills as being unable to function in a knowledge economy and therefore, by extension, in need of literacy training. In New Zealand, about 45% of the working-age population are in either Level 1 or 2; in France this figure was as high as 75%. The suggestion that this whole portion of the population is not coping in society is extraordinary, not the least because, in all countries, most people at Levels 1 and 2 considered that their literacy skills were good or excellent, in the context of both their jobs and their daily lives. In any event, the question which the current paper addresses is not whether people are coping with the demands of everyday life and work but whether their participation and productivity would improve with increased literacy skills, and this is covered in the following Chapters.

The international comparisons in IALS should be viewed with a degree of scepticism. At face value, however, New Zealand does not stand out amongst OECD countries as having particularly poor literacy skills. The proportion of people in New Zealand with Level 1 skills is similar to the proportion in other English-speaking countries such as Australia and the United Kingdom, and lies in the middle of the range of OECD countries. This does not mean, though, that there is no capacity for significant improvements in adult literacy in New Zealand.

3 An introduction to the economic effects of increased literacy

The key factors in any link between literacy skills and economic performance are participation in paid work and workplace productivity. The argument is as follows. Firstly, people with better literacy skills are more likely to be in the workforce. Secondly, workers with greater literacy skills can do their jobs more effectively, or need less supervision or direction, are better able to adapt to new technologies, are likely to make fewer mistakes at work and work better in teams, are less likely to have workplace accidents, are less likely to be absent from work, probably have better morale, and so on. There are a number of different ways of proving (or trying to prove) this argument.

3.1 Country-level studies

If people with better literacy skills are more productive, and these benefits outweigh the costs of literacy training, then an increase in literacy will raise the level of output of the country, that is, it will raise GDP per capita. We can test for this effect directly, by comparing the level of, or growth in, GDP per capita amongst countries with different levels of literacy in their population, taking account of other relevant differences between countries. These sorts of macro-economic cross-country growth regressions are discussed in Chapter 4. This Chapter finds that there is little cross-country evidence to suggest that increased literacy at an aggregate level goes hand-in-hand with increased growth.

3.2 Individual-level studies

Productivity increases can also be measured at the individual level. Studies look at whether people with better literacy skills are more likely to be employed than people with poorer literacy skills. Also, if workers with better literacy skills are paid more, on average, then this suggests they are more productive in their jobs. The studies reviewed in Chapter 5 show that this is the case: people with better literacy skills are more likely to be employed, and to earn more, than people with poorer literacy skills, even when taking account of other factors which affect work performance. Differences between people in terms of literacy – however these differences come about – do matter for productivity.

The studies reviewed in Chapter 5, however, do not show how easy or how difficult it might be to improve people's literacy skills and how much this would cost. The benefits of better literacy, in terms of productivity, need to be weighed up against the costs of literacy training. These costs include the direct costs to individuals, firms and the government (employing teachers, providing materials, hiring facilities, etc) as well as the opportunity cost of foregone labour or foregone leisure time. Literacy training will also have a particular success rate, in terms of the proportion of students who complete courses and who end up with improved literacy skills as a result. This success rate also needs to be taken into account. So, for example, a relatively inexpensive programme with a high success rate, and which markedly improves literacy, might be a good investment because the benefits outweigh the costs; an expensive programme, from which only a few people come out with slightly improved literacy, might not be. Chapter 6 therefore looks at research evidence on the impact of literacy programmes.

The impact of literacy programmes can be considered in two ways. Firstly, there is a question of how effective literacy programmes are in improving people's literacy. If programmes are effective in raising literacy then we can plausibly assume, given the results of Chapter 5, that they will also increase people's employment and their earnings. Labour market outcomes can be measured directly, though, and Chapter 6 also looks at whether, and by how much, literacy programmes increase people's employment chances and earnings. Chapter 6 shows that there have been very few rigorous studies which look at the impact of literacy programmes. Amongst those which have been conducted, there is some evidence that literacy programmes have an impact on earnings but little evidence that they have an impact on measured literacy skills.

Suppose that a literacy programme is shown to improve the employment prospects or earnings of participants. Would this be evidence of a positive effect on GDP? It would certainly suggest this, but some caution is still required. A small-scale programme may not have the same effects when it is rolled-out to a much larger population. Perhaps more importantly, programmes might have other, less-beneficial, effects on 'innocent bystanders', that is, people who do not participate in the programme but whose employment or earnings are affected by those people who do. These are frequently described as 'displacement effects' in the literature on labour market programmes (see, for example, Solow 1998; Heckman, Lalonde and Smith 1999a, ch.9; and Heckman, Lochner and Taber 1999b). In some circumstances, for example, the jobs gained by programme participants may be at the expense of other workers, at least in the short term. While it is very difficult to estimate these effects, they should at least be borne in mind when considering whether a programme would have benefits to the country as a whole.

3.3 Firm-level studies

The discussion above refers only to the benefits of literacy which accrue to individuals. This might underestimate the productivity benefits of increased literacy because some of the benefits of productivity gains might accrue to firms (or, more accurately, to the owners of firms) rather than just to their employees. A 10% increase in worker productivity, for example, might be rewarded by a 5% wage increase, with the rest of the benefit accruing to the firm, or to their customers.

Studies have looked at whether firms with more skilled employees are more productive or more profitable than firms with less skilled employees. The National Skills Task Force (2000), for example, refers to a number of studies comparing matched samples of manufacturing firms in different countries, where differences in productivity are related to differences in skills. These studies focus on intermediate and higher level skills, however, rather than literacy skills. There do not appear to be any studies which compare firms according to their levels of basic literacy skills. Some studies have also looked at the effects of particular training programmes on firm productivity, as is described, for example, in Ananiadou, Jenkins and Wolf (2003), Dearden, Reed and Van Reenan (2000) and the Office of Training and Further Education (1998). Some of the training included in these studies may be literacy-related. However, data sets typically do not distinguish between types of training, and so do not allow for differential analyses of literacy-related as opposed to other types of training.

Since there are no rigorous quantitative studies of the benefits of literacy training to firms, the following chapters make no further reference to firm-level evidence. The findings of qualitative studies are often used, however, to suggest some of the benefits of literacy training. A common finding, for example, is that firms which have introduced literacy

programmes in their workplaces report benefits from these programmes. Workbase (2002), for example, presents four New Zealand case studies of workplaces which have introduced literacy programmes for their employees. These firms report a number of benefits including a decrease in error rates, improved levels of participation in team meetings, growth in employees' confidence, and an improved ability to work more flexibly. A review of the initial achievements of the Workplace Literacy Fund reports similar benefits (Skill New Zealand 2002). Bloom, Burrows, Lafleur and Squires (1997b) survey 41 Canadian firms which offered literacy training to their employees. Twenty-one of these companies provided qualitative feedback on the benefits of literacy training to their organisations, which included better team performance, improved labour-management relations, a reduced error rate and increased output of products and services. Similarly, respondents in a survey of 30 Australian firms (Pearson 1996) report many benefits, including productivity benefits, from workplace literacy training. In particular, 70% of the managers and supervisors interviewed consider that their workplaces had made perceptible cost savings which were directly linked to language and literacy training at work.

In other surveys, firms identify the costs they face as a result of the poor literacy skills they perceive amongst their employees (whether or not these are being addressed). In a much-cited study, the Adult Literacy and Basic Skills Unit (1993) asked employers in the United Kingdom to identify these costs. The ALBSU estimated that poor literacy skills cost each company employing more than 50 employees an average of £165,000 every year in poor quality control, lost orders and poor communication. Grossing this up to a national level, the report estimated that poor literacy skills cost UK industry more than £4.8 billion a year. More recently, the ALBSU (now renamed the Basic Skills Unit) estimated that poor literacy skills cost the Welsh economy, which is considerably smaller than the New Zealand economy, more than £558 million a year (Basic Skills Agency and Affairs 2002).

Knowing that firms can identify literacy-related problems, and that those which have sponsored literacy programmes for their workers have been content with the experience, are by no means trivial findings. However, it would be unwise to treat these as proof of the benefits of literacy training and their results are not generalisable to all other firms. For example, only 15% of firms surveyed in the ALBSU study could provide an estimate of the costs of poor literacy skills. Robinson (1997) is very critical of some of this research and says that that the £4.8 billion estimate made by the ALBSU is "one of the least reliable figures in the whole debate" (p.24).

3.4 Analyses of trends in skill requirements

Basic literacy skills are required in almost all occupations (Chapter 1). In addition, it is often claimed that literacy skills have been increasingly required in the workplace and that this trend is likely to continue in the future. If this is the case it suggests that improvements in literacy are necessary for a thriving modern economy in the future.

There are two aspects to skill changes over time: changes in the occupational structure of the workforce, and changes in the skills required for particular occupations. Regarding the first of these aspects, studies tend to find that the proportion of the workforce employed in manual occupations has been decreasing and the proportion working in more highly-skilled occupations has been increasing. In New Zealand, the Department of Labour (2003) examines the growth in occupational groupings between the 1991 Census and the 2001 Census. The occupational groupings which had the lowest growth tended to be those which, according to IALS, contain the highest concentrations of workers with Level 1

literacy skills (section 2.4). Between 1991 and 2001, for example, agriculture and fisheries workers, craft and trades workers, and workers in elementary occupations, declined as a proportion of the workforce. Professionals and managers, on the other hand, increased as a proportion of the workforce. These trends should not be overstated, however, and there will still be a demand in the future for lower-skilled occupations. In fact, some of the fastest growing individual occupations between 1991 and 2001 were sales assistants, caregivers, couriers and cleaners.

The other aspect of skill changes is the trends in skill requirements within particular jobs. A common view is that new technology and international competition have forced workplaces to change, and to introduce features such as computerised processes, team-based organisation, an emphasis on problem solving at all levels, and compliance with international quality standards. These changes are believed to have increased the demand for literacy skills in the workplace. While these assertions are quite plausible, little evidence exists to demonstrate them. Some research looks directly at skill changes within particular jobs, as discussed by the National Skills Task Force (2000), but none of this research relates to literacy skills in particular. Using Canadian IALS data, both Boothby (1999) and Krahn and Lowe (1998) examine the literacy tasks which people undertake in various occupational groupings, but IALS data does allow for an examination of individual occupations and does not show changes over time. The following chapters make no further reference to analyses of trends in skill requirements.

