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TE TARI MAHI

Workers with low literacy or numeracy skills: characteristics, jobs, and education and training patterns

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KEY FINDINGS

This paper examines the characteristics, jobs and education and training patterns of adults in employment who have low literacy or numeracy skills. The paper also analyses the prevalence of low literacy and numeracy skills in the workforce by industry and occupation. It uses data from the Adult Literacy and Life Skills (ALL) Survey 2006, which measured the English-language literacy and numeracy skills of a representative sample of New Zealanders.

The majority of workers with low literacy or numeracy skills have relatively low levels of formal education. English as a second language (ESOL) speakers make up around one-third. Recent immigrants to New Zealand and people with a non-European ethnic affiliation are also over-represented among workers whose literacy or numeracy skills are low.

Workers with low literacy or numeracy skills are substantially less likely than those with higher levels of these skills to carry out tasks requiring reading, writing or the manipulation of numbers in their jobs on a regular basis. Given evidence that literacy and numeracy skills tend to deteriorate with age and/or lack of use, the lack of opportunity for regular use of these skills at work may make it harder for these workers to maintain them.

The industries with the highest proportions of workers with very low literacy or numeracy skills were agriculture, manufacturing, transport, retail trade, and accommodation and food services. The occupational groups with the highest proportions of workers whose foundation skills were low were sales workers, personal service workers, agricultural workers, drivers, machinery operators and assemblers, and the elementary occupations.

Education and training courses undertaken during adulthood have the potential to help maintain or develop literacy and numeracy skills. Internationally, there is a tendency for adults with low foundation skills to do less further education and training than those with higher skills and higher educational attainment. The ALL results for New Zealand indicate that workers aged 25 and over who had low literacy or numeracy skills were as likely (or not much less likely) to participate in programmes of study linked to a qualification, as workers with higher literacy or numeracy. The absence of a stronger literacy skill 'differential' in studying rates in New Zealand suggests that industry training and/or provider-based learning programmes for adults are reaching workers whose foundation skills are weak, and helping to raise their rates of post-school education and training.

In contrast, workers aged 25 and over with low literacy or numeracy skills were significantly less likely to have undertaken a course that was *not* linked to a qualification. Short training courses provided by employers dominate this category of learning, and therefore the ALL results suggest that less literate or numerate workers are either less likely to be offered, or less likely to take up, shorter training courses that are funded by employers.

Among working adults aged 25 and over with low literacy skills, the likelihood of having studied towards a qualification, controlling for the effects of other characteristics, was significantly higher for men than women, higher for Māori than other ethnic groups, higher for individuals who already held post-school qualifications than those who did not, and higher for workers employed by large enterprises than those employed by small or medium-sized firms. The male/female and Māori/non-Māori differences in rates of studying for a qualification are consistent with the documented patterns of participation in industry training programmes (Tertiary Education Commission, 2007).

Among working adults aged 25 and over with low literacy skills, the likelihood of having taken a course that was not linked to a qualification, after controlling for the effects of other factors, was lower for workers of a Pacific ethnic affiliation that other ethnic groups, and higher for workers employed by large firms.

SUMMARY

Scope and purpose of the paper

This paper examines the characteristics and education and training patterns of adults in employment who have low literacy or numeracy skills. It provides information on:

- their personal and job characteristics and their use of literacy and numeracy skills at work
- where they are located in the labour market, that is, which industries and occupations employ relatively high proportions of workers with low literacy or numeracy skills
- their further education and training rates and patterns.

The study uses data collected in the Adult Literacy and Life Skills (ALL) Survey, which measured the English-language literacy, numeracy and problem-solving skills of a representative sample of New Zealand residents during the 2005–2007 period.

The information in this paper can be used to better understand the characteristics and current learning rates and patterns of workers whose foundation skills are weak, and to help identify the industries and occupations that have greatest literacy and numeracy training needs.

Definition of 'low' literacy and numeracy skills

In this paper, 'low literacy skills' is defined as having document literacy skills that were assessed at level 1 or level 2 on the five-level ALL scale. 'Low numeracy skills' is defined as having numeracy skills at level 1 or level 2 on the five-level ALL scale. The skills of people at level 1 are more limited than those of people at level 2.

How common are low literacy or numeracy skills?

Based on the ALL results, 12 percent of employed people have literacy skills at level 1, and 40 percent are at level 1 or level 2. Similar proportions of workers are at level 1 and similar proportions at level 1 or level 2 if literacy is assessed using the ALL measures of prose literacy. In this paper, the 'document literacy' measures of literacy are analysed and reported rather than the 'prose literacy' measures, unless stated otherwise.

Sixteen percent of all employed people have numeracy skills at level 1, and 46 percent have numeracy skills at level 1 or 2.

The significance of low literacy or numeracy skills

The fact that a worker has literacy or numeracy skills at level 1 or 2 on the five-level ALL scale does not necessarily mean that they are unable to perform their job in a satisfactory manner at present. However, people whose foundation skills are low are more likely than other workers to have difficulties with tasks that require reading, writing or maths, with learning new knowledge and skills or with

adapting to changes at work. Employer surveys and firm case studies undertaken in New Zealand have found evidence that low literacy and numeracy skills in workplaces can lead to mistakes, wastage and reductions in the quality of outputs, to difficulties with documentation and to an increased risk of accidents.

The characteristics of workers with low literacy or numeracy skills

The population of workers who have low literacy or low numeracy skills includes a disproportionate number of adults who have limited formal educational qualifications. It also includes a sizeable group of people who speak English as a second language. ALL assessed English-language literacy only and does not provide information on literacy skills in other languages.

Forty-six percent of workers with literacy skills at level 1 had completed only three years of secondary education or less, compared with 22 percent of all workers. Thirty-three percent of workers with literacy skills at level 1 and 17 percent of those with literacy skills at level 2 did not have English as their first language, compared with 14 percent of all the employed. For numeracy skills, the proportions are similar.

Youth, older adults, Māori, Pacific peoples, Asians and recent immigrants are over-represented among workers who have low foundation skills.

Workers with low literacy or numeracy skills are more likely to be working in part-time jobs or in part-year jobs than workers with higher skill levels. Approximately two-thirds of workers with level 1 literacy or level 1 numeracy skills were employed in the four least skilled occupational groups: service and sales, agriculture, plant and machine operators and assemblers, and elementary occupations.

Workers with lower foundation skills were much less likely to perform tasks involving literacy or numeracy on a regular basis in their jobs, than workers with higher skills.

Industries and occupations with high proportions of workers who have low literacy or numeracy skills

The industry groups with the highest proportions of workers with literacy skills at level 1 (more than 15 percent) were manufacturing, construction, accommodation and food services, and transport. The retail trade and transport industries also had relatively high proportions of workers at level 1.

More than 20 percent of workers had level 1 numeracy skills in the following industries: manufacturing, retail trade, and accommodation and food services.

The occupational groups with the highest proportions of workers with literacy skills at level 1 (more than 15 percent) were personal service workers, sales workers, agricultural workers, machinery operators and assemblers, drivers and elementary occupations. These occupational groups also had the highest proportions of workers whose numeracy skills were at level 1.

Further education and training of workers with low literacy or numeracy skills

Education or training courses that are undertaken during adulthood provide opportunities for individuals to maintain or improve their literacy and numeracy skills. As part of the Government's strategy to raise the literacy and numeracy skills of the workforce, opportunities for literacy and numeracy learning will increasingly be embedded within mainstream vocational courses and industry training.

Fifty-two percent of all employed people in ALL reported that they had participated in a structured learning activity during the last year. Twenty-three percent had taken courses as part of a programme of study towards a qualification, and 36 percent had undertaken a course or courses that were not linked to a qualification.

The likelihood of having studied towards a qualification, for workers aged 25 or over, did not vary greatly by their level of literacy or numeracy skill. Low skilled workers were about as likely to have undertaken some study or training towards a qualification as those with higher levels of literacy or numeracy skill. The learning undertaken by low skilled workers is likely to have comprised a mixture of institution-based tertiary education courses and workplace-based industry training programmes.

Workers with low literacy or numeracy skills were substantially *less* likely to have participated in courses that were not linked to a qualification than workers with higher literacy and numeracy skills. These other courses are predominantly short training courses funded by employers.

Profile of workers who were most likely to participate in further education and training

Within the population of working adults aged 25 and over who had low literacy skills, the likelihood of having studied towards a qualification, after controlling for the effects of other characteristics, was higher among men than women, higher for Māori than other ethnic groups, higher for individuals who already held post-school qualifications than those with no qualifications or school qualifications only and higher for workers employed by large enterprises than those working for small or medium-sized firms.

Among workers aged 25 or over with low literacy skills, the likelihood of having taken a course, after controlling for the effects of other characteristics, was lower for workers of a Pacific ethnic affiliation than for other ethnic groups and higher for workers employed at larger enterprises.

1. INTRODUCTION

This paper focuses on adults in employment who have low literacy or numeracy skills. It provides information on their personal and job characteristics, the industries and occupations they work in and their education and training rates and patterns. The paper analyses information that was collected in the Adult Learning and Life Skills (ALL) Survey. ALL measured the English-language literacy, numeracy and problem-solving skills of a representative sample of New Zealand residents during the 2005–07 period.

The information in this paper can be used to help identify the industries and occupations that have greatest literacy and numeracy training needs and to better understand the characteristics and current learning patterns of workers whose foundation skills are low.

The study differs from previous studies of adults with low literacy and numeracy skills in that it focuses solely on adults who were employed (unlike Sutton, 2009), and it provides information for industry and occupational groups that are defined at a more detailed level than previous analyses. Results are given for 18 occupational groups and 18 industry groups – groups that correspond roughly to the two-digit levels of the official occupation and industry classifications. The study also examines the further education and training patterns of workers aged 25 and over whose literacy or numeracy skills are relatively weak.

The paper has four main sections. The first describes the data used in this paper, including the way in which literacy and numeracy were measured in ALL. The second section examines the characteristics of workers with low literacy and numeracy skills. The third section describes the prevalence of low foundation skills in different industries and occupations. The fourth section explores the formal education and training that is undertaken by workers with low foundation skills, focusing particularly on those aged 25 and over. It explores the factors associated with a higher likelihood for this group of undertaking further education and training.

There are social and economic reasons for identifying the numbers and employment patterns of adults who have low levels of literacy and numeracy. Adults with very low levels of these skills have poorer outcomes than other adults in many domains of life, such as educational participation and achievement, family relationships and incomes (Parsons and Bynner, 2008). In the context of work, previous analyses of the New Zealand ALL survey data have shown that adults with low literacy or numeracy tend to have low earnings (Earle, 2009). Low levels of foundation skills have been identified as one of the factors contributing to low labour productivity (Workplace Productivity Working Group, 2004).

2. DATA SOURCE AND MEASURES

2.1 Measures of literacy and numeracy in ALL

The ALL survey collected data from a representative sample of approximately 7,100 adults who were aged from 16 to 65 years old during the 2005–2007 period.[1] The target population was usual residents who were living in private households. The New Zealand ALL survey was carried out as part of an international data collection. The New Zealand survey was very similar to the survey conducted in other countries, although some minor changes were made to reflect New Zealand vocabulary, conventions and institutions.[2]

Four skill domains were measured in ALL:

- **Prose literacy** is the ability to read and understand continuous text, such as news stories or instruction manuals.
- **Document literacy** is the ability to read and understand discontinuous text, such as instructions, graphs, maps and tables.
- **Numeracy** is the ability to understand and process mathematical and numerical information.
- **Problem solving** is the ability to plan, reason and solve problems in situations where no routine procedure exists.

These skills were measured directly, by giving survey participants questions to answer and problems to solve, based on written material that they had to read. Each respondent answered a booklet of questions designed to measure their skills on one, two or three of the four skill domains. Based on their question responses, literacy, numeracy and problem-solving scores were assigned to each individual using statistical methods and models that were developed internationally for the survey. A measure of each respondent's level of skill on the domains they were not tested on was imputed using a statistical model of the distribution of skills in the population.

People with different levels of literacy or numeracy skill using the ALL measures can be grouped into five broad skill levels, where level 1 is lowest and level 5 is highest. Appendix 1 provides further information on the types of tasks that can be successfully carried out by people at each skill level.

The objective of ALL was to assess English-language skills, and therefore the questionnaire and assessments were conducted in English. People who were not fluent in English may have performed relatively poorly even if they were highly literate in other languages.

This paper analyses literacy and numeracy skills but does not cover problem-solving skills.

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[1] Most respondents were surveyed between May 2006 and March 2007.

[2] Further information on the survey can be found in Satherley and Lawes (2007), Statistics Canada and OECD (2005) and on the Ministry of Education website http://www.educationcounts.govt.nz/themes/research/all.

When considering literacy skills, the ALL measure of document literacy is used in this paper rather than the prose literacy measure, because the set of skills covered by document literacy is believed to better match the types of reading that are required at work in many jobs (Sutton, 2009, p.15). However, the prose and document literacy measures in ALL are distributed in a similar way, and analyses using prose literacy tend to give similar results to analyses using document literacy.

In this paper, 'low literacy skills' is defined as having document literacy skills that were assessed at level 1 or level 2 on the five-level ALL scale. 'Low numeracy skills' is defined as having numeracy skills at level 1 or level 2 on the five-level ALL scale. The skills of people at level 1 are more limited than those of people at level 2.

2.2 Interpreting the ALL measures of literacy and numeracy

The fact that a worker has literacy or numeracy skills at level 1 or 2 on the five-level ALL scale does not necessarily mean that they are unable to perform their job in a satisfactory manner at present. Some jobs do not require much use of literacy or numeracy skills, and some workers whose literacy skills are low may still have the essential knowledge that is required for the tasks they need to carry out at work. As a general rule, however, people whose foundation skills are low are more likely than people with higher skill levels to have difficulties with tasks at work that require reading, writing or maths, with learning new knowledge and skills or with adapting to changes at work.

Evidence from employer surveys and firm case studies indicates that low literacy and numeracy skills can lead to mistakes, wastage and output quality problems within production processes, to difficulties with documentation and to an increased risk of accidents (Schick, 2005; Benseman and Sutton, 2007). It seems likely that, in workplaces where a significant number of people have low literacy and numeracy skills, labour productivity is reduced (Workplace Productivity Working Group, 2004).

2.3 Study population

This report focuses on people who were employed at the time they were interviewed. Approximately 5,070 respondents were employed when interviewed for ALL, and the analysis in this paper is based on that sub-sample. The self-employed are included in the study sample along with wage and salary earners, and for that reason, we use the term 'worker' rather than 'employee'.

2.4 Industry and occupation definitions

In the ALL survey, the industry of each employed respondent was coded to the International Standard Industrial Classification (ISIC Rev 3.1) at the two-digit level. In this paper, the ISIC codes were combined into 18 industry groups, which correspond roughly but not perfectly to the ANZSIC 2006 industry group at the two-digit level. A full correspondence to ANZSIC 2006 could not be achieved because of classification differences between ISIC and ANZSIC and because the small number of respondents in a number of two-digit industries (particularly in

the manufacturing sector) meant that these industries had to be combined or excluded from the analysis. Details of the 18 industry groups can be found in Appendix 2.

The occupation of each employed respondent was coded to the International Standard Classification of Occupations (ISCO) at the four-digit level. In this paper, these occupational codes were reclassified to NZSCO 1999 at the two-digit level. To ensure that all occupations had adequate sample sizes, some related occupations were combined, giving a final total of 18. Details of the occupational groups used in the paper can also be found in Appendix 2.

2.5 Representativeness of the ALL sample

The survey's target population was adults aged 16–65 years who were living in private households. A 64 percent response rate was achieved (Strafford, 2009). Hence, the level of non-response was significant. The sampling weights developed for the survey were designed to compensate for the effects of non-response. These weights were aligned to Census population benchmarks for five-year age groups, genders and ethnic groups in order to make the weighted estimates calculated from the survey sample as accurate as possible.

Table 1: Demographic profile of the ALL and HLFS samples, weighted

	ALL		HLFS	
	Working age population (16-65 years)	Employed (16-65 years)	Working age population (16-65 years)	Employed (16-65 years)
Mean age	39.1	40.7	39.0	39.6
		Percent		
Female	51.3	47.1	50.8	46.3
Youth - aged 16-24	19.4	12.3	19.8	16.3
Older - aged 55-65	16.8	16.1	16.9	15.2
Maori ethnic affiliation	12.0	10.8	10.8	9.6
Pacific ethnic affiliation	5.5	4.5	5.7	4.7
Born in New Zealand	73.1	75.6	74.7	76.8
Recent immigrant to New Zealand	9.8	8.1	9.6	8.5
5th form/year 11 education or less	25.4	21.9	31.3	27.3
Upper secondary school education only	18.4	15.4	16.6	15.3
Tertiary qualification below degree level	33.5	36.7	34.8	37.9
Degree qualification	22.8	26.0	17.2	19.5

Note: The Household Labour Force Survey results shown in this table were obtained by pooling the data for the four quarters from April 2006 to March 2007.