3.5 The following chapters

For the purposes of determining whether improved literacy would be good for economic performance, the best studies which have been conducted are cross-country growth studies, studies of individual returns to literacy skills, and evaluations of specific literacy programmes. These three types of studies are discussed in detail in Chapters 4, 5 and 6 respectively.

Of these, the strongest evidence comes from studies of individual returns to literacy skills. Studies consistently find that people with better literacy skills are more likely to be employed, and to earn more, than people with poorer literacy skills, even when taking account of other factors which affect work performance. However, while there is good evidence for the benefits of literacy (Chapter 5) there is little evidence for the benefits of literacy *training* (Chapter 6) and it is unclear how effectively, and how cost-effectively, literacy can be raised amongst the adult population.

4 Macroeconomic studies of aggregate returns to literacy skills

4.1 Cross-country growth studies

This chapter looks at whether cross-country studies of economic growth provide evidence that increasing literacy skills would be good for the economy. It is one of three chapters looking at the economic effects of increased literacy skills (these were introduced in Chapter 3).

Cross-country growth regressions relate GDP growth in various countries, or the level of GDP at a particular time, to various features of the countries such as their rate of savings, growth in population, size of government, and even the degree of religiosity in the country (Barro and McCleary 2003). In a very recent study, Coulombe, Tremblay and Marchand (2004) use literacy as an explanatory variable in their cross-country growth regression, and find that the average literacy score in a country is positively associated with economic growth. This result appears extremely promising, and is discussed below, but it is first necessary to rehearse a little of the theory of economic growth.

Human capital is a key part of contemporary theories of economic growth, of which there are two main types: neo-classical growth models and endogenous growth models. In an influential and much-cited paper, Mankiw, Romer and Weil (1992) give human capital equal billing with physical capital, labour and technology in an augmented neo-classical growth model.²¹ In this model, the long-run level of GDP per capita in a country is determined by the proportion of GDP the country saves (and therefore invests in physical capital), the proportion it invests in human capital, and the rate at which its population grows. The higher the proportion of GDP saved, or invested in human capital, the richer the country. The higher the rate of population growth, the poorer the country. These factors affect the long-run steady state level of GDP per capita, and also the rate at which a country ‘converges’ to this steady state level over time. Only the fourth factor in the model, technology, affects long-run *growth* in GDP per capita – a country’s steady state level will grow each year as technology (knowledge, for example, about production methods) increases.

Neo-classical growth models treat human capital as an investment good in much the same way as a farmer might consider investing in tractors. And, just as there are diminishing returns to a farmer buying more and more tractors, these models hold that there are diminishing returns to human capital accumulation. Suppose a country devotes a fixed 10% of its GDP each year to accumulating human capital. More human capital means the country can produce more output, which means that more is spent on human capital, which leads to more output, and so on. However, at each iteration the country gets less and less return for its additional investment in human capital, until the process grinds to a halt some years later at the steady state level of human capital investment (and the steady state level of GDP). If the investment rate were to increase from 10% to 12% the process of human capital accumulation and increases in GDP would crank up again and continue until the country reaches a new steady state of human capital investment (and GDP).

²¹ Previous to this, neo-classical growth models in the tradition of Solow (1956) and Swan (1956) did not explicitly refer to human capital, and had as factors only capital, labour and technology.

Endogenous growth models, on the other hand, make much more of the role of human capital, and consider the accumulation of ideas and skills to be quite different from the accumulation of tractors. In particular, they assume constant or increasing returns to investments in human capital. Consider again the country which devotes 10% of its GDP each year to accumulating human capital. As the country gets richer it devotes more to human capital, which in turn continues to increase output, and so on, indefinitely. In endogenous growth models, human capital accumulation leads to a sustained increase in GDP, that is, to sustained economic growth in the long term. Increasing investment in human capital to 12% of GDP would give an even bigger boost to this continuing cycle of growth. Dowrick (2003) discusses features of endogenous growth models which generate constant or increasing returns to human capital investments.

Temple (1999) provides an excellent review and discussion of empirical work on economic growth. Cross-country growth regressions constitute a relatively new field of study in economics, having only been conducted over the past 15 years. Studies typically try to explain countries' growth experiences from 1960 onwards, either using a large sample of countries or, less often, a sample of OECD countries. Some studies use a formal framework derived from one of the theoretical growth models as discussed above but others use a more or less *ad hoc* specification. Almost all cross-country studies include some measure of human capital in their regressions, such as school enrolment rates or the average years of schooling in the working-age population. Hanushek and Kimko (2000) and Barro (2001) depart from the norm by using the results of international student tests of achievement conducted from the 1960's to the 1990's.

4.2 Literacy in cross-country regressions

Coulombe *et al* (2004) perform cross-country growth regressions using literacy scores, obtained from IALS, as their measure of human capital. The study includes those 14 OECD countries which participated in the 1994 and 1996 rounds of IALS. Coulombe *et al* use a specification which is closely based on that tested in Mankiw *et al* (1992), the main difference being that Coulombe *et al* look at growth in GDP over five-year periods between 1960 and 1995 (Mankiw *et al* look at growth over the whole period between 1960 and 1985). For each country, growth in GDP over these five-year periods is modelled as a function of GDP at the beginning of the period, the mean rate of savings over that period, an indicator of literacy over that period, and the mean fertility rate (which performs a similar role to population growth) over that period.

Leaving aside the issue of the validity of IALS comparisons (see section 2.5), the availability of historical literacy data presents an obvious problem for this analysis since IALS has only been conducted once. Coulombe *et al* therefore assume that the mean literacy score for the 51-59 age group in IALS in 1994 would have been the same for this cohort 34 years earlier in 1960, when the cohort was aged 17-25, and they take this 17-25 age group score to be the literacy indicator in the model for the period 1960-65. Similarly, they use the mean literacy score for the 46-54 age group in IALS as the literacy indicator for the period 1965-70, and so on. This use of synthetic cohorts does involve some brave assumptions, not least that people's literacy skills persist over quite long periods of time, neither increasing nor decreasing as they get older. This may not be such a problem for the analysis if any loss or increase in literacy over time occurs in a similar fashion for each country, but we have no knowledge about whether or not this is the case.

Regardless of the difficulties involved in using IALS literacy scores it must be stressed that literacy is included in this model, not for its own sake, but as a proxy for the proportion of

GDP spent on human capital accumulation. This latter variable appears in the augmented neo-classical model but is very difficult to measure directly. Mankiw *et al* use the proportion of the population enrolled at secondary school as their proxy measure, while other studies use average years of schooling of the adult population. These measures are clearly imperfect but are reasonable proxies if the relative position of countries on the proxy measure is more or less the same as their relative position with respect to the proportion of GDP spent on human capital. Coulombe *et al* are testing the explanatory power of the neo-classical growth model when using literacy skills as a proxy for the human capital investment rate rather than enrolment rates or years of schooling. This is in response to a number of studies which find that schooling-based proxies for human capital are statistically insignificant, or have a negative sign, when five-year periods of growth are analysed, or when the cross-country sample consists only of OECD countries, eg Islam (1995).

Coulombe *et al* find that literacy scores, constructed as described above, are positively and significantly associated with the rate of convergence to a country's steady state level of GDP. This is the case regardless of whether prose, document or quantitative literacy is used in the regressions. Literacy is also a determinant of the steady state level of GDP. A country that achieves literacy scores one percent higher than the average is estimated, all else equal, to reach a steady state with around 1.3% higher GDP per capita.

These findings do *not* show, however, that literacy skills in and of themselves are good for the economy. As discussed above, the authors are not trying to isolate the effect of literacy skills on growth but rather to test the use of literacy as a proxy for human capital accumulation. They conclude that literacy performs well in this role:

The central result of the paper is that direct measures of human capital based on literacy scores outperform measures based on years of schooling in growth regressions of a sub-set of OECD countries. Furthermore, it appears that, overall, 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 key economic policy implication that comes out of this result is that, in contrast to previous findings... human capital accumulation matters for the long run wellbeing of developed nations. (p39).

4.3 Conclusion

The aggregate data used in cross-country growth regressions kind is necessarily crude and gives little helpful guidance on detailed policy questions. In particular, some cross-country regressions show that the rate of human capital accumulation is important for economic performance but offer little advice on what to invest in (basic literacy? PhDs? learning Spanish?). The study undertaken by Coulombe *et al* (2004) suggests that literacy is a reasonable proxy for human capital accumulation in cross-country growth regressions but it may be that other aspects of human capital, correlated with literacy scores, actually drive economic performance. Microeconomic studies provide a more detailed investigation of these issues and we turn to such studies in the next chapter.

5 Individual returns to literacy skills

5.1 Introduction

This chapter looks at whether studies of individual differences in literacy and labour market outcomes provide evidence that increasing literacy skills would be good for the economy. It is one of three chapters looking at the economic effects of increased literacy skills (these were introduced in Chapter 3).

The IALS results presented in section 2.4 above show that New Zealanders with higher literacy skills earn more, on average, than people with lower skills and are more likely to be employed. A whole range of job-relevant skills, however, and not just literacy, affect a person's earnings and employment. It may be that some of these other skills are associated with both literacy and earnings (or employment) and that these associations explain some, most, or all, of the apparent link with literacy. In other words, employers value people with literacy skills because these tend to go hand-in-hand with other valuable skills. Suppose, for example, that people with good literacy skills tend, for whatever reason, to be better at working in teams than people with lower literacy skills. Then at least part of the reason why people with higher literacy skills are paid more may be because they are believed to be better team members. Simply increasing a person's literacy skills through participation in a training course, for example, without also improving their other work habits, might have much less of an effect on their earnings than expected, or indeed have no effect at all.