To assess the representativeness of the final weighted sample, the socio-economic characteristics of ALL respondents are compared with those of Household Labour Force Survey (HLFS) respondents in Tables 1 and 2. We use the HLFS sample as a benchmark because the HLFS is a relatively large household survey with a very similar target population, a high response rate (around 85–90 percent) and population-benchmarked weights, and the HLFS was in the field at the same time as ALL. We report the characteristics of HLFS respondents during the four quarters from 1 April 2006 to 31 March 2007 – the period when most of the ALL interviews were carried out.

On most of the socio-economic characteristics considered here, such as gender, age structure, ethnic composition and native/immigrant mix, the ALL sample is quite similar in profile to the HLFS sample after weights are applied. There are some moderately large differences in educational attainment, however. The ALL sample contains a smaller proportion of adults at the lowest qualification level (5th form/year 11 or below) and a higher proportion of adults with degrees. This is true both for the entire working-aged population and for the sub-sample who were employed. For example, 22 percent of employed adults in ALL but 27 percent in the HLFS were in the lowest educational category. At the other end of the educational scale, 26 percent of employed adults in ALL had degrees, compared with 20 percent in the HLFS.

Table 2: Job profile of workers in the ALL and HLFS samples, weighted

	ALL %	HLFS %
Self-employed	18.6	16.0
Occupational group - NZSCO 1999		
Legislators and managers	10.9	13.0
Professionals	17.9	16.6
Technicians and associate professionals	14.3	12.3
Clerks	13.8	12.4
Service and sales workers	14.7	14.4
Agricultural and fishery workers	6.8	6.7
Trades workers	8.5	10.3
Plant and machine operators	8.4	8.4
Elementary occupations	4.8	5.6
Not specified	0.1	0.4
Industry group - ANZSIC 2006		
Agriculture, forestry, and fishing	7.7	6.8
Mining	0.4	0.3
Manufacturing	13.4	13.1
Electricity, gas, water	0.8	0.4
Construction	7.4	8.9
Wholesale trade	3.0	4.6
Retail trade	10.8	12.6
Accommodation, cafes and restaurants	5.6	4.6
Transport and storage	3.8	3.8
Communication	2.4	1.8
Finance and insurance	3.1	3.4
Property and business services	10.7	11.5
Government administration and defence	4.8	4.2
Education	10.4	7.8
Health and community services	10.2	9.3
Cultural and recreational services	2.9	2.4
Personal and other services	2.7	4.1
Not specified	0.3	0.4

Note: The Household Labour Force Survey results shown in this table were obtained by pooling the data for the four quarters from April 2006 to March 2007.

The fact that fewer ALL respondents than HLFS respondents are in the lowest educational attainment categories is likely to be partly due to differences in the questions asked on secondary education. ALL asked respondents whether they had completed particular levels of secondary schooling or not, while the HLFS

records the qualifications that were attained. Someone who completed year 12 but gained no qualifications at that level would be classified to a higher educational level in ALL than in HLFS. However, questionnaire differences are unlikely to explain the higher proportion of tertiary-qualified people in the ALL sample.

Consistent with the higher educational profile of the ALL respondents, they were also more likely than HLFS respondents to be employed in professional or associate professional and technical occupations and less likely to be employed in trades or elementary occupations.

In summary, the final weighted ALL sample appears to be fairly representative of the target population on most criteria, but adults with low educational attainment appear to be somewhat under-represented and adults with high educational attainment appear to be over-represented. This could lead to some minor biases in the ALL results for outcomes that are highly correlated with educational attainment. For example, given the fact that more highly qualified people are more likely than the less qualified people to undertake further education and training, the ALL estimate of the total proportion of adults who participated in further education and training could be somewhat on the high side. This issue is worth noting when ALL results on education and training participation are discussed below.

3. CHARACTERISTICS OF WORKERS WITH LOW LITERACY AND NUMERACY SKILLS

3.1 Introduction

This section describes the personal and job characteristics of workers who have low literacy or numeracy skills, using simple descriptive statistics. Section 3.2 presents descriptive statistics on personal and job characteristics, and Section 3.3 summarises some of the information collected in ALL on the use of reading, writing and number skills at work.

3.2 Personal and job characteristics

Based on the ALL results, as at 2006, approximately 12 percent of employed people had document literacy skills at level 1, and 40 percent were at level 1 or level 2. Similar proportions of workers were at level 1 or at level 1 or 2 on the prose literacy skill domain. Sixteen percent of workers had numeracy skills at level 1, and 46 percent had numeracy skills at level 1 or 2.

Sutton (2009) examined the demographic and educational characteristics of adults with level 1 document literacy skills, level 1 numeracy skills or both, using ALL data. She found that:

- immigrants (i.e. people born outside New Zealand) made up 38 percent of those with both literacy and numeracy skills at level 1
- recent immigrants (those who had arrived since 2000) made up 14 percent of those with both literacy and numeracy skills at level 1
- 38 percent of adults with both low literacy and numeracy skills spoke a language other than English as their first language
- members of the Māori, Pacific peoples and Asian ethnic groups were over-represented among adults with low literacy and numeracy skills
- the educational qualifications of this population were relatively low: 32 percent had completed less than three years of secondary education
- approximately 60 percent were employed at the time of their interview, about 10 percent were unemployed and about 7 percent were students.

The patterns identified by Sutton are also evident when workers with relatively low literacy skills are profiled, as shown in Table 3 and Figures 1 and 2. The numbers in Table 3 show the proportion of workers at each level of literacy skill who had a particular demographic or job characteristic. For example, 40.5 percent of workers with level 1 literacy skills were women and, by inference, 59.5 percent were men.[3] The average age of workers whose literacy skills were at level 1 was 41.1 years, and 14.6 percent were aged 16–24 years.

[3] Using the population estimates given at the bottom of Table 3, the number of workers with each population characteristics and literacy skill level can also be estimated. For example, the number of

Table 2 summarises the demographic and job characteristics of workers who differ in their level of numeracy skill, in a similar manner to Table 1. Figures 1 and 2 plot some of the results in Table 1. As well as showing the proportion of workers at each literacy skill level with a particular demographic characteristic, they show the 95 percent confidence intervals that are associated with these survey estimates. There is a 95 percent chance that the true proportion lies between the upper and lower confidence interval boundaries.[4]

The results indicate the following:

- **Women** in employment were slightly less likely than employed men to have document literacy skills at level 1 but slightly more likely to have document literacy skills or numeracy skills at level 2.
- The average age of workers with low literacy or numeracy skills was little different from the average age of workers with higher skills. However, **youth** (15–24 year olds) were more likely than workers in other age groups to have foundation skills at levels 1 and 2. **Older adults** (those aged 54–65 years) were also over-represented among workers at level 1.
- Workers of **Māori, Pacific or Asian ethnic affiliation, recent immigrants** (i.e. people born overseas who had migrated to New Zealand since 2000) and workers whose **first language was not English** were significantly more likely than Europeans and the New Zealand-born to have low levels of literacy and numeracy skills. For example, 22 percent of workers who had level 1 literacy skills had a Māori ethnic affiliation (alone or in combination with other ethnic groups), while only 4 percent of workers with level 4 or 5 literacy skills identified as Māori. Nineteen percent of workers with level 1 literacy skills but only 3 percent of those at level 4 or 5 identified as belonging to one of the Asian ethnic groups.
- The over-representation of ESOL speakers among the low skilled is particularly marked. Thirty-three percent of workers with document literacy skills at level 1 and 32 percent of those with numeracy skills at level 1 were people whose first language was not English, compared with 14 percent of all the employed.
- A high proportion of workers with low literacy or numeracy have relatively **low levels of education**. Forty-six percent of workers with document literacy skills at level 1 and 32 percent of those at level 2 had completed three years of secondary education or less, compared with 22 percent of all the employed. More than three-quarters had either no qualifications or qualifications classified at level 3 or below in the New Zealand Qualifications Framework.

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workers who had level 1 literacy skills and were female is estimated to be approximately 92,000 (227,000 x .405 = 91,900).

[4] In this paper, standard errors were calculated using the jackknife method and the official survey replicate weights. Standard errors on measures of literacy and numeracy include an adjustment for imputation.

Table 3: Demographic and job characteristics of workers with different literacy skill levels

	Document literacy skill level				
	Level 1	**Level 2**	**Level 3**	**Level 4/5**	**All levels**
Gender and age group					
Female (%)	40.5	50.3	49.6	41.5	47.1
Mean age (years)	41.1	40.4	40.9	40.8	40.7
Aged 16-24 (%)	14.6	16.2	11.8	6.8	12.3
Aged 25-54 (%)	63.9	66.5	72.7	80.4	71.5
Aged 55-65 (%)	21.6	17.2	15.5	12.8	16.1
Ethnic group					
European ethnic affiliation (%)	46.2	67.8	75.9	82.6	71.5
Maori ethnic affiliation (%)	22.1	14.5	8.3	4.2	10.8
Pacific ethnic affiliation (%)	13.7	5.8	2.5	1.2	4.5
Asian ethnic affiliation (%)	18.9	10.8	8.3	3.1	9.2
Birthplace and language					
Born in New Zealand (%)	63.7	76.1	77.1	78.9	75.6
Recent immigrant (%)	12.3	9.0	7.4	5.6	8.1
Speaks English as second language (%)	32.6	16.9	10.8	4.4	13.8
Education					
Completed 5th form /year 11 or less (%)	45.6	31.7	16.6	5.4	21.9
Level 3 qualification or below (%)	77.7	64.4	44.8	28.2	50.8
Job characteristics					
Self-employed (%)	11.4	15.6	20.4	23.6	18.6
Average weekly hours	39.0	38.7	38.5	40.1	39.0
Employed part-time (%)	23.7	21.4	22.0	18.4	21.3
Employed part-year (%)	12.2	8.9	8.0	6.3	8.4
Average job tenure (years)	5.5	5.8	6.5	6.6	6.2
Average hourly earnings ($, employees only)	14.6	17.9	21.9	26.2	20.6
Occupational group					
Managers (%)	3.8	8.3	11.8	17.0	10.9
Professionals (%)	4.0	9.4	20.3	32.8	17.9
Technicians and associate professionals (%)	8.6	12.8	15.5	17.5	14.3
Clerks (%)	9.1	15.0	15.7	11.2	13.8
Service and sales workers (%)	22.4	18.2	13.5	7.9	14.7
Agriculture and fishery workers (%)	11.4	7.7	6.3	3.8	6.8
Trades workers (%)	9.8	10.8	7.8	6.2	8.5
Plant and machine operators and assemblers (%)	18.6	11.5	6.1	2.5	8.4
Elementary occupations (%)	12.3	6.3	3.0	1.2	4.7
Industry group					
Agriculture, forestry and fishing	12.7	8.8	7.0	4.5	7.7
Manufacturing	20.2	15.1	11.0	11.4	13.3
Wholesale and retail trade	15.1	16.6	13.0	10.6	13.8
Food services and accommodation	9.0	6.5	5.0	3.3	5.6
Transport and communications	6.1	6.6	6.3	5.3	6.1
Finance and business services	6.3	9.3	15.3	21.2	13.8
Public administration and defence	1.3	2.5	5.6	8.2	4.8
Education and training	3.9	7.0	12.3	14.9	10.4
Health and community services	10.9	10.6	9.9	9.9	10.2
All other industries	14.6	17.0	14.6	10.7	14.5
Enterprise size (number of employees)					
Less than 5 (%)	19.8	19.2	21.2	19.8	20.2
5 to 9 (%)	9.2	9.8	9.9	8.3	9.5
10 to 19 (%)	11.6	10.4	8.8	9.1	9.6
20 to 99 (%)	16.7	16.3	17.1	16.7	16.7
100 to 499 (%)	13.5	13.7	12.8	14.9	13.6
500 to 999 (%)	6.2	6.4	5.7	6.7	6.2
1000 and over (%)	23.1	24.2	24.6	24.5	24.3
Sample size	669	1472	1985	949	5076
Estimated population size (000s)	227	529	758	390	1903
Share of all employed persons in each skill group	11.9	27.8	39.8	20.5	100.0

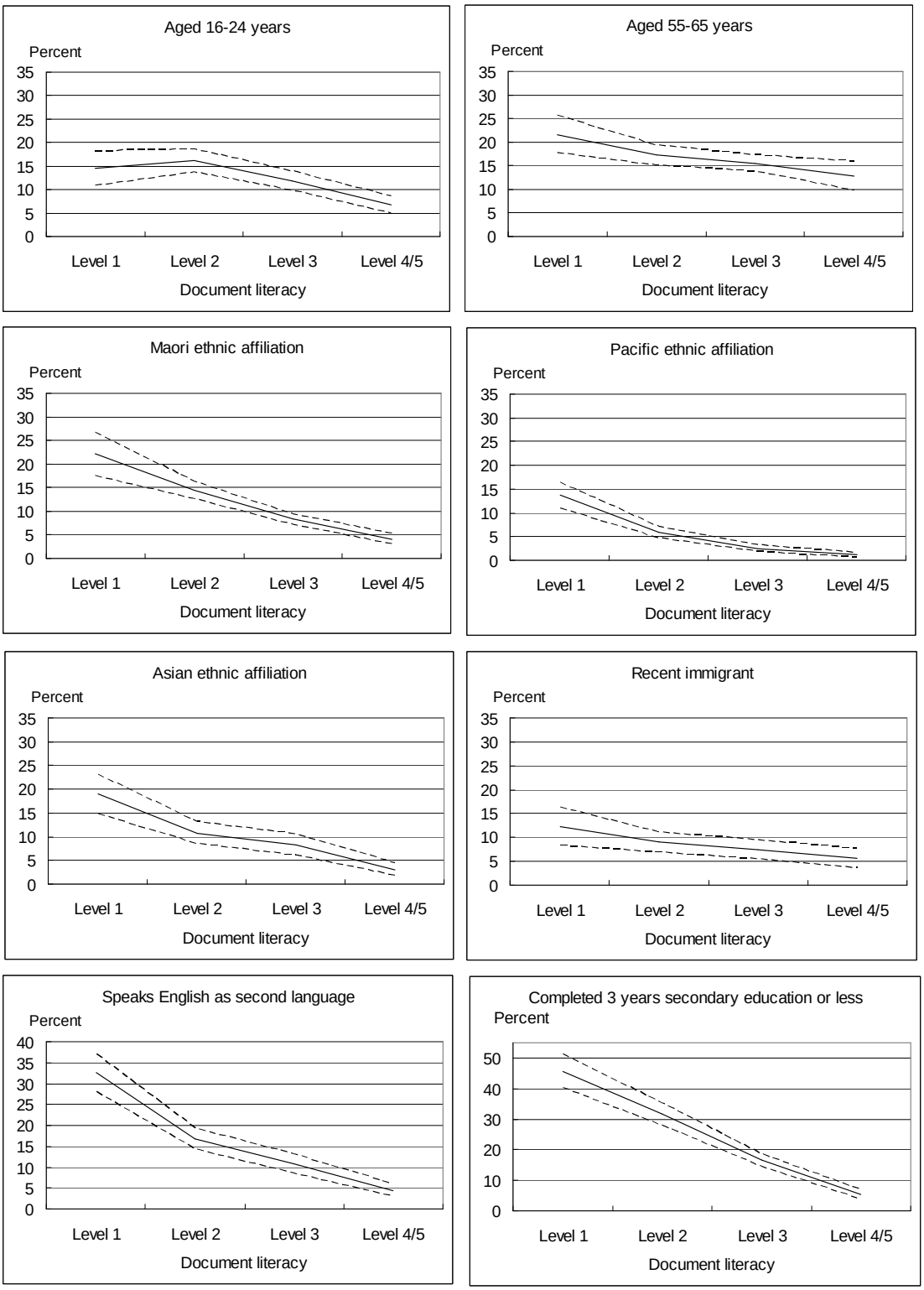
Note: Respondents could give more than one ethnic affiliation, and if they did so, they are counted in each applicable ethnic group. Recent immigrants are people who were born outside New Zealand and moved to New Zealand in 2001 or more recently.