A number of studies have looked at the relationship between literacy and earnings (or employment), controlling for various potentially confounding factors. The results of these studies are presented in Appendix 1 and are discussed below. Most of these studies use data from IALS or similar literacy surveys conducted prior to IALS such as the 1992 National Adult Literacy Survey (NALS) in the United States. Other studies take their data from longitudinal studies, which follow participants over a period of time.

5.2 Literacy and earnings

5.2.1 Concepts and methods

Empirical studies of literacy and earnings typically adopt the following model specification:

$$\text{Equation 1. } \log w = r + ax + bx^2 + cy + dz... + u$$

where w is a measure of earnings (either annual, weekly or hourly earnings), l is a measure of literacy skills (e.g. the prose score from IALS), x is age or years of work experience, and the other control variables y , z , etc include factors such as ethnicity, education, marital status, region, occupation/industry, disability status, immigration status and language spoken at home. The variable u is an error term representing unobserved factors other than s , x , y , z , etc., that affect w . Since log earnings are the dependent variable, coefficients (r , a , b , etc.) can be interpreted as the proportionate effect on earnings of a unit increase in the corresponding variable. In particular, the coefficient r can be interpreted as the percentage difference in earnings, all else remaining equal, between

workers who differ by one 'unit' of literacy, for example one point on an IALS literacy scale.

The most interesting question about the choice of control variables in Equation 1 is whether or not to include measures of educational attainment. One view is that literacy is largely the result of education, although education also teaches other job-relevant skills and specialised knowledge. The effects of literacy on earnings should in this case be assessed by controlling for education, because education is a proxy for the *other* skills and knowledge learned in school, which might be correlated with literacy. On the other hand, if a child's early literacy skills shape their future schooling attainment, and these literacy skills also persist into adulthood, then the full effects of literacy should be estimated by excluding schooling from the earnings regression. The truth, as usual, is probably somewhere in between these two extremes: literacy is likely to be both a cause and an effect of education. It is useful, therefore, to consider earnings equations which control for education, and those which do not control for education, as placing some bounds on the impact of literacy skills on earnings. Also, for the purposes of this report, it is important to consider the differences between improving a person's literacy as an adult and improving their literacy as a primary school student.²²

5.2.2 Results of studies

The studies presented in Appendix 1 show that literacy has a persistent, positive and statistically significant association with people's earnings per hour, or per week. People with greater literacy skills are paid more, on average, than people with weaker literacy skills, even after taking account of other observed factors. Studies which are based on IALS, or similar literacy surveys, find that the measure of literacy included in the regressions makes little difference: using either prose, document or quantitative literacy, or the average of the three, gives a similar result.²³

Those studies which both do and do not control for educational attainment find that including education as a control variable reduces the earnings premium associated with literacy. This suggests that literacy has both an indirect effect (since people with better literacy skills stay in formal education for longer) and a direct effect on earnings. Some studies also find a positive association between literacy and the *quantity* of work people do, e.g. the number of weeks they work in a year.

Using the New Zealand IALS data, Maré and Chapple (2000) show that a 10% increase in the average of the three literacy scores raises male annual earnings by 4.0% and female annual earnings by 5.1%.²⁴ To look at the effect on earnings per unit time, Maré and Chapple add controls for the normal hours each person works per week, weeks worked during the previous year, and whether people work full-time or part-time. They find, using these controls, that a 10% increase in literacy score increases male and female earnings by 5.0% and 3.2% respectively.

²² If the aim of policy is remedial, that is to improve literacy amongst adults, then it is too late to resurrect people's school careers and the earnings benefits of increased literacy are best estimated by controlling for past schooling. However, if the aim of policy is to improve literacy in children's formative years then the effects of this increase in literacy might well include the flow-on effects at school. It is therefore more appropriate to estimate earnings benefits without controlling for schooling.

²³ Some studies do treat literacy and numeracy as distinct skills. However, when they are included together in the same regression, as in Charette and Meng (1998), the coefficient on one of literacy or numeracy is usually driven down to an insignificant level. This is not surprising since these measures of literacy are, at least in IALS, highly correlated.

²⁴ In contrast to the other studies based on IALS or similar surveys, Maré and Chapple use the log literacy score as their dependent variable. Their coefficients therefore represent the percentage increase in wages associated with a percentage increase in literacy score.

Also using IALS data, Denny, Harmon and O'Sullivan (2004) calculate the earnings benefits of literacy in 17 countries, including New Zealand. In New Zealand, a 10 point increase in the average literacy score in IALS is associated with a 2.4% increase in hourly earnings. Results differ considerably between countries, from a return of 1.3% in Germany to 3.3% in the Netherlands. Results for New Zealand were in the middle of this range. Blau and Kahn (2001) also find that the earnings benefits of literacy vary by country, although their sample does not include New Zealand. In most of the studies in Appendix 1, results differ between men and women although no obvious or consistent pattern emerges. The benefits of literacy also appear to change over time. Murnane, Willet and Levy (1995), for example, follow two cohorts of young people in the United States, separated by eight years. They find that the earnings premium associated with basic reading and mathematics skills, measured in the last year of high school, was much greater for the most recent cohort than for the earlier one.

While they vary across studies, countries and times, the results of the different studies are still fairly consistent. Across the studies, a 10-point increase in literacy, on the 500 point scale used in cross-sectional literacy surveys, results in an increase in earnings of around 1 to 5%. A 3% earnings return to a 10 point increase is a reasonable, middle-of-the-road assumption to make. Expressed in a different way, a one standard deviation increase on a literacy test results in an increase in earnings of around 4% to 20%.²⁵ By way of comparison, a year of schooling is typically associated with an earnings increase of around 7 to 10% a year.

As equation 1 makes clear, studies typically model a linear relationship between log earnings and literacy, so that 10 point increase in literacy score will necessarily have the same percentage effect on earnings at high levels of literacy as at low levels. Those studies which do test for nonlinearity, however, report a variety of results. Maré and Chapple (2000) look at whether literacy has a significantly larger earnings elasticity for people with low literacy skills but could find no support for this hypothesis. However, their log-log specification does imply that a 10-point increase in literacy score at low levels of literacy will be more highly rewarded than a 10-point increase at high levels of literacy.²⁶ Rivera-Batiz (1990) finds that a quadratic term involving literacy has a negative sign (indicating a stronger effect at low levels of literacy) but that this is only marginally significant. Denny *et al* (2004) allow for non-linearity in their results by using dummy variables for each quintile of the IALS score distribution instead of the literacy score itself. They find that in New Zealand the biggest increase in earnings comes from moving from the first to the second quintile of IALS score (i.e. at low levels of literacy). Other countries have different patterns of returns, however. In Great Britain, for example, the biggest jump in returns comes with moving from the fourth to the fifth quintile of literacy score.

Lee and Miller (2000) and McIntosh and Vignoles (2001) look specifically at the difference in earnings between people at various levels of literacy in IALS, although most of the coefficients reported in both these studies are not statistically significant, and should therefore be treated with caution. Lee and Miller report, using Australian data, that the biggest increase in earnings for men comes with moving from Level 1 to Level 2, but that the biggest increase for women comes with moving from Level 4 to Level 5. McIntosh and Vignoles report, for the United Kingdom, that the earnings premium for being at Level 2 of the prose literacy scale compared to Level 1 is 11.5% for men and 14% for women. The premium for being at Levels 3-5 drops for men to 9.5% but grows to 19.2% for women.

²⁵ Standard deviations on IALS-type tests typically range from 40 to 60 points, but the range given here also includes the results of longitudinal studies which use different types of literacy tests.

²⁶ A 10-point increase from 100 points (a low score) is a 10% increase; a 10-point increase from 400 points (a high score) is only a 2.5% increase.

In some ways, though, it makes little sense to worry about whether the effects of literacy gains are higher at the bottom of the distribution than at the top. Osberg (2000) makes the point that a 10-point increase, or a 10% increase, refers to the literacy score rather than to literacy itself (the underlying concept). Literacy scores in IALS are essentially ordinal, not cardinal, numbers. A person with a higher score can be considered more literate than one with a lower score, but it is not possible, or meaningful, to say how much more literate they are.

5.3 Literacy and employment

5.3.1 Concepts and methods

A number of the studies of literacy skills and earnings outlined above also look at the effects of people's literacy skills on their labour force status. In considering labour force status, people are typically classified as being either employed (part-time or full-time), unemployed (that is, actively seeking paid employment), or not in the labour force. People who are either employed or unemployed are considered to be in the labour force.

Empirical studies examine the effect of a change in literacy score on the probability of being employed or, alternatively, the probability of being employed full-time, unemployed, or in the labour force. Since employment is a binary variable (people are either employed or they are not) studies typically use logit or probit models, where the probability of being employed (or unemployed) is a function, bounded by 0 and 1, of a person's literacy score and other control variables. These control variables are typically those which are also used in the earnings regressions described above. Raw coefficients from logit and probit models are difficult to interpret, however, so studies usually (although not always) translate these into the effect on employment of a unit increase in the corresponding variable. In particular, the following section is concerned with the difference in the probability of being employed (or unemployed) between people who differ by one 'unit' of literacy.

5.3.2 Results of studies

The studies presented in Appendix 1 show that literacy has a persistent, positive and statistically significant association with people's labour force status. People with greater literacy skills are more likely than people with weaker literacy skills to be employed, even after taking account of other observed factors. People with greater literacy skills are also more likely to be employed full-time, more likely to be in the labour force and, not surprisingly, are less likely to be unemployed.

As with studies of literacy and earnings, the measure of literacy (prose, document or quantitative) included in the regressions makes little difference.²⁷ Those studies which both do and do not control for educational attainment find that including education as a control variable reduces the employment differential associated with literacy. This suggests that literacy has both an indirect effect (since people with better literacy skills stay in formal education for longer) and a direct effect on employment.

Using the New Zealand IALS data, Maré and Chapple (2000) show that a 10% increase in the average of the three literacy scores raises the probability of a male being employed by

²⁷ Again, when literacy and numeracy are both included in the same regression, the coefficient on one measure is usually driven down to an insignificant level.

1.2 percentage points (p.p.) and raises the probability of a female being employed by 2.1 p.p.. Maré and Chapple also examine the effect of literacy on Maori and non-Maori employment prospects separately. They find that a 10 percent increase in literacy score raises Maori employment chances by 3 p.p., compared to only 1.5 p.p. for non-Maori.

Using IALS data for the United Kingdom, McIntosh and Vignoles (2001) find that men with Level 2 prose literacy skills are 9.0 p.p. more likely to be employed than men with Level 1 prose literacy skills; the corresponding figure for women is 13.5 p.p.. North American studies indicate that an increase in literacy of one standard deviation increases the probability of employment by around 2-4 p.p. for men and by up to 8 p.p. for women. In most of the studies in Appendix 1, the impact of literacy on employment is greater for women than for men. Pryor and Schaffer (1999) consider that this because female labour supply is more sensitive to hourly earnings than male labour supply, and hourly earnings are positively related to literacy (as shown in the previous section).

None of the studies in Appendix 1 considers more than one country, or looks at more than one point in time. However, given the results reported in section 5.2.2, it would be safe to assume that the effect of literacy on employment does differ across these two dimensions.

5.4 A note about birth cohort studies

IALS, and other similar surveys of literacy, are limited in the amount of information they collect about individuals. In particular there are no good measures in IALS of an individual's innate abilities, childhood environment, family background and socioeconomic status (apart from parents' education levels), personality, attitudes and 'soft' skills such as sociability and ability to meet deadlines. These factors might be correlated with both literacy skills and earnings (or employment), and their omission from almost all of the analyses reported in Appendix 1 might mean that the studies overstate the earnings (or employment) premium associated with increased literacy skills. Since longitudinal birth cohort studies generally do include this kind of information, the two birth cohort studies included in Appendix 1 warrant a separate mention.

The National Child Development Survey (NCDS) is a longitudinal study of people living in Great Britain who were born during one week in 1958. Information on the cohort has been collected from an early age and in 1995 a 10% sub-sample was tested on their basic literacy and numeracy skills. McIntosh and Vignoles (2001) use this data to regress hourly earnings against literacy and against numeracy, including as control variables the socioeconomic status of respondents' parents and the results of reading and mathematics tests undertaken at ages 7 and 16. McIntosh and Vignoles refer to these as tests of ability, but it is not clear that they measure the individuals' *innate* ability, especially the age 16 tests. As the authors admit, controlling for age 16 test scores almost certainly means that the model is measuring the effect of changes in literacy skill between ages 16 and 37, although this itself is useful as a way of estimating the potential impact of adult interventions to improve literacy.

Table 5 shows the increase in earnings and employment associated with more advanced literacy and numeracy skills, compared to having low skills, under a variety of different specifications. Adding more controls to the model progressively decreases the returns to medium and high level literacy and numeracy skills. In a number of the models the returns to medium skills are relatively small (considering they involve increasing skills by the equivalent of at least one IALS level) and not statistically significant, even at the 10%

level. Models (c) and (f), in particular, are the only ones which control for educational attainment, but few of the coefficients in these models are statistically significant.

Table 5 – Increase in earnings and employment over having low literacy or numeracy skills, NCDS

	Model (a)	Model (b)	Model (c)	Model (d)	Model (e)	Model (f)
Increase in hourly earnings (%)						
medium literacy skills	14.8**	8.5**	2.6	7.1*	4.7	1.3
high literacy skills	28.2**	-	-	16.3**	13.4**	8.0*
medium numeracy skills	14.7**	10.8**	6.9*	8.9**	7.7**	5.7
high numeracy skills	33.2**	-	-	18.0**	14.8**	7.6*
Increase in the probability of employment (p.p.)						
medium literacy skills	5.1**	3.4	-0.03	3.9	3.0	0.2
high literacy skills	6.9**	-	-	5.6*	4.7	1.0
medium numeracy skills	4.5**	4.5**	2.7	4.8**	4.2*	2.9
high numeracy skills	9.0**	-	-	7.6**	6.3**	4.0
Controls						
Background		X	X	X	X	X
Age 7 ability				X	X	X
Age 16 ability					X	X
Education level			X			X

** statistically significant at the 5% level

* statistically significant at the 10% level

- results not shown in the report

Background controls are for gender, ethnicity, parents' education levels and social class and a measure of family financial difficulties.

Low literacy is the equivalent of Level 1 in IALS, medium literacy ≈ Level 2 and high literacy ≈ Levels 3-5.

Low numeracy is the equivalent of Levels 1-2 in IALS, medium literacy ≈ Level 3 and high literacy ≈ Levels 4-5.

Source: McIntosh and Vignoles (2001).

Machin, McIntosh, Vignoles and Viitanen (2001) extend this analysis of NCDS data to take account of individuals' attitudes and soft skills, as measured at age 16 and at age 37.²⁸ The main focus of the paper, however, is to regress earnings and employment against age 16 test scores. The age 16 test scores do not measure literacy and numeracy skills as they are usually conceived,²⁹ and using them in this way is a departure from the previous work by McIntosh and Vignoles. Presumably the authors were compelled to use

²⁸ The age-16 survey asked respondents about their attitudes to school, collected their official attendance record in school, and asked their teachers and parents about the respondents' personality, ability to get on with others, and propensity for anti-social behaviour. At age 37, respondents were asked about their people skills, ability to trust others, tendency to argue, attitudes towards achievement, need for control, and caring skills.

²⁹ The mathematics test at age 16 consisted of "31 multiple choice questions examining a range of topics from the school mathematics syllabus, covering areas such as geometry and algebra". The reading test consisted of "35 sentences, each with one word missing, and requires respondents to select a word from a choice of five that is most suitable to complete the sentences". These are not literacy and numeracy skills as they are usually conceived and, at least for the mathematics component, are not tests of basic skills as measured, for example, in Murnane *et al* (1995).

this specification because it gave them a much greater sample size to work with (they weren't restricted to the 10% sample of 37-year-olds). In a secondary analysis, Machin *et al* do regress hourly earnings against 'real' literacy as measured at age 37, but in all cases control for age 16 test scores. Therefore what is being measured is the impact of *improvements* in literacy and numeracy between ages 16 and 37. Few of the coefficients on literacy and numeracy are significant, however, under this specification.

The Dunedin Multidisciplinary Health and Development Study (DMHDS) also contains information on literacy and employment outcomes, at least for young adults. The DMHDS is a longitudinal study of a birth cohort of around a thousand children born in Dunedin in 1972 and 1973. Using DMHDS data, Caspi, Entner Wright, Moffitt and Silva (1998) find that poor reading achievement at age 15, as measured by the Burt word-recognition reading test, predicts later unemployment. After controlling for a range of individual, family and school variables, measured when participants were aged 15,³⁰ young people with low reading skills were 12.1 p.p. more likely than young people with high reading skills to be unemployed between the ages of 15 and 21, and averaged 1.7 more months of unemployment when unemployed. Some of this effect was due to more people with better reading skills staying longer in school and gaining more qualifications. In other words, young people with poor reading skills were at risk for unemployment, in part, because they left school at an earlier age. Even after accounting for this, however, there remained a direct impact of low reading skills on unemployment in later adolescence.

5.5 Conclusion

There is clear evidence from the studies reviewed above that literacy has a persistent, positive and statistically significant association with people's earnings and labour force status. People with greater literacy skills are more likely than people with weaker literacy skills to be employed and, when employed, tend to be paid more. The studies above point to an earnings premium of 4 to 20% for a one standard deviation increase in literacy test score and, for the same increase, an increased probability of employment of 2 to 8 percentage points. These returns differ across countries and times, and by gender and ethnicity.

Are these benefits large? They are certainly not trivial, but whether or not they are considered large depends on the effort required to raise literacy levels. If it is relatively easy to increase a person's literacy skills then the rewards outlined above might be considered quite substantial. On the other hand, if literacy improvement is a slow and expensive struggle the rewards might be considered small. The studies discussed in Chapter 6 below suggest that a good deal of effort would be required to raise literacy amongst adults by even a fraction of a standard deviation. In terms of schooling, Levin and Kelley (1994, p.99) point out that "there is no educational reform in any country that has been shown to systematically raise test scores of high school graduates by even one standard deviation."

The size of the literacy-related benefits reported above might also be overstated, as cross-sectional studies such as IALS have only a limited number of control variables available to them. There remains the possibility that unobserved factors such as natural ability, family background and 'soft' skills might explain a portion, perhaps a sizeable portion, of the association between literacy skills and earnings (or employment). Naturally clever, perceptive or determined people, for example, might have better literacy skills than

³⁰ These were gender, parent's occupational status, achievement of School Certificate, family structure, family conflict, parental attachment, school involvement, delinquency, mental illness and poor physical health.

their less talented counterparts and, independently, do well in their jobs, thereby giving the appearance that literacy skills have a larger impact on wages than is really the case. The one study which does try to control for natural ability, McIntosh and Vignoles (2001), finds that including measures of ability, along with other controls, drives many of the coefficients on literacy and numeracy down in size, and to insignificant levels. The issue of natural ability has long been discussed in the literature on returns to years of schooling and studies in this area have used research designs, such as twin studies and instrumental variables, to deal with the possibility of 'ability bias'. No such research designs have been used to study literacy and earnings. On the other hand, some comfort might be taken from the fact that studies of the returns to years of schooling which use these other research designs tend to produce estimates similar to those from 'ordinary' studies (Card 1999).

The studies reviewed above only measure the direct earnings and employment benefits of literacy skills to individuals. They do not measure productivity benefits which are captured by firms, or any spill-over benefits to other workers, which are not rewarded by increased wages. The size of the benefits reported above might therefore underestimate the economic benefits of increased literacy to society as a whole.

The focus of this paper is on people with poor literacy skills, but the earnings studies reviewed here indicate that improved literacy is likely to have an effect on *all* people. Even individuals with good literacy skills, who are not considered a problem group, would benefit from an increase in their skills. As Denny *et al* (2004) say:

Helping individuals to make transitions into the highest levels of functional literacy can make as much difference to their earnings as moving from the lowest to next level. This may be counter-intuitive because skills such as are measured in the IALS are typically labelled "basic skills" so there may be a presumption that while some minimum or basic level of these skills pays rich dividends, there is little or no premium to increasing the skills of someone who is already highly skilled. Clearly this is not the case (p.14).