Table 4: Demographic and job characteristics of workers with different numeracy skill levels

	Numeracy skill level				
	Level 1	**Level 2**	**Level 3**	**Level 4/5**	**All levels**
Gender and age group					
Female (%)	47.9	52.7	47.9	35.9	47.1
Mean age (years)	40.2	40.3	41.4	40.6	40.7
Aged 16-24 (%)	16.6	16.5	9.7	6.8	12.3
Aged 25-54 (%)	65.4	66.1	73.8	81.0	71.5
Aged 55-65 (%)	18.0	17.3	16.4	12.2	16.1
Ethnic group					
European ethnic affiliation (%)	46.7	70.1	77.9	82.7	71.5
Maori ethnic affiliation (%)	22.6	13.5	7.1	3.3	10.8
Pacific ethnic affiliation (%)	14.3	4.7	1.7	0.9	4.5
Asian ethnic affiliation (%)	17.6	10.0	7.1	4.8	9.2
Birthplace and language					
Born in New Zealand (%)	65.8	77.1	77.9	77.1	75.6
Recent immigrant (%)	11.7	8.7	6.5	6.8	8.1
Speaks English as second language (%)	32.0	13.7	9.5	6.4	13.8
Education					
Completed 5th form /year 11 or less (%)	43.0	29.6	14.7	5.2	21.9
Level 3 qualification or below (%)	76.5	61.5	44.1	24.2	50.8
Job characteristics					
Self-employed (%)	11.0	16.3	22.0	22.5	18.6
Average weekly hours	38.3	37.8	39.2	41.0	39.0
Employed part-time (%)	24.9	23.9	20.6	15.5	21.3
Employed part-year (%)	11.2	9.2	7.9	5.6	8.4
Average job tenure (years)	5.3	6.0	6.6	6.7	6.2
Average hourly earnings ($, employees only)	14.9	18.2	22.5	26.8	20.6
Occupational group					
Managers (%)	4.9	8.6	13.0	15.7	10.9
Professionals (%)	4.6	10.9	20.2	35.7	17.9
Technicians and associate professionals (%)	8.7	13.3	16.2	17.3	14.3
Clerks (%)	11.3	16.0	15.1	10.2	13.8
Service and sales workers (%)	23.4	18.4	11.7	7.2	14.7
Agriculture and fishery workers (%)	8.3	8.4	6.3	3.9	6.8
Trades workers (%)	9.3	9.0	9.1	6.2	8.5
Plant and machine operators and assemblers (%)	17.3	9.7	6.2	2.8	8.4
Elementary occupations (%)	12.3	5.7	2.3	1.0	4.7
	61.2	42.1			
Industry group					
Agriculture, forestry and fishing	9.3	9.5	7.1	4.5	7.7
Manufacturing	19.0	14.0	11.4	11.1	13.3
Wholesale and retail trade	16.0	15.2	13.0	10.9	13.8
Food services and accommodation	8.8	6.6	4.6	2.9	5.6
Transport and communications	6.1	7.0	6.0	5.1	6.1
Finance and business services	6.0	9.5	14.9	24.9	13.8
Public administration and defence	1.2	3.3	5.7	8.6	4.8
Education and training	5.4	8.4	12.3	14.1	10.4
Health and community services	12.6	11.1	9.5	8.1	10.2
All other industries	15.6	15.6	15.5	9.9	14.5
	65.8	56.3			
Enterprise size (number of employees)					
Less than 5 (%)	18.3	19.8	21.8	19.4	20.2
5 to 9 (%)	9.3	10.3	9.2	8.8	9.5
10 to 19 (%)	10.0	9.7	9.6	9.2	9.6
20 to 99 (%)	14.8	15.5	18.1	17.8	16.7
100 to 499 (%)	15.8	13.9	12.6	13.0	13.6
500 to 999 (%)	6.0	5.9	5.8	7.3	6.2
1000 and over (%)	25.7	25.0	22.9	24.6	24.3
Sample size	915	1590	1688	883	5076
Estimated population size (000s)	304	579	657	363	1903
Share of all employed persons in each skill group	16.0	30.4	34.5	19.1	100.0

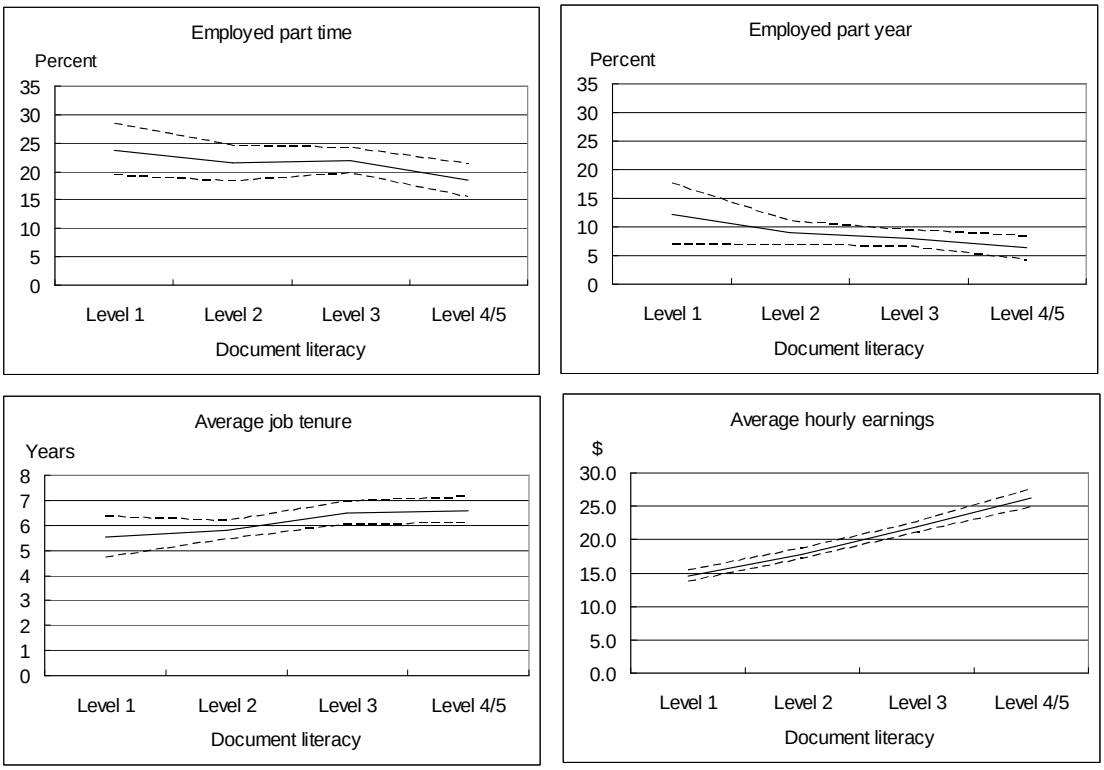
Note: Respondents could give more than one ethnic affiliation, and if they did so, they are counted in each applicable ethnic group. Recent immigrants are people who were born outside New Zealand and moved to New Zealand in 2001 or more recently.

Figure 1: Population groups that are over-represented among workers with low literacy skills



Note: The main results are given by the unbroken lines in each graph. The dashed lines on each side give the 95 percent confidence intervals associated with each survey estimate. There is a 95 percent chance that the true number lies within the confidence interval boundaries.

Figure 2: Job characteristics of workers with different literacy skill levels



Note: The main results are given by the unbroken lines in each graph. The dashed lines on each side give the 95 percent confidence intervals associated with each survey estimate. There is a 95 percent chance that the true number lies within the confidence interval boundaries.

Turning to job characteristics, the ALL results indicate the following:

- Workers with low literacy or numeracy are less likely to be self-employed and more likely to be working as **wage or salary earners** than workers whose skill levels were higher.
- Workers with poorer skills of this type are more likely to be working in **part-time** jobs or **part-year** jobs than workers with higher skill levels. On average, they have spent slightly less time working in their current main job.
- Approximately two-thirds of workers with level 1 literacy or numeracy skills were employed in the four least skilled major **occupational groups**: service and sales, agriculture, plant and machine operators and assemblers, and elementary occupations.
- Around two-thirds workers with level 1 literacy or numeracy skills and more than half of those with level 2 literacy or numeracy skills, were employed in five broad **industry groups**: agriculture forestry and fishing, manufacturing, wholesale and retail trade, accommodation and food services, and health and community services.
- There is no obvious relationship between literacy or numeracy skill and **firm size**: workers with low skills were employed in a similar mix of small, medium-sized and large enterprises as workers with higher skills.

- Employees with low literacy or numeracy skills tend to work in relatively low paid jobs. The average hourly earnings of employees with level 1 document literacy skills were $14.60 per hour. The average for all employees in the survey was $20.60.

3.3 Use of reading, writing and numeracy skills at work

ALL collected information from employed people on the frequency with which they undertook particular reading, writing and numerical tasks at work. The questions covered about 15 tasks, such as 'reading letters, memos or emails' and 'writing bills, invoices, spreadsheets or budget tables'. Note that the questions recorded how often these tasks were undertaken but did not assess their level of difficulty, and therefore the information gathered provides only a rough guide to differences in job requirements.

Figures 3 and 4 plot the proportions of workers at each level of document literacy skill who said they 'never' or 'rarely':

- read letters, memos or emails
- read directions or instructions
- read manuals or reference books
- read bills, invoices, spreadsheets or budgets
- measured or estimated the size or weight of objects
- calculated prices, costs or budgets
- counted or read numbers to keep track of things.

The results show, perhaps not surprisingly, that workers with lower literacy skills were less likely to perform tasks involving reading or maths on a regular basis in their jobs than workers with higher skills. A substantial group of workers with level 1 literacy skills (30–70 percent, varying across the different tasks) said that they rarely or never did these tasks in their jobs. Rates of performing the other tasks recorded in ALL, including writing tasks, were similar.

Figure 3: Proportion of workers who rarely or never performed specified reading tasks at work, by literacy skill level

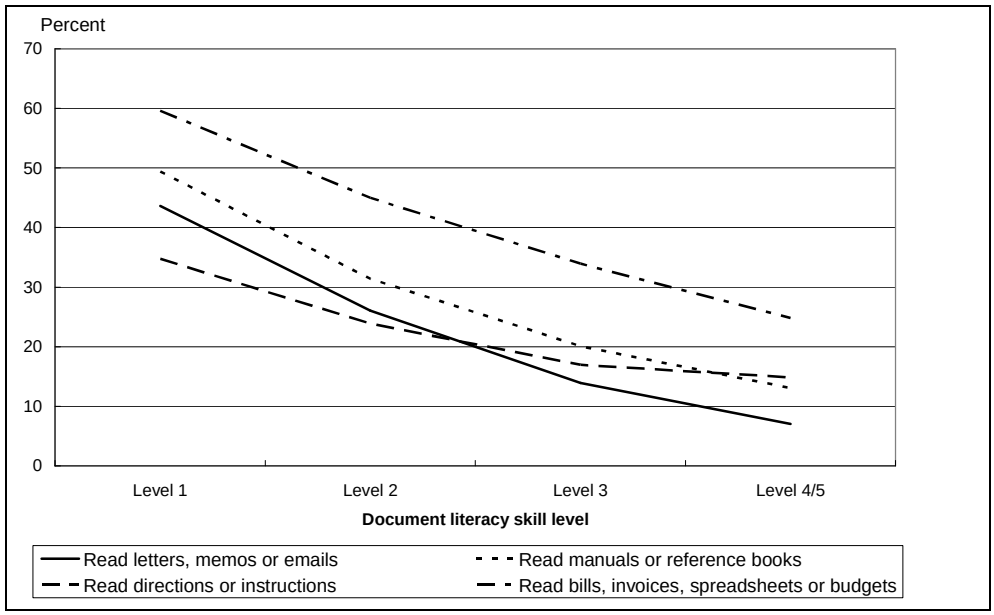
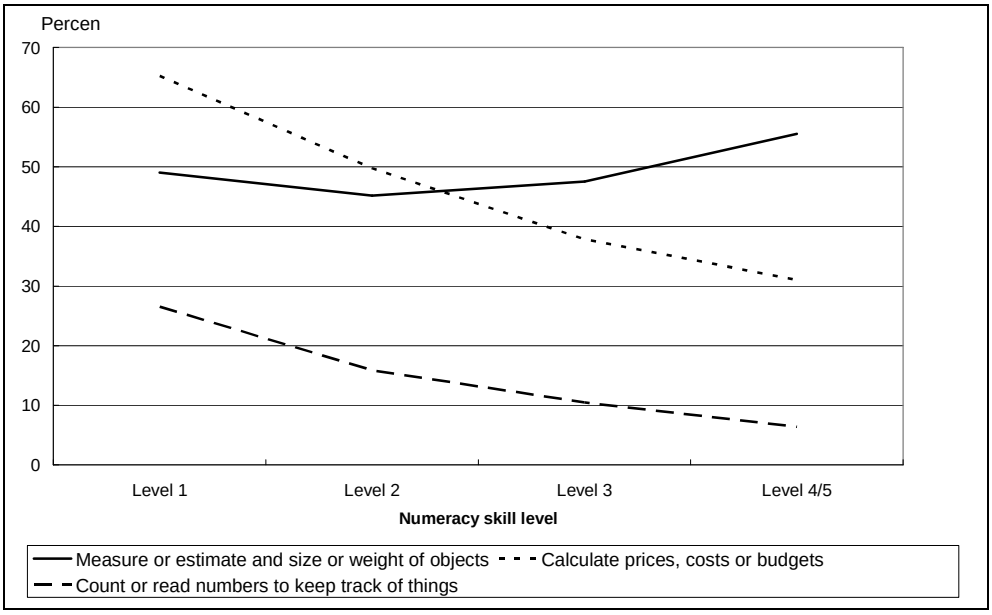


Figure 4: Proportion of workers who rarely or never performed specified numeracy tasks at work, by numeracy skill level



One possible explanation is that many of these workers held jobs that genuinely had little requirement for reading or interpreting numbers. It could also be the case that the tasks individuals undertake at work are influenced and perhaps restricted by their literacy skills, however. Benseman and Sutton (2007, p.4) report that employers use a range of strategies to minimise the impact of poor literacy skills in their firms, including developing oral culture in the workforce, rewriting documentation, changing work practices and passing literacy requirements onto a person in the team with the best skills.

One implication of these results is that a significant minority of people in the workforce are not regularly undertaking tasks that would help them develop or maintain their reading, writing and maths skills, at least not in the context of their jobs. These tend to be the individuals whose literacy or numeracy skills are poorest.

An alternative way of viewing the results, however, focuses on the proportion of workers who said that they did perform the specified tasks at least once a week. Even if we consider the workers whose literacy skills were assessed as weakest (those at level 1), more than half undertake reading and number-related tasks in the course of their jobs on a regular basis (at least once a week or more often). Therefore, the majority are in jobs with some requirement for the use of literacy and numeracy skills, and their proficiency at reading, writing or mathematical tasks is relevant for their performance at work.

4. THE PREVALENCE OF LOW LITERACY AND NUMERACY SKILLS IN THE WORKFORCE: INDUSTRY AND OCCUPATIONAL PATTERNS

There are marked differences in the literacy and numeracy skill profiles of the workers who are employed in different industries and occupations. These differences are due to variations in the educational and skill requirements of different jobs and to variations in the demographic and educational profiles of the workers who are employed in different industries and occupations.

Figure 5 illustrates the proportions of workers in each industry group who were at level 1 and the proportions who were at level 1 or level 2 in terms of their document literacy skills (sections A and C) and their numeracy skills (sections B and D). Figure 6 gives the same results for occupational groups. The data underlying these graphs and a number of additional results, including the percentages of workers whose literacy and numeracy skills were at level 3 or levels 4/5 and the total number of workers employed in each industry group or occupational group, are set out in Tables A3–A5 in Appendix 3.

In each part of Figure 5 and Figure 6, the proportion of workers whose skills were at level 1 and at level 1 or 2 is given by the column heights. Because the sample sizes for some industries and occupations are relatively small, we also show the 95 percent confidence intervals associated with each estimate. These confidence intervals are shown by the vertical bars straddling the top of each column. There is a 95 percent chance that the true proportion lies within the confidence interval 'bar'. Small confidence intervals indicate relatively accurate estimates, and large confidence intervals indicate less accurate estimates. As a general rule, literacy and numeracy skills are measured more accurately for larger industries and occupational groups than for smaller ones (i.e. those with lower employment and therefore fewer cases in the survey sample). The survey estimates of the proportion of workers who were at level 1 or 2 are also more accurate than the estimates of the proportion who were at level 1.