There is, however, some evidence that literacy improvements at low levels of literacy have higher rewards than improvements at higher levels of literacy, at least in New Zealand if not in all countries.

Finally, it is worth pointing out that the effect of basic skills on absolute levels of earnings and employment is likely to be dwarfed by other factors. Literacy skills may be important, but at any point in time will only explain a small portion of the variation in outcomes between individuals. Over time, as well, macroeconomic factors will influence absolute levels of earnings and employment. Murnane *et al* (1995), for example, find that increased literacy and numeracy skills were much more highly rewarded in the United States in 1986 than in 1978. However, they also find that men with strong basic numeracy skills earned *less* in 1986 than men with weak numeracy skills did in 1978, due to the relative performance of the economy at these two points in time.

6 Impact of literacy programmes

6.1 Introduction

This chapter looks at whether, and by how much, literacy programmes improve participants' literacy skills. If programmes are effective in raising literacy then we can plausibly assume, given the results of Chapter 5 above, that they will also increase people's employment and their earnings. Labour market outcomes can be measured directly, though, and this chapter also looks at whether, and by how much, literacy programmes increase people's employment chances and earnings. It is the third of three chapters looking at the economic effects of increased literacy skills (these were introduced in Chapter 3).

6.1.1 Types of studies

Studies of three types of programmes are reviewed in this chapter. *Employment-related training programmes* (section 6.2) aim to combat welfare dependency and poverty by getting participants into work or into higher-paying jobs. These programmes typically involve some form of basic literacy training. *Workplace literacy programmes* (section 6.3) are conducted in people's places of work and aim to improve participants' performance in their jobs. *Community and family literacy programmes* (section 6.4) are those offered to members of the community who wish to increase their literacy skills. In family literacy programmes, adults and their children are educated together. Evaluations of these three types of programmes look at whether participating in a programme leads to better outcomes than not participating. Greater detail on the methodology of the studies reviewed in this chapter is given in Appendix 2.

Another type of research in the field of adult literacy involves setting up small-scale experiments or quasi-experiments to test whether certain instructional techniques are more effective than others. These studies test innovations in literacy training rather than evaluating existing, ongoing literacy programmes. In a New Zealand study, for example, Lavery, Townsend and Wilton (1998) compare the improvement in literacy and numeracy skills of two groups: a group of six people who received 18 hours of computer-aided instruction and a group of six who received 18 hours of traditional 'textbook and lecture' instruction. Torgerson, Brooks, Porthouse, Burton, Robinson, Wright and Watt (2004) and Kruidenier (2002) review these types of studies. Such studies are not discussed in this chapter, however, as they do not bear directly on the question of whether literacy training, as implemented in real-life settings, is effective compared to no training at all.

This chapter also avoids any discussion of literacy interventions for school-aged children, e.g. Reading Recovery. Studies of school-based programmes do not look at the effects on employment and earnings, or on literacy skills in adulthood (although increased literacy as a child should hopefully result in increased literacy as an adult). More importantly, the school system – a core role for which is developing sound basic skills – is already well established and funded, and the positive effects of schooling in general (if not for every component of it) have been well documented. There is no real policy debate, at least in New Zealand, over the importance of literacy and numeracy in the school system. Adult literacy training, on the other hand, is a developing field, and governments in a number of countries are considering a major expansion of provision. This makes adult literacy a

topical policy issue and it is timely to consider the evidence on the effectiveness of adult programmes.

6.1.2 Quality of studies

Studies of adult literacy programmes are included in this chapter if they objectively measure the outcomes of interest (literacy skills or earnings or employment) both before and after participants take part in the programme. Other studies rely on self-report data, which is less satisfactory. Apart from problems associated with accuracy of recall and lack of precision, there is also an understandable tendency for survey respondents to inflate the value of experiences, like adult literacy training, that entail significant sacrifices on the part of respondents and tutors. On the other hand, objective tests of literacy skills may or may not be appropriate for the teaching given or sensitive enough to measure the sorts of literacy gains perceived or valued by learners.

Finding that people who participated in a literacy programme gained literacy skills, or earnings, or employment, does not necessarily imply that the literacy programme was effective. This is particularly the case with earnings or employment, since these outcomes are influenced by a whole range of factors that have nothing to do with literacy acquisition: for example, the state of the local labour market, inflation, changes in welfare benefits, changes in the minimum wage, employment regulations and fluctuations in the economy. Over time, as well, people tend to get paid more as a result of experience on the job. Studies therefore need to compare the labour market outcomes of people who took part in the literacy programme (the ‘treatment’ group) against the outcomes of similar people who did *not* take part in the programme (the ‘control’ or ‘comparison’ group). Studies of the earnings or employment impacts of literacy programmes are therefore included in this chapter if they employ a control or comparison group. This requirement is relaxed for studies which measure gains in literacy skills since it can plausibly be assumed that people’s literacy skills are reasonably constant in the absence of literacy training, at least in the short term.

For studies of earnings or employment, a group of people with literacy needs should ideally be randomly assigned to either the treatment group or to the control group, but this experimental design is not always practical or affordable. The second-best option is to construct a comparison group of people who are as similar as possible to people in the treatment group. This is not as satisfactory as random assignment, however, since people who choose, or who are selected, to undertake literacy training may differ in some unobserved ways from people who don’t take part. They may, for example, be more naturally able or have greater motivation and persistence than people who don’t take part, and any observed increase in earnings or employment might be a result of this ability or motivation, rather than the effect of literacy training.

Other methodological problems can also plague studies of literacy programmes, and studies have not been included in this chapter if they are seriously flawed: if, for example, they have unacceptably low response rates. Beder (1999) provides an excellent and sympathetic discussion of the methodological issues involved in evaluating adult literacy programmes. Beder reviews 23 studies of adult literacy programmes, most of which have considerable methodological problems.

6.2 Employment-related training programmes

Governments in many countries fund training programmes to help low-skilled, disadvantaged people find employment and raise their earnings. These programmes typically include one or more of the following components: remedial education (primarily basic literacy training and, in the United States, GED preparation³¹), vocational training, wage and employment subsidies, short-term work experience, and job search assistance. In the United States, a number of these programmes have been subject to intensive evaluations (Heckman *et al* 1999a).

Programmes in the United States can usefully be divided into mandatory and voluntary programmes (Friedlander, Greenberg and Robins 1997). Mandatory programmes are aimed at welfare recipients: participation is the *quid pro quo* for receiving a benefit. These are often known as welfare-to-work programmes, of which the primary national programme is the Job Opportunities and Basic Skills Training (JOBS) programme which began in 1989. California's Greater Avenues for Independence (GAIN) programme pre-dated JOBS but effectively became that state's JOBS initiative from 1989 onwards. Across sites, JOBS programmes differ according to whether they emphasise education as the first step for most participants or whether they emphasise getting people into work as soon as possible. Voluntary programmes provide training for people who apply and meet certain criteria of need such as having income below a certain level or lacking a high school diploma. The primary national programme in the United States is the Job Training Partnership Act (JTPA) programme which began in 1982.

The JOBS, GAIN and JTPA programmes have been subject to experimental evaluations. The key reports of these evaluations, however, concentrate on the impact of participation compared to non-participation, rather than the impact of basic skills training in isolation. The following sections, however, look for evidence that low-skilled people who undertook adult education reaped benefits in terms of employment, earnings or literacy skills.

6.2.1 Mandatory programmes

The National Evaluation of Welfare-to-Work Strategies (NEWWS) looks at the impacts of 11 welfare-to-work programmes, all of which began as JOBS initiatives. NEWWS randomly assigned welfare recipients (predominantly women) to either participating in the programme or to a control group. As part of this evaluation, Bos, Scrivener, Snipes, Hamilton, Schwartz and Walter (2002) look at the experiences of participants in three programmes who lacked a high school diploma or a GED at the time of assignment. Both the treatment and the control group were tested after two years using the Test of Applied Literacy Skills (TALS) document literacy test, which is very similar to the IALS document literacy test. Receipt of a GED was also recorded. The three programmes achieved modest impacts on GED receipt during a two-year follow-up period, but no impact on measured reading and maths skills. After two years, 10.6% of treatment group members (pooled across the three programmes) had received a GED compared to only 3.6% of control group members. Mean scores on the TALS document literacy scale, however, were almost identical for the treatment group and the control group (250 compared to 249). A total of 26.2% of the treatment group were in Level 1 of TALS compared to 24.9%

³¹ The General Educational Development certificate is a second-chance qualification for adults in the United States which is equivalent to a high school diploma.

of the control group: again, this difference was not statistically significant. Bos *et al* do not report differences in earnings or employment for the treatment or the control group.³²

California's state-wide Greater Avenues for Independence (GAIN) programme began in 1986 and emphasised education as the way into paid employment. The GAIN evaluation, conducted in the late 1980s, randomly assigned welfare recipients to either participating in the programme or to a control group. Martinson and Friedlander (1994) look at the experiences of more than 2,500 participants – treatments and controls – who were assessed at programme entry as needing basic education. Data were available from five counties in the evaluation. Both the treatment and the control group were tested after two-to-three years using the TALS document and quantitative literacy tests. Receipt of a GED over this period was also recorded. As with the NEWWS evaluation, GAIN was reasonably successful in raising GED receipt but not in raising measured literacy skills, with the exception of San Diego County (Table 6).