The overall patterns can be summarised as follows:

Industries – literacy

- **Level 1**: Food manufacturing, accommodation and food services, agriculture and 'other manufacturing' (a group that covers all manufacturing industries other than food manufacturing) had the highest proportions of workers with document literacy skills at level 1 (23 percent, 19 percent, 16 percent and 16 percent respectively). Other industries with more than 10 percent of their workers at level 1 were construction, wholesale trade, retail trade, motor vehicle sales and service, transport, and health care and social services.

Figure 5: Proportion of workers with low literacy or low numeracy skills, by industry group

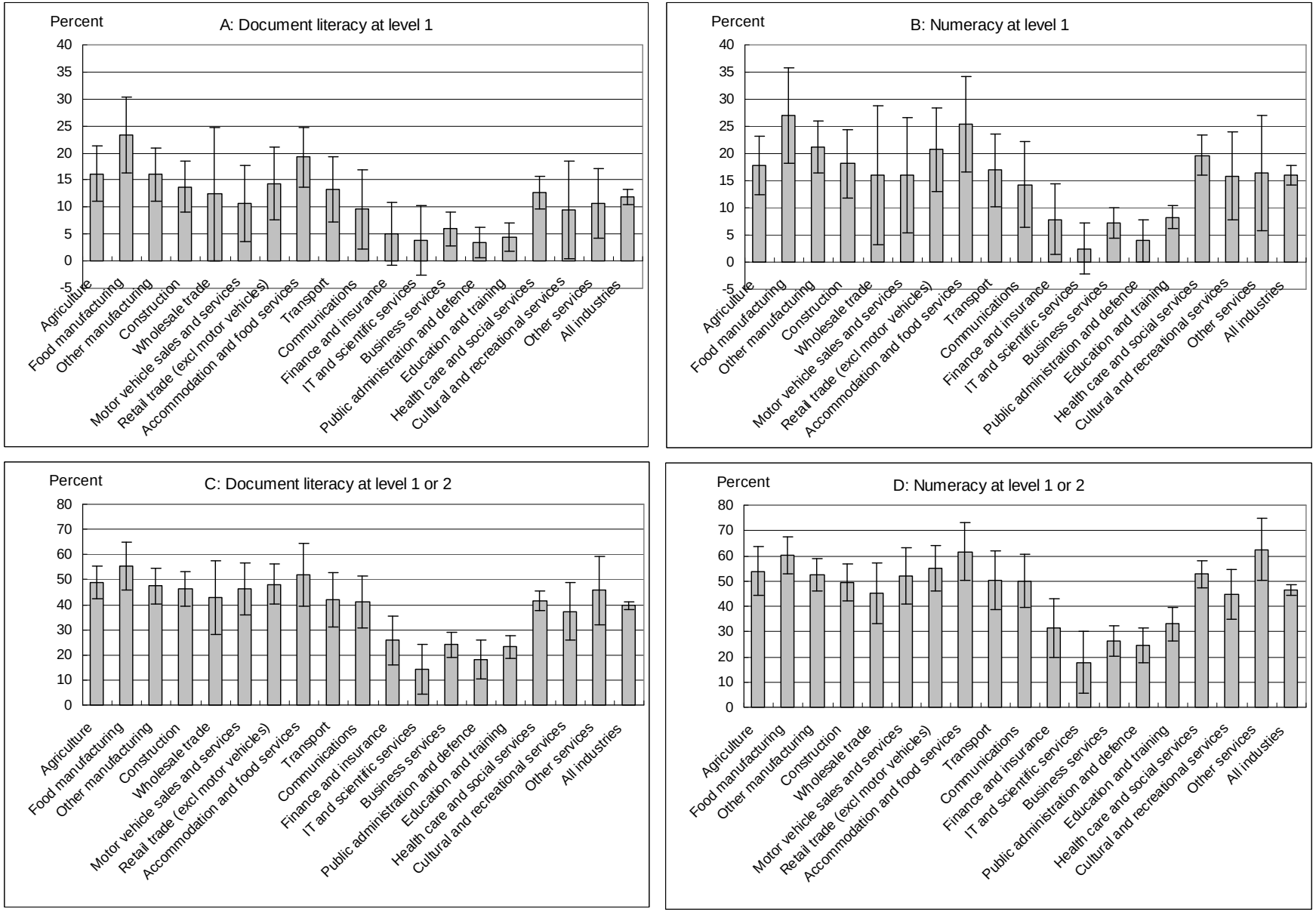
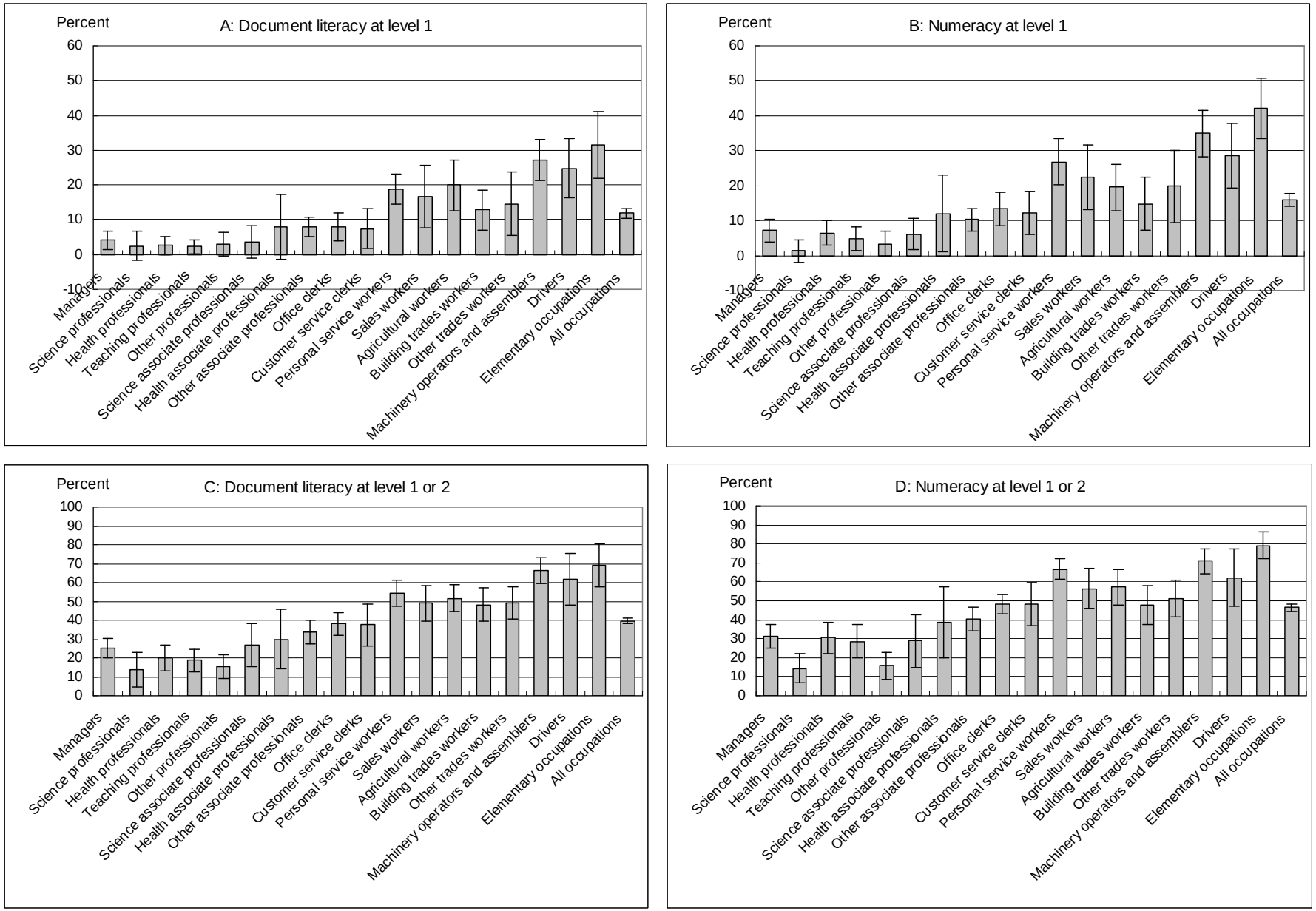


Figure 6: Proportion of workers with low literacy or low numeracy skills, by occupational group



- If we consider prose literacy rather than document literacy, the results are similar although not identical. Food manufacturing, accommodation and food services, and construction had the highest proportions of workers with prose literacy at level 1 (21 percent, 19 percent and 17 percent respectively). The agriculture, other manufacturing, motor vehicle sales and service, retail trade and transport industries were also estimated to have more than 10 percent of workers at level 1.
- **Level 1 or 2**: The industries with the highest proportions of workers with document literacy at either level 1 or level 2 were food manufacturing (56 percent) and accommodation and food services (52 percent).
- The industries with the lowest proportions of workers assessed as having low literacy skills were finance and insurance, information technology and scientific services, business services, public administration and defence, and education and training.

Industries – numeracy

- **Level 1**: Food manufacturing, other manufacturing, accommodation and food services, and retail trade had the highest proportions of workers whose numeracy skills were assessed as being at level 1 – more than 20 percent.
- **Level 1 or 2**: More than 50 percent of workers were at level 1 or level 2 in terms of their numeracy in the following 10 industries: agriculture, food manufacturing, other manufacturing, motor vehicle sales and service, retail trade, accommodation and food services, transport, communications, health care and social services, and other business and personal services.
- The industries with the lowest proportions of workers with low numeracy were information technology and scientific services, public administration and defence, and business services.

Occupations – literacy

- **Level 1**: Elementary occupations, machinery operators and assemblers, and drivers had the highest shares of workers with document literacy skills at level 1 (32 percent, 27 percent and 25 percent respectively). The occupational groups with the next highest proportions include personal service workers, sales workers, agricultural workers, building trades workers and other trades workers.
- **Level 1 or 2**: More than half of all workers in the following occupational groups had document literacy scores at either level 1 or level 2: elementary occupations (69 percent), machinery operators and assemblers (66 percent), drivers (62 percent), personal service workers (54 percent) and agricultural workers (52 percent).
- If prose literacy is considered rather than document literacy, the patterns are similar. Workers in the elementary occupations, machinery operators and assemblers, and drivers occupational groups had the highest proportions of workers whose prose literacy was at level 1 (29 percent, 27 percent and 25 percent respectively).

Occupations – numeracy

- **Level 1**: The elementary occupations, machinery operators and assemblers, and drivers occupational groups had the highest proportions of workers with numeracy skills at level 1 (42 percent, 35 percent and 29 percent respectively). In two further occupational groups, personal service workers and sales workers, more than 20 percent of workers had level 1 numeracy skills.
- **Level 1 or 2**: More than 50 percent of the workforce had numeracy skills at levels 1 or 2 within seven occupational groups: elementary occupations, machinery operators and assemblers, personal service workers, drivers, agricultural workers, sales workers and other trades workers.

Summarising and simplifying a little, the industries in which low literacy and numeracy skills were most common were agriculture, manufacturing, transport, retail trade, and accommodation and food services, while the occupational groups in which low foundation skills were most common were the elementary occupations, machinery operators and assemblers, drivers, personal service workers, sales workers and agricultural workers. These are industries and occupations in which many workers have relatively little formal education. Several of these industries and occupations also employ a relatively high proportion of recent immigrants and/or ESOL speakers: the accommodation and food services industry, and the personal service workers, drivers, machinery operators and assemblers, and elementary occupational groups. Tables A6 and A7 in Appendix 3 provide supplementary information on the workforce characteristics of each industry and occupational group.

At the time of the survey, approximately 37 percent of all employment in the economy was located in the agriculture, manufacturing, transport, retail trade, and accommodation and food services industries – the industries we have identified as having the highest proportions of workers with low foundation skills. About half (52 percent) of all workers with level 1 literacy skills and 43 percent of those with level 2 literacy skills worked in these industry groups.

About one-third (34 percent) of the workforce was employed in the six broad occupational groups we have identified as having the highest proportions of workers with low foundation skills – the elementary occupations, machinery operators and assemblers, drivers, personal service workers, sales workers and agricultural workers). Two-thirds (65 percent) of workers with level 1 literacy skills and 44 percent of workers with level 2 literacy skills were employed in these six occupational groups. Further statistics on the industrial and occupational distribution of workers categorised by their level of foundation skills can be found in Section 3.

5. FURTHER EDUCATION AND TRAINING

5.1 Introduction

Literacy and numeracy skills tend to be chiefly acquired in the early years of life through the formal educational system, but the learning activities that are undertaken during the remaining years, at work or outside of work, can also contribute to the retention or further development of these skills. Birth cohort studies that follow individuals over their life course have shown that literacy and numeracy skills tend to decline with age (Willms and Murray, 2007), but are less likely to do so if tasks requiring literacy and numeracy skills are regularly undertaken. For this reason, it is interesting to examine the learning activities of workers with relatively low levels of literacy or numeracy.

As part of the Government's strategy to raise literacy and numeracy skills, literacy and numeracy teaching and assessment will increasingly be embedded into vocational training (Tertiary Education Commission, 2008, p.9). In this way, people studying for a certificate in an education setting or participating in industry training will be able to improve their reading, writing and mathematical skills in the course of their vocational learning. This policy direction also provides an impetus for considering what can be learnt from ALL on the further education and training participation patterns of less literate adults at the time the ALL survey was carried out. We focus particularly on the learning activities of workers aged 25 and over, because we are most interested in the 'further' education and training that adults do after they have made the transition from full-time education to employment.

The education and training questions in ALL distinguish between courses or programmes of study that lead to a qualification and courses that do not lead to a qualification. The questions were not restricted to courses completed at work or for work purposes. However, the vast majority of learners said that their main reason for studying towards a qualification or taking a course was a job or career-related reason. This does not necessarily mean that the study or course was related to the job they currently held. Many tertiary students work in part-time or temporary jobs that are unrelated to their course of study, for financial reasons.

Because the reference period for the education and training questions was the previous 12 months, the learning that was recorded in ALL could have been carried out in a school or tertiary institution in the period before the worker was recruited to the job they currently held or in a previous job in a different industry or occupation. However, any type of formal learning has the potential to raise or maintain literacy and perhaps numeracy skills, and the study and course participation rates discussed here give an indication of how many workers in each industry or occupation had recently undertaken some form of structured education or training.

It seems likely that the ALL survey's measure of 'studying for a qualification' will cover participation in provider-based tertiary education courses and participation in workplace-based industry training programmes. Most industry training

programmes lead to qualifications at levels 1–4 in the National Qualifications Framework. ALL's measure of 'other courses not leading to a qualification' is likely to cover short courses that are delivered through workplaces and funded by employers, as well as short courses that are undertaken by adults at their own initiative.

Section 5.2 summarises the education and training rates of the working-aged population and workforce as a whole to provide a context for the rest of the analysis. Section 5.3 compares the further education and training rates of workers with low literacy skills and workers with higher literacy skills. Section 5.4 analyses the demographic and job characteristics of the workers who participated in further education or training, to identify factors that may increase the likelihood of participation. Section 5.5 concludes.

5.2 Education and training rates

Compared with other countries that have also conducted ALL, the rate of participation in programmes of study leading to a qualification was relatively high in New Zealand. Details are given in Table 5. Twenty-seven percent of all adults aged 16–65 did some study towards a qualification in the previous 12 months, compared with 16–21 percent in Canada, Norway, Switzerland and the United States. However, average hours of study per participant appear to be lower in New Zealand than elsewhere.[5] This could be because the courses or study programmes are shorter on average in New Zealand than in other countries or because a higher rate of participation is associated with a higher rate of non-completion.

Table 5: Education and training of the working-aged population during the past year – New Zealand compared with other OECD countries

	Study towards a qualification			Other courses		
	Participation rate (%)	Average hours per participant	Average hours per capita	Participation rate (%)	Average hours per participant	Average hours per capita
New Zealand	27	526	143	31	54	17
Canada	16	595	94	25	63	16
Norway	21	895	185	31	48	25
Switzerland	20	640	125	40	61	15
United States	20	574	114	21	65	14

Note: The data for New Zealand were collected in 2005–07. The data for the other countries were collected in 2003 and sourced from Rubenson et al, 2007.

Evidence presented later in this paper indicates that adults with higher levels of educational attainment are more likely than those with lower levels of educational attainment to participate in further education or training, even when other

[5] Some assumptions had to be made to calculate average hours of study for all participants. Respondents who said that they mostly studied on a full-time basis, for at least 8 months of the last 12, were assumed to have spent 1,200 hours. Respondents who said they mostly studied on a full-time basis but for less than 8 months were assumed to have studied for 162 hours in each month of study. Respondents who said they mostly studied on a part-time basis were asked to estimate their actual hours of study during the year, and those responses were used in the calculations.

characteristics, including the individual's literacy skill level, are taken into account. As discussed in Section 2, more highly educated adults appear to be somewhat over-represented in the ALL sample, and it is possible that this feature of the sample composition is contributing to a relatively high measured rate of participation in programmes leading to qualifications.

The rate of participation in courses that do not lead to a qualification in New Zealand, and the average hours spent on such courses by participants, were broadly comparable with the rates reported in the other countries: New Zealand is in the middle of the distribution. Although the average number of hours spent on courses by participants may seem high at 54 hours, this represents the total time spent on up to three courses. The average duration of an individual course was 30 hours, and the median duration was 10 hours.

Adults who were currently employed were less likely than the working-aged population as a whole to have studied towards a qualification in the last 12 months (see Table 6), but they were more likely to have taken a course or courses. Twenty-three percent of the employed did some study towards a qualification,[6] and 36 percent took a course that was not intended to lead to a qualification. Overall, 52 percent of employed people reported that they participated in a programme of study, a course or both types of learning during the previous 12 months.

Table 6: Education and training rates of working-aged and employed adults, previous year

	Study towards a qualification			Other courses		
	Participation rate (%)	Average hours per participant	Average hours per capita	Participation rate (%)	Average hours per participant	Average hours per capita
All working-aged adults	27	526	143	31	54	17
All employed	23	315	73	36	42	15
Employed and aged 25 or over	20	210	41	38	40	15
Employees aged 25 and over						
All courses	22	214	47	39	42	17
Courses with employer funding	12	120	15	28	NA	NA

Note: The duration of employer-funded courses is not shown in the table because information on the sources of funding was not collected separately for each individual course.

Per employed participant, the average number of hours of study towards a qualification was 315. Per worker, the average number of hours was 73. To put these figures in context, a full-time full-year educational course is expected to require at least 1,200 hours of study. It is likely that many participants were either studying part-time or for part of the year only.

[6] The Household Labour Force Survey also measures participation in courses of study towards a qualification but uses a shorter reference period of one week. On average during the period from 1 April 2006 to 31 March 2007, 12.2 percent of all adults aged 16–65 and 10.2 percent of employed adults in this age group said they had undertaken some study towards a qualification in the week before the interview. In both the HLFS and ALL, the participation rate of the employed was approximately 85 percent of the participation rate of the whole of the working-aged population.

The rate of participation in study programmes leading to qualifications is slightly lower if the population is restricted to employed people who were aged 25 or over, but not much lower (20 percent rather than 23 percent). However, the average hours of study per participant are considerably lower when 16–24 year olds are excluded (210 rather than 315). The rate of participation in courses not linked to a qualification was slightly higher among workers aged 25–65 than among all workers.

People who did some study or courses were asked to say who contributed to the costs (for example, their employer, the government or themselves). Only employees can receive employer funding, and therefore we restrict the analysis to employees aged 25 years or over and exclude the self-employed. Information on all education and training courses undertaken by employees and the courses they took that were identified as receiving funding from employers is shown in the final two rows of Table 6.

Because employees do not always know how the courses they attend are financed, it is possible that there is some under-estimation of the total volume of employer-funded education and training. Nevertheless, the results indicate that about 55 percent of employees who did qualifications-oriented study or training were partly or fully employer-funded, and around 70 percent of employees who did other courses (not leading to qualifications) received some employer funding.

5.3 Education and training rates of workers with different levels of literacy or numeracy

For the rest of this section, we examine the learning of workers aged 25 years and over, excluding the under-25s as a crude method of excluding those who have not yet completed the first phase of their formal education. We are interested in the 'further' education and training that adults do when they have already made a transition from full-time education to employment.

The relationship between level of literacy or numeracy skills and rates of participation in further education and training, for workers aged 25 years and over, is explored in Table 7. In general, rates of study towards a qualification do not vary greatly by foundation skill level: lower skilled adults were about as likely to have undertaken some study towards a qualification as adults with higher levels of literacy or numeracy skills. Workers with level 1 literacy skills are a partial exception to this statement. The 'volume' of studying time per participant is also fairly constant across skill levels. In other words, average hours of study per participant does not show much of a literacy or numeracy skill gradient.

Table 7: Education and training rates of workers aged 25 years and over by their level of literacy or numeracy skill

	Participation rates (%)			Average hours per participant	
	Study towards a qualif-ication	Other courses	Study and courses	Study towards a qualif-ication	Other courses
All education and training					
All employed	*20*	*38*	*51*	*210*	*40*
Level 1 literacy	14	17	28	214	58
Level 2 literacy	21	28	43	194	45
Level 3 literacy	21	44	57	210	37
Level 4/5 literacy	19	50	61	228	39
Level 1 numeracy	18	16	32	192	44
Level 2 numeracy	23	34	50	237	46
Level 3 numeracy	18	42	54	196	38
Level 4/5 numeracy	18	52	63	194	38
Employer-funded education and training					
All employees	*12*	*28*	*38*	*120*	*NA*
Level 1 literacy	8	14	19	127	NA
Level 2 literacy	13	19	30	105	NA
Level 3 literacy	13	33	43	124	NA
Level 4/5 literacy	13	40	49	129	NA

The absence of a stronger literacy skill gradient in study rates may partly reflect the role of industry training in New Zealand, which provides workplace-based training to workers who typically do not have high levels of education. In 2006, for example, around 176,000 individuals participated in industry training programmes (Tertiary Education Commission, 2007, p.3), of whom 122,500 were aged 25 years or over. Those workers represented about 7 percent of the total number of employed persons aged 25 years and over who were employed on average during 2006.[7] However, the majority of industry training participants were workers who did not already have post-school qualifications, and the vast majority of the qualifications they gained were at levels 1–4 of the National Qualifications Framework. Workplace-based training opportunities are likely to be particularly important in engaging workers with low foundation skills because much of the learning is undertaken in work time and employers often facilitate the enrolment process.

In contrast to this pattern, workers with low literacy or numeracy skills were substantially less likely to have participated in courses that were not linked to a qualification than workers with higher skills. For instance, only 17 percent of workers with level 1 document literacy skills reported taking part in a course, compared with 50 percent of workers who were at level 4 or 5. This finding is not surprising, as this category of learning is dominated by relatively short courses that are funded by employers (and probably undertaken in work time). Studies of

[7] HLFS data indicate that around 1,704,000 persons aged 25–64 were in employment on average during 2006.

the incidence of employer-funded training that is delivered within workplaces almost universally find that workers with higher levels of educational attainment tend to do more of this type of training. This pattern has also been found in analyses of ALL data for other countries. For example, Rubenson et al (2007, p.37) reports there is a strong positive relationship between the literacy skills of individuals and their rates of participation in organised forms of learning in four countries that carried out ALL surveys (Canada, the US, Switzerland and Norway).

Figure 7: Further education and training participation rates for workers aged over 25, by literacy skill level

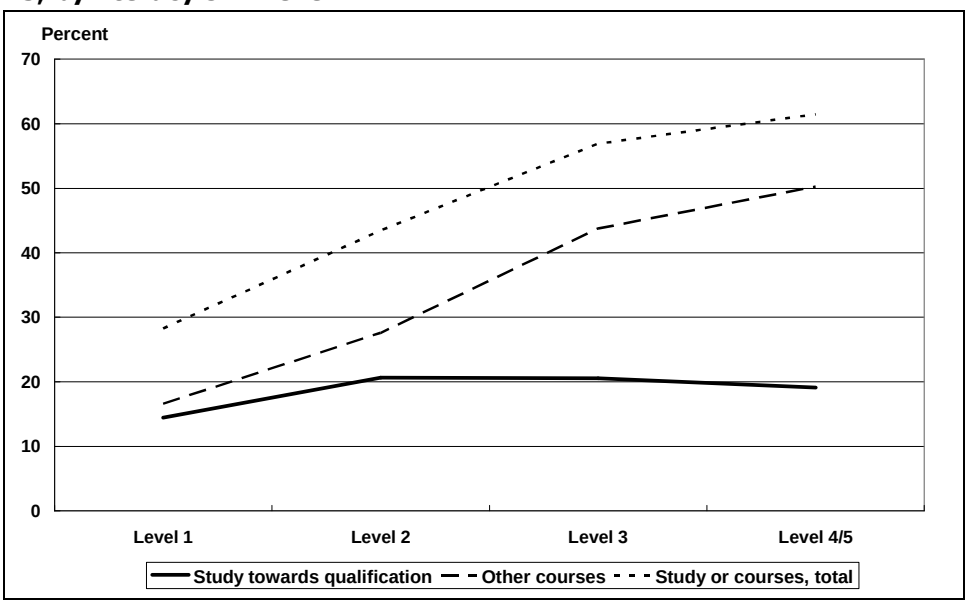


Table 7 also indicates that the proportion of employees who received employer funding for study towards a qualification (which was 12 percent overall) did not vary much by the worker's literacy skill level. In contrast, employees with higher literacy skills were far more likely than employees with lower skills to have taken courses that were not linked to qualifications, with employer funding. Although this disparity in course participation may put workers with low literacy or numeracy skills at a disadvantage when it comes to retaining or developing their skills, the total volume of learning time associated with such courses is considerably less than the volume of learning time associated with qualifications-linked courses.

5.4 Who is more likely to participate in further education or training?

In this section of the paper, we examine the further education and training patterns of workers with relatively low literacy skills in more detail, as well as those of all workers aged 25 and over. The main objective is to better understand which types of worker – viewed in terms of their demographic, educational and job characteristics – are more likely to undertake further education and training, despite having relatively low literacy skills. 'Low literacy skills' is defined here as level 1 or 2 on the document literacy scale.

The education and training rates of employed people aged over 25 are likely to be influenced by a variety of factors including their own preferences and choices, their family circumstances and the learning opportunities that are made available to them, particularly through work. Individuals of different ages and educational levels have different incentives to undertake further education and training. Some occupations and careers require or reward a higher level of continuing education than others. Firm characteristics such as size, profitability, capital intensity and technology will influence both the need and the incentives that employers have to provide training to their workforces. Government subsidies will also influence the incentives that firms in different industries have to provide training.

5.4.1 Education and training rates by worker characteristics – descriptive statistics

We begin by presenting simple summary statistics on the further education and training rates of workers in the ALL survey, disaggregated by their demographic, socio-economic and job characteristics. These summary statistics are set out in Table 8 (studying for qualifications) and Table 9 (participation in other courses). Each table shows the participation rates for all workers on the left and the participation rates for workers with low literacy skills on the right, along with the confidence intervals associated with each rate. For some socio-economic groups, the sample sizes in ALL are relatively small, especially when we focus on the 'low literacy' sub-sample, leading to relatively imprecise estimates of studying and course rates with fairly large sampling errors. We comment only on the differences between population groups that are statistically significant at the 95 percent confidence level.

For all workers aged 25 and over, the descriptive statistics indicate the following:

- Rates of studying for qualifications are similar for men and women, but women were more likely than men to have taken courses that were not linked to qualifications.
- Older workers were less likely to study for a qualification than younger workers. There is not a clear age gradient in rates of undertaking courses that are not linked to qualifications, however.
- Māori were more likely to have studied for a qualification than Europeans. Their rate of undertaking other types of courses was not significantly different from that of Europeans.
- Workers with a Pacific ethnic affiliation were significantly less likely than Europeans to have participated in a course that was not linked to a qualification, suggesting they were less likely to have received employer-funded training.
- Workers who had a tertiary qualification already (including level 1–3 qualifications) were more likely to undertake further education than those who did not. This is true of both study for qualifications and participation in other courses.

Table 8: Rates of studying for a qualification, by worker and job characteristics

	All workers aged 25 or over			Workers with low literacy skills (level 1 or level 2)		
	Partic-ipation rate	95 percent confidence intervals		Partic-ipation rate	95 percent confidence intervals	
		Lower	Upper		Lower	Upper
All demographic and labour force groups	19.6	*18.5*	*20.6*	18.7	*16.4*	*21.1*
Gender and age group						
Males	19.2	*17.6*	*20.9*	19.7	*16.3*	*23.0*
Females	19.9	*18.7*	*21.1*	17.8	*15.1*	*20.4*
Aged 25-34	26.0	*23.5*	*28.5*	21.8	*16.9*	*26.7*
Aged 35-44	21.2	*18.8*	*23.6*	19.0	*15.1*	*22.9*
Aged 45-54	16.2	*14.6*	*17.8*	18.7	*14.8*	*22.6*
Aged 55-65	13.8	*10.8*	*16.8*	15.4	*10.4*	*20.3*
Ethnic group						
European	18.1	*17.0*	*19.3*	15.9	*12.9*	*18.9*
Maori	31.2	*25.9*	*36.5*	30.5	*22.6*	*38.3*
Pacific	24.0	*17.6*	*30.4*	22.0	*15.2*	*28.7*
Asian	20.7	*16.8*	*24.6*	20.6	*14.1*	*27.1*
Birthplace and language						
Born in New Zealand	19.2	*17.9*	*20.5*	18.0	*15.2*	*20.9*
Recent immigrant	25.6	*19.3*	*31.8*	20.7	*12.4*	*29.0*
Speaks English as second language	22.0	*18.6*	*25.3*	20.4	*16.2*	*24.5*
Education						
Completed 5th form /year 11 or less	13.7	*11.4*	*16.0*	12.2	*9.4*	*15.1*
Upper secondary education	15.4	*12.1*	*18.7*	11.8	*8.5*	*15.1*
Post-school level 1,2 or 3 qualification	24.1	*19.4*	*28.7*	26.8	*19.4*	*34.2*
Level 4 qualification	20.3	*15.5*	*25.2*	19.5	*14.1*	*24.9*
Level 5, 6, or 7 qualification	24.3	*21.0*	*27.5*	19.7	*14.2*	*25.2*
Degree	21.2	*19.1*	*23.3*	32.5	*24.0*	*41.0*
Job characteristics						
Employee	21.9	*20.6*	*23.1*	20.4	*17.7*	*23.0*
Self-employed	10.9	*9.0*	*12.8*	10.8	*6.7*	*14.9*
Full-time employed	20.4	*19.0*	*21.8*	19.1	*16.3*	*21.9*
Part-time employed	16.2	*13.2*	*19.3*	17.5	*12.3*	*22.6*
Enterprise size (number of employees)						
Firm size 1-19 employees	14.7	*12.9*	*16.6*	14.0	*10.5*	*17.5*
Firm size 20-99 employees	17.7	*14.7*	*20.7*	17.9	*12.0*	*23.7*
Firm size 100-9999 employees	22.1	*19.0*	*25.2*	18.5	*12.8*	*24.2*
Firm size 1000 or more employees	26.7	*24.1*	*29.4*	28.0	*24.4*	*31.6*
Industry						
Agriculture, forestry and fishing	16.7	*12.8*	*20.5*	14.4	*7.9*	*21.0*
Manufacturing	16.7	*13.5*	*20.0*	14.1	*10.5*	*17.7*
Wholesale and retail trade	11.9	*8.4*	*15.4*	7.8	*4.1*	*11.6*
Food services and accommodation	20.8	*12.2*	*29.3*	12.7	*5.6*	*19.9*
Transport and communications	15.0	*10.2*	*19.7*	8.8	*1.4*	*16.2*
Finance and business services	12.0	*9.1*	*14.9*	10.9	*4.0*	*17.8*
Public administration and defence	29.5	*22.9*	*36.0*	35.0	*17.8*	*52.2*
Education and training	26.7	*22.5*	*31.0*	40.1	*31.9*	*48.4*
Health and community services	32.5	*28.1*	*37.0*	33.0	*26.4*	*39.6*
Sample size	4561			1885		
Estimated population size (000s)	1668.4			638.7		

Note: Respondents could give more than one ethnic affiliation, and if they did so, they are counted in each applicable ethnic group. Recent immigrants are people who were born outside New Zealand and moved to New Zealand in 2001 or more recently.