Table 6 – GAIN's impact on GED receipt and TALS test scores, for people assessed as needing basic education

County	Sample size	Treatment group	Control group	Difference
Percentage who had received a GED or high school diploma over two-to-three years				
Alameda	466	8.9	1.2	7.7***
Los Angeles	389	2.7	0.5	2.2*
Riverside	582	6.2	3.6	2.6
San Diego	380	6.8	2.6	4.2*
Tulare	441	20.8	1.8	19.0***
All counties	2,258	9.1	2.0	7.1***
TALS score, document plus quantitative, after two-to-three years				
Alameda	334	482	480	2.3
Los Angeles	186	449	445	3.7
Riverside	233	488	507	-19.0*
San Diego	114	488	454	33.8**
Tulare	248	468	478	-10.2
All counties	1,115	475	473	1.8

Statistical significance levels are indicated as *** = 1%; ** = 5%; * = 10%.

The data in this table is restricted to single parents, mostly women, who made up the majority of GAIN participants.

The 'all counties' estimate is the average of the county estimates, with each county weighted equally.

The standard deviation of TALS scores was around 100.

Source: Martinson and Friedlander (1994) Tables 2 and 3.

³² The NEWWS study as a whole (Hamilton, Freedman, Gennetian, Michalopoulos, Walter, Adams-Ciardullo, Gassman-Pines, McGroder, Zaslow, Ahluwalia, Brooks, Small and Ricchetti 2001) did find that participants in the seven education-focused programmes increased their earnings but that this effect diminished over time so that by the end of the fifth year of follow-up, earnings were not statistically different from those of the control group. The three employment-focused programmes appeared to be slightly more effective than the education-focused programmes, and cheaper to run, but the most effective programme by far was in Portland. This programme used both job search and short-term training approaches and emphasised people holding out for a good job, not just any job.

Standout performers in terms of raising GED receipt were Alameda and Tulare Counties. In San Diego, the GAIN programme produced a considerable (around a third of a standard deviation), and statistically significant, impact on TALS scores. In Riverside County, people in the treatment group performed worse on TALS than people in the control group, although this result was only marginally significant. Overall, the GED impacts and improvements in literacy skills associated with GAIN were concentrated amongst those individuals who were the most literate when they first entered the programme.

Over the follow-up period studied by Martinson and Friedlander, the treatment group in Riverside County earned significantly more than the control group, but this was not the case in the other four counties. Freedman, Friedlander and Riccio (1993) extend this analysis by estimating the three-year impacts on earnings in the GAIN evaluation. For people assessed as requiring basic education, Freedman *et al* find statistically significant earnings increases in Riverside and in Tulare County, but not in the other three counties.³³ The earnings impact in Riverside, in particular, was high: the treatment group's average earnings over three years were 59% higher than the control group's earnings (Heckman *et al* 1999a) Table 23. Notably, Riverside and Tulare were the two counties where the literacy skills of treatment group members appeared to *decline* compared to the controls. (Table 6). Conversely, the San Diego GAIN programme had a considerable impact on literacy skills but not on earnings. Both Freedman *et al* and Martinson and Friedlander comment that Riverside stood out amongst the other sites as having a emphasis on quickly moving participants into employment.

6.2.2 Voluntary programmes

The National JTPA study randomly assigned nearly 21,000 JTPA applicants at 16 sites to either participating in JTPA or to a control group. Random assignment occurred after each person was assessed as requiring a particular type of service. Of the people assessed as needing classroom training, those in the treatment group had higher total earnings over the 30-month follow-up period than those in the control group (ranging from 1.6% to 8.9% depending on gender and age) but none of these differences were statistically significant (Bloom, Orr, Bell, Cave, Doolittle, Lin and Bos 1997a). In both groups earnings increased over time. The education component of JTPA did appear, however, to have an effect on educational attainment. Of those people in the sample who were high school dropouts at programme entry, a significantly greater proportion obtained a high school diploma or a GED after the 30-month follow-up period. For adult women, for example, 32% of dropouts in the treatment group had attained a GED, compared to 20% of the control group.

The Washington Workforce Training Study (described in Beder 1999)³⁴ looks at the short- and medium-term labour market outcomes for jobseekers in adult basic skills programmes in Washington State. A matched comparison group of jobseekers who had not participated in a basic skills programme was also constructed. In both the short term, and the medium term, participants in the adult basic skills programmes were in fact *less* likely than people in the comparison group to be employed (45.7% compared to 49.5% after three years). Participating in an adult literacy programme was found to have a small positive short-term effect on hourly earnings but no medium-term effect. Participating in such a programme did, however, have a positive effect on the number of hours a person worked (measured over a three-month period) and therefore on total earnings.

³³ They also find a statistically significant earnings impact in Butte County, which was the one GAIN site not included in Martinson and Friedlander (1994).

³⁴ The actual report of this study, the Washington State Training and Education Coordinating Board (1997), could not be located.

6.3 Workplace literacy programmes

There are very few quantitative studies of workplace literacy programmes, not least because firms appear reluctant to admit researchers. In any event, small sample sizes can be an issue, since programmes often put relatively few people through training and this training is highly tailored to the individual workplace. Tailored training programmes also mean that appropriate measures of progress need to be designed: 'off-the-shelf' tests of literacy skills, for example, are likely to be inappropriate in a workplace setting (Mikulecky and Lloyd 1996).

Krueger and Rouse (1998) have conducted the most rigorous quantitative evaluation of a workplace literacy programme, concentrating on improvements in earnings and productivity. They look at the impact of a programme for low-skilled workers in a manufacturing company and in a service company, both in New Jersey. After controlling for differences between participants and non-participants, Krueger and Rouse find only small effects of the programme on all measured outcomes. The follow-up period was, however, relatively short. In the manufacturing company, workers who attended literacy training had slightly higher wage growth than non-trainees, and the trainees were more likely to get an internal promotion. In the service company, however, the literacy programme had no significant effect on wage growth, although there was some evidence that literacy trainees were more likely to be nominated, and to win, a performance award. In both companies, workers who participated in training were neither more nor less likely to have left the firm after training. Krueger and Rouse estimate that, for the manufacturing firm at least, the benefits of the training programme in terms of increased productivity probably outweigh the costs. The costs to the firm, however, were only around a half of the total cost of the training programme, with the remainder being paid for by the federal government.

6.4 Community and family literacy programmes

A number of community and family literacy programmes have been evaluated, although most studies rely on self-reported measures of impact. Many are also methodologically flawed. Beder (1999) reviews the best of these evaluation studies, dating back to 1968. However, with the exception of St. Pierre, Swartz, Gamse, Murray, Deck and Nickel (1995), the findings of these studies are too unreliable to use.

St. Pierre *et al* (1995) evaluate the ongoing Even Start Family Literacy Program in the United States. Even Start is offered to adults with poor literacy skills and to their children. The programme includes adult literacy training, together with early childhood education and parenting education. As part of the Even Start evaluation, 200 families were randomly assigned to be in either Even Start or in a control group. After 18 months, adults in both the participant group and the control group had made gains in measured literacy skills and the difference between the groups was not statistically significant. The increased literacy skills amongst the control group was puzzling, although nearly a quarter of controls had in fact participated in other sorts of literacy programmes. People who participated in Even Start were significantly more likely to obtain a GED after 18 months, however: 22.4% of Even Start adults attained a GED compared to 5.7% of adults in control group families.

In a more recent study, not included in Beder's (1999) review, Brooks, Davies, Ducke, Hutchison, Kendall and Wilkin (2001a) study the progress made in literacy by adults in dedicated, mainstream basic skills programmes in England and Wales. A sample of 1,224 learners from across the two countries were given two reading tests based largely on

IALS, and were given estimated composite IALS scores between 0 and 500. The period between tests varied, but did not exceed 20 weeks of literacy provision. The mean score on the first test was 214.3 and on the second was 225.4. The difference between these means of 11.1 points (which is 0.22 of a standard deviation on this particular scale) was statistically significant and is quite considerable given the brief periods of tuition many learners experienced.³⁵ More than half of those taking the second test received less than 40 hours tuition and only 17% received more than 60 hours. On the results of the first test, 48% of the sample were in Level 1 of IALS, and in the second this had reduced to 43%. Although some students did worse on the second test, considerably more did better.

6.5 Conclusion

Table 7 summarises the results of the studies reviewed in this chapter. Taken as a whole, they provide good evidence that adult basic skills programmes can increase educational attainment, as measured by receipt of a GED; provide some evidence that programmes can lead to increases in earnings (total earnings, if not hourly earnings); and provide little evidence that programmes can increase people’s literacy skills, with two notable exceptions – the San Diego GAIN programme and the evaluation by Brooks *et al* (2001a). Only in Krueger and Rouse (1998) is the cost of a basic skills programme discussed. The other studies reviewed above either do not report information on costs, or are concerned with the costs of a wider programme of which adult education is only one component.

Table 7 – Summary of the findings reported in Chapter 6

	GED receipt	Measured literacy gain	Earnings
NEWWS	✓	=	
Alameda GAIN	✓	✓ n.s.	✓ n.s.
Los Angeles GAIN	✓ n.s. (marginal)	✓ n.s.	✓ n.s.
Riverside GAIN	✓ n.s.	✗ n.s. (marginal)	✓
San Diego GAIN	✓ n.s. (marginal)	✓	✓ n.s.
Tulare GAIN	✓	✗ n.s.	✓
JTPA	✓		✓ n.s.
Washington Workforce Training			✓
Krueger and Rouse, manufacturing			✓
Krueger and Rouse, service			✗ n.s.
Even Start	✓	✓ n.s.	
Brooks <i>et al</i>		✓	

✓ denotes positive effect; ✗ negative effect; = no difference; n.s. differences not significant

It is clear that literacy skills and GED receipt do not necessarily go hand-in-hand: the combination of modest increases in GED receipt and a lack of significant gains in measured literacy and numeracy skills is found in many of the studies. There are a number of possible explanations for this apparent discrepancy. One is that GED receipt requires building up knowledge, and applying existing skills to specific topics, rather than any improvements in literacy or numeracy skills. Another is that people taking the literacy tests did not face the same incentives to achieve as people taking the GED. It may also

³⁵ The authors, on the other hand, downplay these results, calling them “undramatic but worthwhile” (p.1).

be that the literacy tests used in the assessments were not sufficiently sensitive, or not appropriate for measuring the types of literacy skills learned on these training courses.