Table 9: Rates of participation in courses that were not linked to a qualification, by worker and job characteristics

	All workers aged 25 or over			Workers with low literacy skills (level 1 or level 2)		
	Partic-ipation rate	95 percent confidence intervals		Partic-ipation rate	95 percent confidence intervals	
		Lower	Upper		Lower	Upper
All demographic and labour force groups	37.7	*36.1*	*39.3*	24.2	*21.6*	*26.8*
Gender and age group						
Males	34.5	*32.0*	*37.1*	21.7	*18.9*	*24.6*
Females	41.3	*39.1*	*43.5*	26.9	*23.4*	*30.4*
Aged 25-34	35.7	*32.8*	*38.5*	22.6	*16.7*	*28.5*
Aged 35-44	38.9	*36.2*	*41.5*	25.9	*20.5*	*31.3*
Aged 45-54	41.1	*38.0*	*44.2*	21.6	*17.2*	*26.0*
Aged 55-65	33.2	*29.9*	*36.4*	27.2	*21.7*	*32.7*
Ethnic group						
European	39.5	*37.4*	*41.7*	25.5	*22.5*	*28.4*
Maori	35.2	*30.4*	*40.0*	27.1	*20.7*	*33.5*
Pacific	19.8	*14.3*	*25.3*	14.1	*9.0*	*19.1*
Asian	27.5	*20.9*	*34.1*	19.5	*12.7*	*26.3*
Birthplace and language						
Born in New Zealand	38.6	*36.9*	*40.3*	25.2	*22.6*	*27.9*
Recent immigrant	34.5	*27.1*	*41.9*	20.3	*10.9*	*29.7*
Speaks English as second language	26.7	*22.1*	*31.4*	19.1	*13.0*	*25.1*
Education						
Completed 5th form /year 11 or less	23.2	*20.5*	*25.9*	17.6	*14.5*	*20.7*
Upper secondary education	30.1	*25.5*	*34.7*	20.3	*13.7*	*27.0*
Post-school level 1,2 or 3 qualification	31.8	*26.3*	*37.3*	25.5	*17.9*	*33.1*
Level 4 qualification	37.4	*32.2*	*42.5*	26.1	*17.9*	*34.2*
Level 5, 6, or 7 qualification	46.1	*41.7*	*50.5*	30.3	*21.8*	*38.7*
Degree	51.0	*47.4*	*54.6*	38.3	*30.4*	*46.2*
Job characteristics						
Employee	39.2	*37.6*	*40.8*	24.9	*21.9*	*28.0*
Self-employed	31.9	*28.4*	*35.5*	20.9	*16.4*	*25.4*
Full-time employed	38.3	*36.5*	*40.1*	24.4	*21.4*	*27.4*
Part-time employed	35.2	*30.7*	*39.8*	23.7	*18.5*	*28.9*
Enterprise size (number of employees)						
Firm size 1-19 employees	29.7	*27.5*	*31.8*	17.2	*9.7*	*24.6*
Firm size 20-99 employees	42.4	*38.6*	*46.2*	16.5	*9.2*	*23.7*
Firm size 100-9999 employees	41.2	*36.7*	*45.8*	17.4	*12.9*	*21.9*
Firm size 1000 or more employees	46.3	*42.6*	*50.0*	16.9	*5.3*	*28.4*
Industry						
Agriculture, forestry and fishing	24.9	*19.5*	*30.4*	17.4	*10.6*	*24.1*
Manufacturing	29.4	*25.7*	*33.2*	16.9	*12.1*	*21.7*
Wholesale and retail trade	27.8	*23.1*	*32.4*	18.6	*13.6*	*23.6*
Food services and accommodation	27.0	*20.1*	*34.0*	27.7	*16.3*	*39.1*
Transport and communications	31.4	*22.1*	*40.6*	20.9	*12.5*	*29.3*
Finance and business services	41.5	*34.7*	*48.4*	30.4	*20.7*	*40.2*
Public administration and defence	57.0	*50.0*	*64.0*	36.4	*22.8*	*49.9*
Education and training	55.1	*51.0*	*59.1*	41.9	*32.2*	*51.6*
Health and community services	50.9	*45.6*	*56.3*	33.6	*26.7*	*40.5*
Sample size	4561			1885		
Estimated population size (000s)	1668.4			638.7		

Note: Respondents could give more than one ethnic affiliation, and if they did so, they are counted in each applicable ethnic group. Recent immigrants are people who were born outside New Zealand and moved to New Zealand in 2001 or more recently.

- Employees were twice as likely to have studied for a qualification as the self-employed. They were also more likely to have taken other courses.
- Workers at larger enterprises (particularly those with more than 1,000 employees but also those with more than 100 employees) were more likely to have participated in both types of further education and training than those who worked at small or medium-sized enterprises.
- Using broadly defined industry groups, the industries with the highest rates of studying towards a qualification were health care and social services, public administration and defence, and education and training.
- For courses that do not lead to qualifications, there is also a clear pattern of higher participation by workers in the three industry groups that have the highest levels of public ownership or public funding – public administration, education and training, and health and community services – than elsewhere in the economy.

If we consider the further education and training rates of workers with low literacy skills (shown in the right-hand columns of each table), most of these general patterns also hold true. This suggests that an understanding of the drivers of participation in further education and training for workers in general is likely to be relevant for understanding the drivers of participation by less literate adults.

5.4.2 Multivariate analysis of further education and training participation patterns

When considering the relationship between any particular characteristic and education or training participation rates, it is important to control for other factors that may also be influencing the probability of studying or training. For example, the higher course participation rate of women may be due to differences in the occupational or industry distribution of women and men, rather than any gender-specific differences in the motivation to learn or the likelihood of being sent on training courses by employers. Women may tend to work in the types of occupations or industries in which there is a high level of emphasis on further education or training.

Binomial logistic regression models were used to explore the association between particular characteristics and studying or training rates, while holding all other variables constant. These regression models use information on the personal and job characteristics of individuals to predict the likelihood of studying or training. Using the model estimates, the impact (or marginal effect) of a change in one characteristic on the chance of participating, while holding all other measured characteristics constant at their mean values, can be estimated.[8] If there are systematic differences in participation rates by personal and job characteristics,

[8] Because the logit model is non-linear, the marginal effect of each independent variable is not constant, as in a linear regression model. Rather, it varies according to the values of all the other independent variables that are included in the model. In this paper, we adopt the conventional approach to reporting the marginal effects of each independent variable by evaluating the probabilities at the sample averages for all other independent variables.

this could reflect differences in the opportunities that are open to workers, although other more direct evidence would be needed to verify whether this is the case.

The likelihood of participation in a) programmes leading to a qualification and b) other courses was modelled. The characteristics that were included in the regression models as explanatory variables were: gender; five-year age group; ethnic affiliation; whether born overseas and recently migrated to New Zealand; whether an ESOL speaker; level of educational attainment; literacy skills measured on the document literacy scale; whether self-employed; whether working part-time hours; firm size; and occupation and industry of employment. Most characteristics are categorical rather than numeric and were included in the regression model using a set of dummy variables. For each characteristic, we omit the group or 'category' whose studying or course participation rate was closest to the all-sample average. The omitted group becomes the reference group against which the results for the other groups are compared.

Summary results are presented in Table 10, and the full results are presented in Tables A8 and A9 in Appendix 3. Here, we summarise the main findings on the statistically significant effects.

Likelihood of studying or training for a qualification – all workers aged 25 and over

Estimates from a regression model of the probability of studying for a qualification that was estimated using the entire sample of workers aged 25 and over indicate the following:

- Workers aged 25–29 years were more likely to study for a qualification than workers aged 30 or over (and 9 percentage points more likely to do so than the omitted age group of 40–44 year olds, after controlling for the effects of other factors). Workers aged 50 and over were less likely to study towards a qualification.
- Workers with a Māori ethnic affiliation (alone or in combination with other ethnic groups) were more likely to study than Europeans (9 percentage points more likely).
- Workers with no qualifications or school-level qualifications only were less likely to have studied (about 6 percentage points less likely than workers with a level 4 qualification – the omitted educational group).
- The self-employed were less likely to have studied towards a qualification than employees (by about 5 percentage points).
- Workers who were part-time employed were less likely to have studied than the full-time employed (by about 5 percentage points).
- Those employed in small or medium-sized enterprises were less likely to have studied than those employed at larger firms (those with 100 or more employees). The estimated participation probability of workers who were employed by firms in the largest size group (1,000 plus employees) is 5 percentage points higher than that of workers in the smallest firm size group (1–19 employees).

Table 10: Marginal effects of worker and job characteristics estimated from the regression models of participation in further education or training

	Studied for a qualification		Other courses	
	All workers	Workers with low literacy skills	All workers	Workers with low literacy skills
Female	-0.02	-0.06 *	0.04 *	0.03
Aged 25-29	0.09 *	0.07	-0.06	-0.02
Aged 30-34	0.04	0.00	-0.03	-0.08
Aged 35-39	0.05	0.04	-0.03	-0.04
Aged 45-49	-0.01	0.02	-0.01	-0.08
Aged 50-54	-0.06 *	0.00	-0.01	-0.07
Aged 55-59	-0.03	0.00	-0.09 *	-0.03
Aged 60-65	-0.07 *	-0.04	-0.04	0.01
Maori ethnic affiliation	0.09 *	0.11 *	0.02	0.01
Pacific ethnic affiliation	0.02	0.04	-0.11 *	-0.10 *
Asian ethnic affiliation	-0.02	0.01	-0.06	-0.08
Recent immigrant	0.04	0.01	-0.01	-0.02
Speaks English as second language	0.02	-0.01	-0.06	-0.05
Educational attainment				
Completed 5th form/year 11 only	-0.06 *	-0.07 *	-0.11 *	-0.08
Upper secondary school	-0.06 *	-0.08 *	-0.08 *	-0.05
Level 1, 2, or 3 qualification	0.02	0.05	-0.05	0.01
Level 5, 6, or 7 qualification	0.01	-0.02	0.01	-0.01
Bachelors degree	-0.02	0.02	0.00	0.05
Higher degree	-0.03	0.09	0.03	0.10
Document literacy score in ALL/100	0.02	0.04	0.10 *	0.04
Self-employed	-0.05 *	-0.04	-0.01	0.03
Employed part-time	-0.05 *	-0.02	-0.05	-0.03
Firm size 1-19 employees	-0.03	0.00	-0.09 *	-0.12 *
Firm size 20-99 employees	-0.04 *	0.00	0.00	-0.05
Firm size 1000 or more employees	0.02	0.08 *	0.03	0.03
Industry				
Agriculture	0.05	0.17	0.00	-0.09
Food manufacturing	0.03	0.06	0.01	-0.09
Other manufacturing	-0.05	0.01	-0.04	-0.12
Construction	0.02	0.14	-0.02	-0.05
Wholesale trade	-0.06	-0.02	-0.09	-0.13
Motor vehicle sales and service	0.01	-0.03	-0.03	-0.08
Retail trade (excluding motor vehicles)	-0.09 *	-0.09	-0.02	-0.09
Accommodation and food services	0.00	-0.02	0.02	0.07
Transport	-0.04	-0.04	-0.02	-0.05
Commmuications	-0.05	-0.03	0.03	-0.13
IT and scientific services			-0.05	-0.08
Business services	-0.01	0.01	0.01	-0.04
Public administration and defence	0.05	0.15	0.10	-0.08
Education and training	0.14 *	0.30 *	0.03	0.02
Health care and social services	0.16 *	0.23	0.12	0.00
Cultural and recreational services	0.01	0.13	-0.02	-0.01
Other services	-0.06	-0.08	0.18	-0.04

Note: The models also contained 18 occupational group controls and controls for 'industry not specified' and 'firm size not specified'. *Indicates that the marginal effect was statistically significant at the 95 percent confidence level. The underlying model estimates are given in Appendix 3.

- Workers in the education and training industry and in health and community services were more likely to have studied for a qualification than those

employed in other industries, while workers in retail trade were less likely to have done so.

Likelihood of studying or training for a qualification – workers with low literacy skills

Fewer characteristics showed a statistically significant association with the likelihood of studying for a qualification when the model was restricted to workers with document literacy skills at level 1 or 2. This is partly because the total sample of workers with low literacy skills is relatively small (around 1,900 persons).

Statistically significant effects were found for the following factors:

- Females were less likely to have studied than males by around 6 percentage points.
- Māori were more likely to have studied or trained than Europeans by around 11 percentage points.
- Workers with school level qualifications only or no qualifications were less likely to have studied (7–8 percentage points less likely than workers with level 4 qualifications, the omitted group).
- Those employed in large enterprises with 1,000 employees or more were more likely to have studied or trained than workers at enterprises in any other size group. The estimated participation probability of workers employed by firms in the largest size group (1,000 plus employees) is 8 percentage points higher than the estimated participation probability of workers in the smallest firm size category (1–19 employees).
- Workers who were employed in the education and training industry were more likely to have studied or trained than those in other industries. Their estimated participation probability is 30 percentage points higher than that of workers in finance and insurance, the omitted industry group. It is possible that tertiary students who hold part-time jobs at the institution where they study are contributing to the high education and training participation rate of workers in this industry.

Likelihood of taking other courses – all workers aged 25 and over

Estimates from the regression model of the probability of taking a course that would not lead to a qualification, estimated using the entire sample of workers aged 25 and over, suggest the following:

- Females were more likely to have taken a course than males. However, the estimated gender difference in probability (4 percentage points) is smaller than the gender difference in the unadjusted course participation rates (7 percentage points), indicating that other correlated factors such as job characteristics were contributing to the overall difference in the descriptive statistics.
- Workers with a Pacific ethnic affiliation were less likely to have taken a course than Europeans, by around 11 percentage points. This is smaller than the 20 percent difference between Pacific and European workers found in the

unadjusted course participation statistics, suggesting that correlated factors such as educational attainment or job characteristics were contributing to the total course participation gap between Pacific and European workers.

- Workers with no qualifications or school level qualifications only were significantly less likely to have taken a course than workers with a post-school qualification. The lowest educational attainment group was 11 percentage points less likely to have taken a course than workers with a level 4 qualification, the omitted educational group, and 14 percentage points less likely than workers with a higher degree.
- Workers with higher document literacy skills were more likely to have taken a course than those with lower literacy skills.
- People employed in small enterprises were less likely to have taken a course than those employed by large enterprises. Those in the smallest firm size group (1–19 employees) were 9 percentage points less likely to have taken a course than those in organisations with 100–999 employees, the omitted size group, and 12 percentage points less likely to have taken a course than those working in organisations with 1,000 or more employees.

Likelihood of taking other courses – workers with low literacy skills

For workers with low literacy skills, the marginal effect estimates indicate the following:

- Workers with a Pacific ethnic affiliation were less likely to have taken a course than Europeans by around 10 percentage points.
- Workers in very small enterprises (those with less than 20 employees) were less likely to take courses than those employed by larger enterprises (those with 100 employees or more). Those in the smallest firm size group (1–19 employees) were 12 percentage points less likely to have taken a course than those in organisations with 100–999 employees, the omitted firm size group, and 15 percentage points less likely than those in organisations with 1,000 or more employees.

5.4.3 Summary

The analysis in this section indicates, perhaps not surprisingly, that adults who already hold a post-school qualification are more likely to undertake further education and training, and this appears to be true of workers with level 1 or level 2 literacy skills as well as those with skills at level 3 or above.

There are some significant ethnic group variations in the further education and training participation rates measured in ALL that cannot readily be explained using information on educational attainment, age, occupation and industry. Māori workers were more likely than Europeans to have undertaken some education or training towards a qualification, and Pacific workers were less likely than Europeans to have participated in short courses that were not linked to a qualification. Although the reasons for these ethnic patterns are not clear, the Māori/European differential is consistent with documented patterns in the take-up of industry training programmes. In 2006, for instance, 18 percent of participants in industry training programmes were Māori (Tertiary Education Commission,

2007), higher than the proportion of Māori in the workforce. Statistics on students enrolled with tertiary educational providers for level 1–3 certificates also indicate that Māori were over-represented relative to their share in the workforce in 2006.

Recent immigrants and ESOL speakers were somewhat more likely to have studied for a qualification and somewhat less likely to have taken other courses than native-born residents and native-English speakers, but these differences were not statistically significant and tended to decline in size when other characteristics were taken into account.

Substantial firm size variations in the likelihood of a worker undertaking further education and training were identified, even after controlling for worker characteristics, occupation and industry. This was true of both training that is linked to qualifications and training that does not lead to qualifications. Focusing on workers with relatively low literacy skills, we estimated, for example, that the participation probability of workers who were employed by firms in the largest size group (1,000 plus employees) was 8 percentage points higher than that of workers in the smallest firm size group (1–19 employees). We also estimated that workers with low literacy skills in the smallest firm size group (1–19 employees) were 15 percentage points less likely to take a course that was not linked to a qualification than those in organisations with 1,000 or more employees. The model results suggest that firm size has a larger impact on the probability of undertaking training that is not linked to a qualification than on study or training within the qualifications system.

At the time the ALL survey was carried out, 39 percent of the workforce was employed by enterprises (or non-profit organisations) with 1–19 employees, 18 percent by firms with 20–99 employees, 20 percent by firms with 100–999 employees and 24 percent by firms with 1,000 employees or more. Workers with low literacy skills were distributed across firm size groups in a very similar way.[9] The enterprise size patterns suggest that larger employers – those with 100 or more employees – tend to invest in workforce learning to a greater extent than small and medium-sized firms, leading to differences in opportunities across workers. It is also possible, however, that workers at smaller and larger firms differ in ways that contribute to the firm-size differences in education and training participation probabilities and are not fully controlled for in the regressions, such as the motivation to learn.

Differences in participation patterns by industry group were found in the analysis that suggest there may be a positive 'public sector ownership' effect on training rates, but it is difficult to be sure of this as the business sector of the job (public or private) was not measured directly in ALL.

[9] For example, 41 percent of the workers with level 1 document literacy skills were employed by enterprises with 1–19 employees, 17 percent by firms with 20–99 employees, 20 percent by firms with 100–999 employees and 23 percent by firms with 1,000 employees or more. See Table 3 for more details.

5.5 Concluding comments

The ALL results indicate that workers with low literacy and numeracy skills have reasonably high rates of participation in further education and training courses that are linked to qualifications, that is, participation rates similar to those of workers with higher literacy or numeracy skills. In contrast, they are much less likely than workers with higher literacy and numeracy skills to receive or participate in education and training courses that are not linked to qualifications – courses that are much less likely to receive government funding, are frequently funded by employers and are more likely to be delivered in the workplace.

Although courses at tertiary institutions and industry training programmes have the potential to help to maintain or raise the literacy skills of adult learners, an obvious question is how effective they are at doing this in practice, particularly for adults whose existing literacy skills are relatively low. An important dimension of the Government's current strategy for raising the literacy, language and numeracy skills of the workforce is to provide more literacy and numeracy learning opportunities that are 'embedded' within mainstream vocational training courses. Embedded learning opportunities are believed to be more effective in encouraging the participation of less literate or numerate adults and in achieving good learning outcomes. At the time this paper was written, a least two evaluation studies of 'embedded' literacy programmes were underway, and in future, these are likely to provide more information on the effectiveness of those initiatives.

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APPENDIX 1: DESCRIPTION OF THE FIVE SKILL LEVELS

Prose literacy, document literacy and numeracy skills were measured on numerical scales in ALL. People at different levels of skill, according to these measures, can be grouped into five broad levels, where level 1 represents the lowest level of skill and level 5 represents the highest.

- **Level 1** (Scores 0–225): Tasks at this level require the ability to read simple documents, accomplish literal information-matching with no distractions and perform simple one-step calculations.
- **Level 2** (Scores 226–275): This level includes tasks that demand the capacity to search a document and filter out some simple distracting information, achieve low-level inferences and execute one- or two-step calculations and estimations.
- **Level 3** (Scores 276–325): Typical tasks at level 3 involve more complex information-filtering, sometimes requiring inferences and the facility to manipulate mathematical symbols, perhaps in several stages.
- **Level 4** (Scores 326–375): A level 4 task might demand the integration of information from a long passage, the use of more complex inferences and the completion of multiple-step calculations requiring some reasoning.
- **Level 5** (Scores 376–500): Level 5 tasks incorporate the capability to make high-level inferences or syntheses, use specialised knowledge, filter out multiple distractors and understand and use abstract mathematical ideas with justification.

For further information on how literacy and numeracy skills were conceptualised and measured in the survey, see Satherley and Lawes (2007) and Statistics Canada and OECD (2005).

APPENDIX 2: OCCUPATION AND INDUSTRY CLASSIFICATIONS

Table A1: Classification of occupations

2-digit NZSCO99 code	Official title of NZSCO code	Name of occupational group in this paper
11	Legislators and administrators	Managers
12	Corporate managers	Managers
21	Physical, mathematical and engineering science professionals	Science professionals
22	Life science and health professionals	Health professionals
23	Teaching professionals	Teaching professionals
24	Other professionals	Other professionals
31	Physical science and engineering associate professionals	Science associate professionals
32	Life science and health associate professionals	Health associate professionals
33	Other associate professionals	Other associate professionals
41	Office clerks	Office clerks
42	Customer service clerks	Customer service clerks
51	Personal and protective services workers	Personal service workers
52	Salespersons, demonstrators and models	Sales workers
61	Market-oriented agriculture and fisheries workers	Agricultural workers
71	Building trades workers	Building trades workers
72	Metal and machinery trades workers	Other trades workers
73	Precision trades workers	Other trades workers
74	Other craft and related trades workers	Other trades workers
81	Industrial plant operators	Machinery operators and assemblers
82	Stationery machine operators and assemblers	Machinery operators and assemblers
83	Drivers and mobile machinery operators	Drivers
84	Building and related elementary service workers	Machinery operators and assemblers
91	Labourers and related elementary service workers	Elementary occupations
99	Response outside scope	Not specified

Table A2: Classification of industries

ISICR code	International Standard Industry Classification name	Approximate ANZSIC06 two-digit matches	Industry group in this paper
100	Agriculture and hunting	A01 Agriculture	Agriculture
200	Forestry and logging	A03 Forestry and logging	Excluded
500	Fishing (includes aquaculture)	A02 Aquaculture, A04 Fishing, hunting and trapping	Excluded
1000	Coal mining	B06 Coal mining	Excluded
1100	Oil and gas	B07 Oil and gas extraction	Excluded
1300	Metal mining	B08 Metal ore extraction	Excluded
1400	Other mining and quarrying	B09 Non metallic minerals mining and quarrying	Excluded
1500	Food and beverage manufacturing	C11, C12 Food and beverage manufacturing	Food manufacturing
1600	Tobacco manufacturing	C11, C12 Food and beverage manufacturing	Food manufacturing
1700	Textile manufacturing	C13 Textile, leather, clothing & footwear manufacturing	Other manufacturing
1800	Apparel manufacturing	C13 Textile, leather, clothing & footwear manufacturing	Other manufacturing
1900	Leather manufacturing	C13 Textile, leather, clothing & footwear manufacturing	Other manufacturing
2000	Wood manufacturing	C14 Wood product manufacturing	Other manufacturing
2100	Paper manufacturing	C15 Paper product manufacturing	Other manufacturing
2200	Printing	C16 Printing	Other manufacturing
2300	Petroleum manufacturing	C17 Petroleum and coal manufacturing	Other manufacturing
2400	Chemical manufacturing	C18 Chemical manufacturing	Other manufacturing
2500	Plastics and rubber manufacturing	C19 Polymer and rubber manufacturing	Other manufacturing
2600	Other non-metallic manufacturing	C20 Non-metallic mineral product manufacturing	Other manufacturing
2700	Basic metal manufacturing	C21 Primary metal manufacturing	Other manufacturing
2800	Fabricated metal manufacturing	C22 Fabricated metal manufacturing	Other manufacturing
2900	Machinery and equipment manufacturing	C24 Machinery and equipment manufacturing	Other manufacturing
3000	Office accounting and computing machinery manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3100	Electrical machinery manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3200	Radio, TV and communications manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3300	Medical, optical, watches and clocks manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3400	Motor vehicle manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3500	Other transport manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3600	Furniture manufacturing	C25 Furniture and other manufacturing	Other manufacturing
3700	Recycling	C25 Furniture and other manufacturing	Other manufacturing
4000	Electricity, gas and hot water supply	D26, D27 Electricity and gas supply	Excluded
4100	Water supply and waste	D28, D29 Water supply and waste collection	Excluded
4500	Construction	E30, E31, E32 Construction	Construction
5000	Motor vehicle sale and maintenance	G39 Motor vehicle retailing	Motor vehicle sales and service

ISICR code	International Standard Industry Classification name	Approximate ANZSIC06 two-digit matches	Industry group in this paper
5100	Wholesale trade	F33–F38 Wholesale trade	Wholesale trade
5200	Retail trade	G40–G43 Retail trade	Retail trade (excluding motor vehicles)
5500	Hotels and restaurants	H44, H45 Accommodation and food services	Accommodation and food services
6000	Land transport	I46, I47 Road and rail transport	Transport
6100	Water transport	I48 Water transport	Transport
6200	Air transport	i49 Air transport	Transport
6300	Transport support, including travel agents	I52 Transport support services	Transport
6400	Post and telecommunications	I51, J55–J60 Postal & courier services, Information, media & telecommunications	Communications
6500	Finance intermediation	K62 Finance	Finance and insurance
6600	Insurance and pension funding	K63 Insurance and superannuation funds	Finance and insurance
6700	Other financial activities	K64 Auxiliary finance and insurance service	Finance and insurance
7000	Real estate	L67 Property operators and real estate services	Other services
7100	Renting of machinery and equipment	L66 Rental and hiring services	Other services
7200	Computer and related activities	M70 Computer systems design and related activities	Information technology and scientific services
7300	Research and development	M69 Other professions, scientific & technical services	Information technology and scientific services
7400	Other business activities (includes legal, accounting, auditing, architectural, engineering and advertising services)	N72 Administrative support services	Business services
7500	Public administration and defence (includes police and law enforcement services)	O75, O76, O77 Public administration and defence	Public administration and defence
8000	Education	P80, P81, P82 Education and training	Education and training
8500	Health and social work (includes health care, residential and non-residential care services)	Q84, Q85, Q86, Q87 Health care and social services	Health and social services
9000	Sewage and refuse disposal	N73, D28–D29 Water supply and waste collection	Excluded
9100	Activities of membership organisations (includes trade unions, business and professional organisations)	N72 Administrative support services	Business services
9200	Recreational, cultural and sporting	R89, R90, R91, R92 Art and recreational services	Cultural and recreational services
9300	Other service activities (includes personal and household services)	S94, S95 Other services	Other services
9500	Private households with employed persons	S96 Private households employing staff	Excluded
9998	Refused	X Not stated	Excluded
9999	Not stated	X Not stated	Excluded
9900	Extra-territorial organisations	N72 Administrative support services	Cultural and recreational services

APPENDIX 3: ADDITIONAL TABLES

Table A3: Document literacy data for all employed persons, by industry and occupation

		Results						Precision of the estimates					
								Mean score 95 percent confidence intervals		Percent at level 1 95 percent confidence intervals		Percent at level 1 or 2 95 percent confidence intervals	
	Employment (survey estimate)	Mean score	Percent at level 1 (%)	Percent at level 2 (%)	Percent at level 1 or level 2 (%)	Percent at level 3 (%)	Percent at level 4/5 (%)	Lower	Upper	Lower	Upper	Lower	Upper
Industry													
Agriculture	128,000	271	16.2	32.7	48.9	38.4	12.7	265	277	11.0	21.3	42.4	55.4
Food manufacturing	71,100	266	23.3	32.2	55.5	25.7	18.9	255	276	16.2	30.3	45.9	65.0
Other manufacturing	182,900	274	16.0	31.5	47.5	35.5	17.0	268	281	11.0	21.0	40.3	54.6
Construction	140,500	274	13.8	32.6	46.4	40.9	12.7	267	281	9.1	18.5	39.5	53.2
Wholesale trade	56,500	282	12.4	30.5	42.9	38.2	19.0	269	295	0.1	24.7	28.1	57.6
Motor vehicle sales and services	60,800	278	10.6	35.6	46.2	37.4	16.4	265	290	3.6	17.7	36.0	56.5
Retail trade (excl motor vehicles)	144,400	273	14.3	33.8	48.1	37.4	14.4	263	284	7.6	21.1	40.0	56.4
Accommodation and food services	105,600	266	19.2	32.7	51.9	36.1	12.0	257	276	13.6	24.8	39.4	64.3
Transport	72,200	281	13.3	28.6	41.9	40.7	17.4	272	289	7.2	19.3	31.1	52.6
Communications	44,800	285	9.6	31.5	41.1	40.4	18.4	275	294	2.3	16.9	30.6	51.7
Finance and insurance	59,200	302	5.1	20.8	25.9	44.6	29.5	287	318	-0.7	10.9	16.1	35.6
Information technology and scientific services	42,900	317	3.9	10.4	14.3	42.1	43.7	303	330	-2.6	10.4	4.3	24.2
Business services	151,000	302	6.0	18.0	24.0	44.7	31.3	293	311	2.9	9.2	18.9	29.1
Public administration and defence	90,900	309	3.3	14.8	18.1	46.7	35.1	302	316	0.5	6.2	10.5	25.8
Education and training	197,200	302	4.5	18.8	23.3	47.3	29.5	297	308	1.9	7.1	18.7	27.9
Health care and social services	194,300	282	12.7	28.9	41.6	38.5	19.9	277	286	9.6	15.7	37.7	45.5
Cultural and recreational services	55,500	289	9.5	27.7	37.2	40.4	22.4	280	299	0.5	18.4	25.7	48.7
Other services	52,100	277	10.7	34.9	45.6	42.5	11.9	269	286	4.3	17.2	31.8	59.4
All industries	1,903,100	284	11.9	27.8	39.7	39.8	20.5	281	286	10.5	13.3	38.1	41.3
Occupation													
Managers	207,400	303	4.1	21.1	25.2	42.9	31.9	297	309	1.4	6.8	19.9	30.6
Science professionals	68,000	319	2.5	11.2	13.7	39.4	46.9	309	330	-1.7	6.7	4.5	22.9
Health professionals	94,700	304	2.6	17.5	20.1	50.4	29.6	298	311	-0.2	5.3	13.0	27.1
Teaching professionals	84,300	308	2.3	16.3	18.6	49.4	31.9	302	314	0.3	4.3	12.5	24.8
Other professionals	92,600	316	3.1	12.4	15.5	40.4	44.1	303	330	-0.3	6.5	9.2	21.9
Science associate professionals	51,000	300	3.6	23.1	26.7	44.9	28.3	290	309	-1.0	8.3	15.4	38.2
Health associate professionals	31,600	295	8.0	21.8	29.8	39.0	31.2	280	310	-1.3	17.3	14.0	45.6
Other associate professionals	189,900	292	7.9	25.7	33.6	43.2	23.2	287	298	5.1	10.7	27.5	39.8
Office clerks	195,600	287	8.0	30.2	38.2	43.7	18.1	281	292	3.9	12.1	32.1	44.2
Customer service clerks	66,900	283	7.4	30.0	37.4	50.0	12.6	275	291	1.7	13.1	26.4	48.5
Personal service workers	186,400	265	18.8	35.4	54.2	35.9	9.9	260	270	14.3	23.2	47.4	61.0
Sales workers	93,600	270	16.7	32.4	49.1	38.0	13.0	259	282	7.8	25.6	39.6	58.5
Agricultural workers	128,700	267	20.0	31.6	51.6	36.9	11.5	260	274	12.7	27.3	44.6	58.6
Building trades workers	79,300	274	12.8	35.4	48.2	39.3	12.4	265	284	7.2	18.5	39.2	57.2
Other trades workers	83,000	273	14.6	34.8	49.4	33.6	17.0	263	283	5.4	23.7	40.8	57.9
Machinery operators and assemblers	109,700	250	27.2	39.0	66.2	27.7	6.0	244	256	21.4	33.1	59.5	72.9
Drivers	49,500	256	24.8	36.7	61.5	32.0	6.5	249	263	16.3	33.4	47.8	75.3
Elementary occupations	88,400	244	31.6	37.8	69.4	25.5	5.1	233	255	22.0	41.1	57.9	80.8
All occupations	1,903,100	284	11.9	27.8	39.7	39.8	20.5	281	286	10.5	13.3	38.1	41.3