Literacy skills and earnings also do not appear to be necessarily connected. The treatment group in the Riverside GAIN programme experienced significantly higher earnings than controls over subsequent years but appeared to have lower literacy skills. Conversely, the treatment group in the San Diego GAIN programme had higher literacy skills than the controls but there was no significant difference in earnings. In the GAIN and JOBS programmes, adult education is part of a wider package of services including work experience, job search assistance and vocational training. It might be that these services, and not the basic education components, drive any subsequent gains in employment and earnings. Supporting this hypothesis is the fact that employment-focused JOBS programmes have had better employment and earnings outcomes than education-focused programmes (Hamilton *et al* 2001). On the other hand, it might be that it takes a long time to translate increases in literacy into increases in earnings.

The experimental studies reviewed above – the NEWWS, GAIN, JTPA and Even Start evaluations – are the most sophisticated of the studies discussed in this chapter but their random assignment methodology means that they examine the effects of being referred to, or eligible for, a particular basic skills programme rather than actually taking part in the programme. This needs to be kept in mind when interpreting the results of these studies. Many of the people in treatment groups did not actually participate in adult education programmes, or did so only for a brief period; conversely, some of the people in control groups took part in adult training courses of their own volition. It may have been the case, in fact, that adult education *did* improve the literacy skills or earnings of participants, but that these improvements were too small or made by too few people to affect the treatment-control comparisons made in the studies. The evaluation of the Washington Workforce Training Study and the workplace literacy study of Krueger and Rouse (1998), on the other hand, look at the experiences of people who started basic skills programmes (and may or may not have completed them), compared to those who didn't start. Brooks *et al* (2001a) goes even further, studying the literacy gains of people who stayed in a literacy programme over a period of time and didn't drop out. This might go some way towards explaining why Brooks *et al* report a considerable increase in literacy after a short period of tuition and the employment-related programmes, and Even Start, generally report an insignificant increase in literacy after a much longer period of tuition.

Another reason for the difference in literacy gain reported in Brooks *et al* and in the JOBS and GAIN programmes is that JOBS and GAIN are mandatory. The adult students in Brooks *et al* sought out programmes and enrolled voluntarily, and therefore exhibited a motivation to learn. Students in a welfare-to-work programme may, at least initially, be motivated to attend classes less by the desire to learn than by the desire to avoid reductions in their welfare benefits. Finally, the welfare-to-work programmes tested the literacy skills of their samples after two-to-three years, while Brooks *et al* tested their sample when they were still participating in a literacy programme. It would be interesting to know whether the literacy gains that Brooks *et al* report persist over time or decline. In fact, a good deal more about the effectiveness of adult literacy programmes in England and Wales should be known over the next few years, as the current expansion of adult literacy programmes in those countries will be accompanied by a series of evaluations.

7 Discussion

This paper looks at whether an increase in the basic literacy skills of adults would have a positive effect on the New Zealand economy, through increased employment and workplace productivity.

Modern definitions of literacy have at their core the ability to understand and use printed information to solve everyday problems at home and at work. According to the IALS survey, around 1 in 5 working-age New Zealanders has Level 1 literacy skills. People with Level 1 skills differ considerably in their ability to perform particular tasks. Most, however, are able to read, and to locate and use information from a straightforward text, but they cannot consistently perform more difficult or sophisticated tasks, especially those involving unfamiliar types of texts.

International comparisons in IALS are problematic. At face value, however, New Zealand does not stand out amongst OECD countries as having particularly poor literacy skills. The proportion of people in New Zealand with Level 1 skills in IALS is similar to the proportion in other English-speaking countries, and lies in the middle of the range of OECD countries. If the poor literacy skills of the 'tail' are restricting growth in New Zealand then they are also restricting growth in most other OECD countries. This does not imply, however, that there is no capacity for improvements in adult literacy in New Zealand.

Chapter 2 of this paper describes the characteristics of people with Level 1 skills but this does not mean that all and only those with Level 1 skills have problems with literacy or would benefit from an improvement in skills. Literacy is a continuum, and any cut-off point for the purposes of analysis will be to a large extent arbitrary. One commonly-used cut-off point, however, unnecessarily exaggerates the extent of literacy problems in New Zealand. Based on a comment in the introduction to the official IALS report, it is often asserted that people with Level 1 or 2 skills – almost half the working-age population in New Zealand – do not have the literacy skills to cope with the demands of everyday life and work in a complex, advanced society. This assertion is unreasonable and is not justified in the literature.

In any event, the question which this paper addresses is not whether people's skills are sufficient to cope with the demands of everyday life and work but whether their employment and workplace productivity would increase by having improved literacy skills. Much of the commonly-discussed research on adult literacy, however, only suggests the possibility of economic benefits and has not been designed, for example, to account for potentially confounding factors. This paper has therefore tried to describe and review the most rigorous studies of the economic benefits of literacy. These are of three types: cross-country growth studies, studies of individual returns to literacy skills, and evaluations of literacy training programmes.

Only one very recent study, Coulombe *et al* (2004), has incorporated a measure of literacy into a cross-country growth regression. This study finds that literacy, as measured in IALS, is positively and significantly associated with economic growth.³⁶ The purpose of including IALS scores in this regression, however, is not to isolate the effects of literacy on growth but to test the use of literacy as a proxy for human capital accumulation compared to alternative proxy measures. It may be that other aspects of human capital, correlated

³⁶ More accurately, it is associated with the steady-state level of GDP and with the rate of convergence to that steady-state level.

with literacy scores, are in fact driving economic performance. In general, the aggregate data on human capital investment used in cross-country growth regressions is necessarily crude and gives little helpful guidance on what areas of human capital to invest in.

Studies of individual returns to literacy skills are far more promising. Literacy appears to be an important job-relevant skill that is rewarded in the labour market. Surveys such as IALS show that people with greater literacy skills are more likely than people with weaker literacy skills to be employed and, when employed, tend to be paid more. This remains the case even after taking account of other job-relevant factors which are recorded in the surveys. These findings suggest that increasing people's literacy skills would have a positive effect on participation in the workforce. They also suggest that an increase in literacy, from no matter how high a starting base, would lead to people being more productive in their jobs. However, while these are promising results, it may be that at least some of the apparent benefits of greater literacy are due to factors not recorded in IALS-type surveys, such as natural ability, family background and 'soft' skills.

While there is a good deal of research on the benefits of higher literacy for individual workers, it is difficult to find convincing evidence on the benefits of literacy *training*, at least for adults. There have been relatively few rigorous studies of adult literacy training programmes. Those which have been conducted provide good evidence that adult basic skills programmes have increased the attainment of educational qualifications; provide some evidence that programmes have led to increases in earnings; but provide little evidence that programmes have increased people's literacy skills. Of the eight programmes discussed in Chapter 6 which measure gains in literacy, only two report statistically significant increases in literacy. Notably, however, in one of these programmes, participants who stayed in the programme made considerable literacy gains in a relatively short time. The cost of literacy training is almost never considered in these studies.

It is one thing, therefore, to say that an increase in literacy skills would be beneficial for individuals (or for firms or for the economy), but quite another to say whether this can actually be achieved, what it would take to accomplish it, and how much it would cost. This is not to suggest that adult literacy programmes are ineffective, just that there is little effectiveness information in the literature and what little exists is inconclusive. This might be because adults, especially those with low skills, are difficult to teach: after all, if 10 years of compulsory schooling have failed to develop a person's literacy skills then we need to be realistic about what a short training course can do. Alternatively, it might be that previous adult literacy programmes have been poorly run, or that successful interventions have not been evaluated. In any event, it should not be surprising that few literacy programmes have been evaluated. Only recently has adult literacy moved towards the mainstream of educational provision. For many years, adult literacy has been a very small-scale field, staffed by voluntary tutors and with a focus on social justice. Funding has generally not been large enough in the past (apart from in the big United States employment-related programmes) to justify a substantial investment in research and evaluation.

However, despite the paucity of information on impacts and costs of programmes, there is a good case for an increased focus on adult literacy provision. Literacy does seem to matter for employment and productivity, and well-run training programmes conducted by qualified tutors provide an opportunity for literacy skills to be improved after, and in many cases well after, the end of compulsory schooling. In particular, workplace literacy programmes have as their explicit aim an increase in productivity and are tailored to individual workplaces and individual jobs. They are therefore more likely than other, more

general, types of programmes to benefit the economy. There are good examples of well-run workplace literacy programmes in New Zealand (eg, those described in Workbase 2002).

The lack of evidence on successful adult interventions is a good reason, though, to be cautious about the wholesale expansion of existing programmes. An increase in the provision of publicly-funded adult literacy training needs to happen alongside a series of well-researched pilot programmes, where different types of programmes are tested out and evaluated for effectiveness and for whether or not they constitute good investments. Full-scale experiments which measure labour force outcomes over a number of years, like those conducted in the United States, are probably not practical or affordable in New Zealand. Evaluations should, however, at a minimum, measure people's literacy skills before and after they take part in a literacy programme, and should test a sample of *all* participants not just those, as in Brooks *et al*, who remain in the course.

Finally, the evidence presented in this paper points, at best, to modest gains from modest investments. People typically participate in literacy training programmes for a relatively short duration; a short course can only be expected, at most, to increase literacy by a small amount; and a small increase in literacy will on average have small employment or earnings benefits. In the short term at least, an increase in literacy training, unless delivered on a very large scale, is unlikely to materially affect GDP. It may, however, be a good investment, and a better investment than other types of tertiary training and education – but only good research and evaluation will tell us this.

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Study	Country	Dataset	Sample	Type of model	Dependent variable (log for earnings)	Measure of literacy	Controls for	Results for men (women)
Caspi <i>et al</i> (1998) Table 1	New Zealand	DMHDS	whole sample	tobit	prob. and duration of unemployment between 15 and 21	score on the Burt Word Reading test, measured at age 15	gender, school qualifications, school involvement, family background, delinquency, mental and physical health, all measured at age 15	adolescents with low reading scores had a 12.1 p.p. greater probability of being unemployed and, when unemployed, averaged 1.7 more months of unemployment

* not statistically significant at 5% level

† significance not given

DESCRIPTIONS OF THE STUDIES

National Adult Literacy Survey (NALS) was conducted in the United States in 1992. NALS is the forerunner to IALS: it was designed by the same organisation that designed IALS and has prose, document and quantitative scales ranging between 0 and 500. A nationally representative sample of nearly 13,600 individuals were interviewed in their homes and a sample of over 1,000 was also drawn from the prison population.

The Young Adult Literacy Assessment (YALS) was conducted in the United States in 1985. This was a nationally representative household survey of 3,600 21-25 year olds. Again, prose, document and quantitative literacy scores were created, ranging from 0 to 500.

Statistics Canada's 1989 Survey of Literacy Skills Used in Daily Activities (LSUDA) was based on YALS, and was a nationally representative survey of around 9,500 people. LSUDA measures reading ability and numeracy on a scale from 0 to 500.

The National Child Development Study NCDS is an ongoing birth cohort study of 17,000 people living in Great Britain who were born between 3 and 9 March 1958. A full survey was undertaken in 1991, and a 10% sub-sample was surveyed in 1995, when the cohort was 37. The 1995 survey included a test of basic literacy and numeracy skills. As with IALS, the tasks in this test measured participants' ability to apply literacy and numeracy skills in an everyday context, for example in using a Yellow Pages directory. The test in the NCDS was considerably shorter than IALS, however, consisting of 41 questions and taking around 30 minutes to complete.

The National Longitudinal Study of the High School Class of 1972 (NLS72) and the High School and Beyond study of 1980 (HS&B) are two large longitudinal surveys of United States students first surveyed as high school seniors. In both surveys, participants were given very similar tests of basic mathematics, reading and vocabulary skills in their last year of high school. Scores in the maths tests had means between 12 and 14, depending on the year and whether the respondent was male or female, and standard deviations of around 7.

The National Longitudinal Survey of Youth (NLSY79) is a nationally representative sample of 12,686 14-22 year olds in the United States, first surveyed in 1979. In 1980, participants were tested on the Armed Services Vocational Aptitude Battery which included tests of mathematics knowledge, arithmetic reasoning (combined into a numeracy measure), word knowledge and paragraph comprehension (combined into a literacy measure).

The Dunedin Multidisciplinary Health and Development Study DMHDS is a longitudinal study of a birth cohort of 1,037 children born in Dunedin between April 1972 and March 1973. Members of the cohort have been studied at various ages from 3 to 26. At age 26, 95% of the original sample of children were still participating in the study.

Appendix 2 – Studies of literacy training programmes

Mandatory employment-related programmes

The National Evaluation of Welfare-to-Work Strategies (NEWWS) examined the impacts on welfare recipients and their children of 11 welfare-to-work programmes in 7 sites, all of which began as JOBS initiatives. Some of the programmes concentrated on enrolling people in education or training (primarily basic skills education or GED preparation); others emphasised getting people into work as soon as possible, even low-paid or temporary work. NEWWS randomly assigned welfare recipients (predominantly women) to either participating in the programme or to the control group, or, in sites where two programmes were offered, to either one of the programmes or to the control group. Programme intake for the study began in June 1991 and ended in December 1994. The results of the NEWWS study, after a five-year follow-up period, are summarised in Hamilton (2002).

Bos *et al* (2002) looks at the experiences of participants who are the target group for adult education: those without a high school diploma or a GED. The study uses data from three of the education-focused programmes in NEWWS: Atlanta, Georgia; Grand Rapids, Michigan; and Riverside, California (which was also studied in the GAIN evaluation). About a quarter of the sample in Riverside's education-focused programme did have a high school diploma or GED, but had poor reading or maths skills, or limited English, and were therefore considered to be in need of basic education. About half the treatment group actually participated in adult education offered by their local programme. The average treatment group member spent about 244 hours (or about twelve 20-hour weeks) in adult education. Only 18% of the control group participated in adult education outside of NEWWS. The sample was tested two years after assignment using the Test of Applied Literacy Skills (TALS) document literacy test and the CASAS Maths Test. TALS is very similar to the tests given in NALS and IALS and participants can achieve a score between 0 and 500. Receipt of a GED was also recorded. Data were obtained for between 2,500 and 3,000 sample members.

California's state-wide Greater Avenues for Independence (GAIN) programme began in 1986. GAIN emphasised education as the way into paid employment and most participants were assessed as requiring some type of basic education (basic literacy education, GED preparation, or ESL) before any other employment-related services were provided. The GAIN evaluation was conducted in six Californian counties, beginning in the late 1980s, and involved randomly assigning welfare recipients to either the treatment group, which received the GAIN services, or to a control group, which did not.

Martinson and Friedlander (1994) look at the experiences of more than 2,500 participants – treatments and controls – who were assessed as needing basic education. Data were available from five of the counties in the evaluation: Alameda, Los Angeles, Riverside, San Diego, and Tulare. Around 40% of the treatment group actually participated in a basic education programme (others got jobs, fell ill, chose to receive job search services, etc). Those who participated attended classes for around 8 months, on average, during a two-to-three-year follow-up period, although were only in class for about 60% of their scheduled hours. People in the treatment group with relatively low levels of literacy tended to be put in remedial reading and mathematics classes, while those with relatively higher

levels of literacy tended to participate in GED preparation classes. Only around 8% of the control group participated in adult education outside of GAIN. Around 1,100 sample members were tested between two and three years after assignment using the Test of Applied Literacy Skills (TALS) document and quantitative literacy scales, and the CASAS Maths Test. TALS was administered in English, so those people in the sample who were not proficient in English were not tested. Receipt of a GED was also recorded for all of the sample.

Voluntary employment-related programmes

The Job Training Partnership Act (JTPA) was passed in 1982 to establish job training programmes for low-skilled or disadvantaged people. The National JTPA study randomly assigned nearly 21,000 JTPA applicants at 16 sites to either participating in JTPA (two-thirds of the sample) or to a control group (one-third of the sample) which was not allowed to enrol for 18 months. People in the control group were permitted, however, to enrol in other employment or training courses. Random assignment lasted on average about 15 months in each site, beginning in 1987 and ending in 1989. Data was collected on 15,981 sample members and were obtained from sources such as state unemployment and welfare records, and two waves of follow-up surveys. Earnings were recorded over a 30-month follow-up period. JTPA provided several types of training including basic education, vocational training, on-the-job training, job-search assistance, and subsidised work experience. In order to look at the effects of each type, random assignment occurred after each person in the sample was recommended for a particular type of training but before they actually received it (or didn't receive it). The study is described in Bloom *et al* (1997a).

The Washington Workforce Training Study looks at the outcomes for participants in adult basic skills programmes, offered at community colleges and technical colleges in Washington State. Only participants who enrolled in a basic skills programme in order to gain employment were included in the study. Data was collected in 1995, on participants who left a relevant programme in 1991-92 or in 1993-94. This meant that effects over both the short-term (7 to 9 months) and medium-term (three years) could be examined. A comparison group was constructed from people who were registered with the employment service as job-seekers and who had not participated in a basic skills programme. Members of the comparison group were selected to be equivalent to participant group members with respect to age, ethnicity, gender, education, employment history, earnings and receipt of welfare benefits. Comparison group members were not, however, matched on the basis of their literacy skills, which is a weakness of the study. Data for the study were obtained from administrative records of the particular programmes involved, the state employment service, and welfare and unemployment insurance offices. The study is described in Beder (1999).

Workplace literacy programmes

Krueger and Rouse (1998) look at the impact of a workplace literacy programme for low-skilled workers in two midsized companies (250-800 employees) – one a manufacturing company and the other a service company – in New Jersey. The literacy programme was focused on low-skilled workers and was designed and run by a community college. Training ran from late 1992 until early 1994, and consisted of twice-weekly two-hour classes running for 8 to 12 weeks. Training covered subjects like basic reading, writing and mathematics and English as a second language, and was in part tailored to specific company needs. Attendance was voluntary, and a combined total of 480 workers attended one or more courses. The federal government met all of the direct costs of the training

through the Workplace Literacy Program. Data for the study was obtained from administrative company records, including the hourly wages of participants and non-participants.

Community and family literacy programmes

The Even Start Family Literacy Program is a federally-funded programme delivered to adults with poor literacy skills and to their children (aged under eight years). The programme, which began in 1989 and is still ongoing, has a core of three components: early childhood education, adult literacy training, and parenting education. The national evaluation of Even Start ran from 1990 to 1993. Details of the evaluation are given in St. Pierre *et al* (1995). The evaluation had two arms: an annual survey of all Even Start projects and participating families, and an in-depth study of 200 families from five Even Start projects. These 200 families were randomly assigned to be in either Even Start or in a control group. Literacy skills of parents were measured using the Comprehensive Adult Student Assessment (CASAS) test, which has been used extensively as a measure of learning gain in adult literacy. Parents were tested before entering the programme, after 9 months and again after 18 months. Testing took place whether or not the programme families were still participating in Even Start or if control group families had participated in literacy programmes through other sources. Acquisition of a General Educational Development (GED) diploma was also recorded. GED in the United States is a second-chance qualification equivalent to obtaining a high school diploma.

Brooks *et al* (2001a) study the progress made in literacy by adults in dedicated, mainstream basic skills programmes in England and Wales. A sample of 2,135 learners from 71 Colleges of Further Education or Local Education Authorities were given a reading test and 1,224 of these were given another reading test some months later. The period between tests varied, but did not exceed 20 weeks of literacy provision. More than half of those taking the second test received less than 40 hours tuition and only 17% received more than 60 hours. It is not clear from the survey description whether people taking the first test were at beginning or mid-way through their courses; likewise it is not clear whether the people who didn't take the second test had completed their courses, had dropped out, or had refused to take part. There were two reading tests, A and B, and half the sample were given A first and B later, and half were given B first and A later. The reading tests contained 25 items from the IALS prose and document items, including all the Level 1 items. Items used in other literacy surveys were also included. In both the first and second tests, participants were given an estimated composite IALS score between 0 and 500.