Table A4: Prose literacy data for all employed persons

	Employment (survey estimate)	Results						Precision of the estimates					
		Mean score	Percent at level 1	Percent at level 2	Percent at level 1 or level 2	Percent at level 3	Percent at level 4/5	Mean score 95 percent confidence intervals		Percent at level 1 95 percent confidence intervals		Percent at level 1 or 2 95 percent confidence intervals	
			(%)	(%)	(%)	(%)	(%)	Lower	Upper	Lower	Upper	Lower	Upper
Industry													
Agriculture	128,000	273	13.7	33.1	46.8	41.6	11.7	266	281	9.3	18.1	40.5	53.0
Food manufacturing	71,100	263	21.3	34.5	55.8	31.8	12.4	254	271	14.2	28.3	46.1	65.6
Other manufacturing	182,900	272	16.0	31.8	47.8	38.9	13.2	267	278	12.5	19.6	40.9	54.9
Construction	140,500	268	16.6	35.6	52.2	39.7	8.1	262	274	11.6	21.6	45.2	59.2
Wholesale trade	56,500	280	8.2	36.9	45.1	38.3	16.5	269	292	1.1	15.4	32.8	57.5
Motor vehicle sales and services	60,800	273	11.6	37.4	49.0	39.1	11.9	264	282	5.3	18.0	36.7	61.3
Retail trade (excl motor vehicles)	144,400	273	14.8	32.5	47.3	39.6	13.1	262	284	8.1	21.5	38.1	56.6
Accommodation and food services	105,600	263	18.9	40.7	59.6	32.0	8.4	253	273	9.3	28.5	47.7	71.5
Transport	72,200	273	15.9	33.3	49.2	39.5	11.2	264	282	8.8	23.0	39.5	58.9
Communications	44,800	280	7.7	34.7	42.4	45.0	12.7	271	288	0.9	14.5	30.7	54.1
Finance and insurance	59,200	293	5.1	21.2	26.3	56.6	17.2	282	303	-0.4	10.7	14.3	38.2
Information technology and scientific services	42,900	306	4.7	12.7	17.4	51.6	31.1	292	320	-1.4	10.7	7.8	27.0
Business services	151,000	297	5.3	18.2	23.5	53.9	22.7	290	303	2.0	8.5	17.4	29.5
Public administration and defence	90,900	302	3.0	19.6	22.6	50.2	27.3	295	309	0.3	5.7	13.9	31.2
Education and training	197,200	306	2.6	17.1	19.7	48.2	32.0	301	311	0.6	4.7	15.2	24.3
Health care and social services	194,300	288	8.0	28.1	36.1	43.2	20.7	283	293	5.4	10.7	32.5	39.7
Cultural and recreational services	55,500	290	5.7	29.4	35.1	45.2	19.6	282	298	0.0	11.5	24.3	46.1
Other services	52,100	274	8.2	44.4	52.6	36.8	10.6	266	282	1.9	14.5	40.3	64.9
All industries	1,903,100	282	10.9	29.4	40.3	42.7	17.0	280	284	9.7	12.1	38.3	42.4
Occupation													
Managers	207,400	298	3.9	22.2	26.1	48.5	25.4	293	304	1.3	6.5	20.5	31.8
Science professionals	68,000	309	3.2	13.8	17.0	48.1	34.8	300	318	-0.4	6.8	7.7	26.4
Health professionals	94,700	308	1.7	15.0	16.7	50.9	32.4	303	314	-0.7	4.0	10.4	22.9
Teaching professionals	84,300	311	0.9	13.0	13.9	51.6	34.6	306	317	-0.3	2.0	8.3	19.4
Other professionals	92,600	308	3.0	12.1	15.1	52.0	32.9	300	316	0.3	5.8	8.8	21.5
Science associate professionals	51,000	293	4.6	27.7	32.3	46.2	21.5	284	303	-0.4	9.6	21.4	43.3
Health associate professionals	31,600	295	5.3	23.2	28.5	47.4	24.1	282	308	-1.9	12.5	14.4	42.7
Other associate professionals	189,900	290	4.8	28.9	33.7	47.8	18.5	286	295	2.2	7.5	26.0	41.5
Office clerks	195,600	287	7.5	28.5	36.0	48.4	15.7	283	291	3.7	11.3	30.7	41.3
Customer service clerks	66,900	284	6.5	30.8	37.3	51.7	11.0	277	291	0.9	12.2	24.4	50.4
Personal service workers	186,400	265	15.7	43.5	59.2	33.1	7.7	261	269	10.7	20.6	53.0	65.4
Sales workers	93,600	270	17.0	30.7	47.7	40.1	12.2	259	281	7.2	26.8	36.0	59.4
Agricultural workers	128,700	271	16.3	32.2	48.5	40.6	10.9	264	277	8.8	23.8	42.0	54.9
Building trades workers	79,300	266	15.6	38.8	54.4	38.8	6.7	258	275	8.4	22.9	44.7	64.2
Other trades workers	83,000	266	15.8	37.6	53.4	37.0	9.6	258	275	9.0	22.7	45.0	62.0
Machinery operators and assemblers	109,700	248	26.9	42.6	69.5	26.5	3.9	241	254	21.1	32.7	63.7	75.4
Drivers	49,500	253	24.6	42.1	66.7	28.6	4.7	245	261	14.7	34.5	54.0	79.5
Elementary occupations	88,400	248	29.1	39.0	68.1	26.0	5.9	239	257	20.9	37.4	57.9	78.4
All occupations	1,903,100	282	10.9	29.4	40.3	42.7	17.0	280	284	9.7	12.1	38.3	42.4

Table A5: Numeracy data for all employed persons

	Employment (survey estimate)	Results						Precision of the estimates					
		Mean score	Percent at level 1	Percent at level 2	Percent at level 1 or level 2	Percent at level 3	Percent at level 4/5	Mean score 95 percent confidence intervals		Percent at level 1 95 percent confidence intervals		Percent at level 1 or 2 95 percent confidence intervals	
			(%)	(%)	(%)	(%)	(%)	Lower	Upper	Lower	Upper	Lower	Upper
Industry													
Agriculture	128,000	268	17.8	36.1	53.9	33.8	12.3	259	276	12.4	23.1	44.3	63.5
Food manufacturing	71,100	260	27.1	33.2	60.3	22.7	17.0	249	270	18.3	35.8	53.0	67.5
Other manufacturing	182,900	269	21.3	31.3	52.6	32.1	15.3	262	275	16.5	26.0	46.1	59.1
Construction	140,500	269	18.1	31.3	49.4	38.6	11.9	262	277	11.9	24.4	42.2	56.7
Wholesale trade	56,500	279	16.0	29.0	45.0	35.6	19.3	267	291	3.3	28.8	33.0	57.1
Motor vehicle sales and services	60,800	272	16.0	36.0	52.0	33.4	14.6	257	287	5.4	26.6	40.8	63.3
Retail trade (excl motor vehicles)	144,400	266	20.7	34.3	55.0	31.3	13.7	255	278	13.1	28.3	46.0	64.0
Accommodation and food services	105,600	259	25.4	36.3	61.7	28.5	9.8	249	268	16.7	34.2	50.4	73.0
Transport	72,200	274	16.9	33.5	50.4	33.2	16.4	265	282	10.3	23.6	38.8	62.1
Communications	44,800	274	14.3	35.8	50.1	35.1	14.8	266	283	6.3	22.2	39.5	60.6
Finance and insurance	59,200	294	7.9	23.6	31.5	38.5	30.1	283	306	1.4	14.3	19.9	43.0
Information technology and scientific services	42,900	320	2.5	15.2	17.7	34.5	47.8	306	333	-2.1	7.1	5.4	30.0
Business services	151,000	302	7.2	19.1	26.3	39.6	34.1	293	311	4.4	10.0	20.1	32.5
Public administration and defence	90,900	305	3.9	20.7	24.6	41.1	34.3	297	313	0.0	7.8	17.7	31.6
Education and training	197,200	293	8.3	24.7	33.0	41.1	26.0	287	299	6.1	10.4	26.3	39.6
Health care and social services	194,300	270	19.7	33.0	52.7	32.1	15.2	264	275	16.0	23.4	47.3	58.1
Cultural and recreational services	55,500	278	15.9	28.9	44.8	38.9	16.4	267	289	7.7	24.0	34.9	54.6
Other services	52,100	265	16.4	46.1	62.5	26.7	10.8	256	274	5.8	27.0	50.2	74.8
All industries	1,903,100	277	16.0	30.4	46.4	34.5	19.1	275	280	14.2	17.7	44.2	48.6
Occupation													
Managers	207,400	296	7.2	24.0	31.2	41.3	27.5	289	303	4.0	10.3	25.1	37.3
Science professionals	68,000	326	1.6	13.1	14.7	31.4	53.9	316	337	-1.8	4.4	6.8	22.0
Health professionals	94,700	298	6.5	24.0	30.5	40.2	29.3	290	306	2.8	10.1	22.4	38.5
Teaching professionals	84,300	299	4.8	23.8	28.6	43.3	28.1	290	308	1.4	8.1	19.9	37.3
Other professionals	92,600	316	3.3	12.4	15.7	39.8	44.5	301	331	-0.3	6.9	8.5	23.0
Science associate professionals	51,000	297	6.2	22.6	28.8	42.8	28.5	286	309	1.6	10.7	14.8	42.6
Health associate professionals	31,600	286	12.0	26.6	38.6	36.8	24.7	271	302	1.1	22.9	19.7	57.5
Other associate professionals	189,900	286	10.2	30.0	40.2	38.4	21.3	282	291	6.9	13.6	34.1	46.5
Office clerks	195,600	276	13.3	35.0	48.3	36.8	14.9	271	282	8.5	18.2	43.2	53.4
Customer service clerks	66,900	275	12.2	36.0	48.2	40.1	11.8	266	284	6.0	18.3	36.7	59.6
Personal service workers	186,400	254	26.8	39.9	66.7	25.0	8.4	249	259	20.2	33.4	61.2	72.1
Sales workers	93,600	263	22.3	34.0	56.3	32.4	11.2	249	277	13.2	31.5	45.9	66.8
Agricultural workers	128,700	264	19.5	37.7	57.2	31.9	11.0	255	273	12.9	26.0	47.8	66.4
Building trades workers	79,300	272	14.7	32.9	47.6	39.7	12.7	261	284	7.1	22.3	37.5	57.7
Other trades workers	83,000	269	19.8	31.4	51.2	33.7	15.1	260	279	9.5	30.1	41.6	60.8
Machinery operators and assemblers	109,700	243	34.9	35.9	70.8	23.4	5.8	236	250	28.2	41.6	64.3	77.3
Drivers	49,500	254	28.6	33.6	62.2	30.1	7.8	244	265	19.2	37.9	47.1	77.2
Elementary occupations	88,400	232	42.1	37.0	79.1	16.9	4.0	224	241	33.6	50.6	71.9	86.3
All occupations	1,903,100	277	16.0	30.4	46.4	34.5	19.1	275	280	14.2	17.7	44.2	48.6

Table A6: Workforce characteristics, by industry group

Industry group	Sample size	Estimated number of employed persons	Female (%)	Mean age	Youth - aged 16-24 years (%)	Older - aged 55-65 years (%)	Maori (%)	Pacific (%)	Asian (%)	Born overseas (%)	Recent immigrant (%)	English as second language (%)	Fifth form / year 11 qualification or below (%)	Level 3 qualification or below (%)	Degree (%)
Agriculture	358	128,000	36.5	41.6	12.4	18.8	9.3	2.3	5.7	16.9	5.8	10.7	33.8	64.9	12.5
Food manufacturing	212	71,100	36.5	39.6	12.5	10.9	22.1	7.0	4.7	17.1	4.4	12.2	38.9	72.2	10.8
Other manufacturing	489	182,900	28.1	39.9	13.6	14.8	8.6	7.7	9.8	28.7	6.1	16.5	27.0	59.5	12.4
Construction	374	140,500	14.4	39.7	15.2	14.6	15.4	5.0	4.0	18.8	4.4	9.9	27.4	66.8	6.3
Wholesale trade	154	56,500	36.1	42.1	6.8	11.9	7.6	5.3	12.1	25.9	9.1	15.0	21.3	50.2	21.5
Motor vehicle sales and service	143	60,800	22.9	39.9	13.5	13.8	9.8	3.0	8.9	23.5	12.5	10.8	32.9	62.0	10.9
Retail trade (excl motor vehicles)	373	144,400	61.0	37.1	21.8	13.5	10.5	3.4	12.2	17.6	6.1	10.7	30.8	69.5	11.7
Accommodation and food services	245	105,600	54.0	33.0	34.4	7.8	7.8	6.9	21.7	35.2	17.3	30.5	30.4	68.0	15.5
Transport	188	72,200	29.1	43.5	7.6	20.1	10.3	6.1	11.5	26.6	8.2	18.1	29.5	61.4	16.7
Communications	125	44,800	51.6	37.3	21.9	13.2	15.7	5.0	14.3	32.3	11.5	16.8	20.3	54.7	17.6
Finance and insurance	145	59,200	53.3	38.5	9.3	6.9	3.4	5.2	17.6	30.9	8.8	17.0	18.2	49.9	37.9
Information technology and scientific services	98	42,900	25.6	37.0	7.0	6.6	2.7	0.8	19.4	50.0	21.0	25.2	3.9	20.4	61.4
Business services	387	151,000	49.4	43.2	7.9	21.6	6.9	2.8	7.7	23.4	8.5	11.0	10.7	32.0	50.7
Public administration and defence	247	90,900	47.6	42.2	4.7	17.1	10.7	4.1	6.9	18.2	5.4	8.2	7.7	33.1	40.0
Education and training	546	197,200	69.2	44.4	4.1	20.7	10.4	2.6	8.4	25.5	8.5	11.5	7.6	18.3	57.6
Health care and social services	586	194,300	80.7	45.0	5.8	22.7	12.1	4.4	7.8	28.1	9.0	13.4	17.5	38.0	31.9
Cultural and recreational services	135	55,500	47.8	39.0	13.9	13.5	14.7	3.5	3.9	25.8	5.4	13.7	16.0	46.2	32.3
Other services	138	52,100	63.5	38.9	26.7	20.5	9.0	5.0	3.5	17.2	4.6	10.7	27.1	67.6	8.8
All Industries	4,943	1,903,100	47.1	40.7	12.3	16.1	10.8	4.5	9.2	24.4	8.1	13.8	21.9	50.8	26.0

Table A7: Workforce characteristics, by occupational group

Occupational group	Sample size	Estimated number of employed persons	Female (%)	Mean age	Youth - aged 16-24 years (%)	Older - aged 55-65 years (%)	Maori (%)	Pacific (%)	Asian (%)	Born overseas (%)	Recent immigrant (%)	English as second language (%)	Fifth form / year 11 qualification or below (%)	Level 3 qualification or below (%)	Degree (%)
Managers	551	207,400	37.4	43.4	3.1	17.5	6.0	2.3	7.4	20.8	6.0	10.0	16.3	41.5	33.5
Science professionals	154	68,000	22.4	39.1	4.9	11.0	2.9	1.0	14.3	48.8	18.9	19.5	1.3	7.3	73.2
Life science and health professionals	257	94,700	64.7	44.5	1.6	16.7	8.1	2.5	11.7	36.3	11.4	16.0	0.7	2.0	67.5
Teaching professionals	235	84,300	76.2	43.9	3.5	19.4	6.9	2.1	7.3	19.2	7.2	9.1	1.4	4.5	67.4
Other professionals	231	92,600	48.8	43.5	5.9	20.2	4.8	3.4	8.1	26.5	7.0	12.1	2.2	14.8	70.9
Science associate professionals	131	51,000	25.0	40.9	7.8	12.3	2.9	4.7	13.9	27.9	10.1	15.2	10.6	33.2	23.5
Life science and health associate professionals	79	31,600	75.4	44.0	6.5	17.4	5.9	3.1	8.8	38.4	11.5	15.9	12.0	34.0	38.9
Other associate professionals	500	189,900	56.4	42.3	7.7	20.3	10.9	3.3	5.4	21.0	5.4	9.7	19.0	45.0	32.2
Office clerks	550	195,600	75.9	41.4	10.7	15.4	11.0	6.3	8.6	23.7	8.3	12.9	22.5	63.7	13.1
Customer service clerks	181	66,900	81.2	37.7	23.3	18.9	8.8	3.2	12.3	21.7	5.5	12.3	30.7	71.3	13.4
Personal service workers	494	186,400	62.9	36.1	28.8	14.8	14.5	5.8	13.9	26.2	11.0	21.0	28.2	66.2	10.9
Sales workers	228	93,600	59.5	34.8	25.8	7.3	10.6	3.3	10.9	15.7	7.8	8.9	29.7	73.8	10.3
Agriculture and fisheries workers	348	128,700	30.7	41.0	11.5	17.4	13.9	2.4	5.1	15.9	5.1	10.7	30.7	66.8	11.2
Building trades workers	193	79,300	2.1	38.5	21.4	13.2	12.0	2.8	9.2	20.7	5.4	9.2	20.8	63.4	4.3
Other trades workers	214	83,000	7.2	39.5	14.2	13.8	7.1	5.1	6.9	28.6	10.5	14.6	26.9	56.4	3.5
Machinery operators and assemblers	348	109,700	25.5	39.4	11.2	11.6	20.1	10.1	10.9	25.3	7.5	19.8	38.9	75.7	6.7
Drivers	133	49,500	9.0	46.0	3.1	24.6	14.5	8.4	6.0	20.6	6.2	17.6	49.6	75.8	7.2
Elementary occupations	241	88,400	36.8	39.2	25.5	16.7	25.3	10.6	9.5	26.7	8.3	19.7	48.3	82.9	6.6
All Occupations	5,068	1,903,100	47.1	40.7	12.3	16.1	10.8	4.5	9.2	24.4	8.1	13.8	21.9	50.8	26.0

Table A8: Logistic regression model estimates for the probability of having studied for qualification

	All workers aged 25 and over			Level 1 or 2 document literacy		
	Coef.	Std Error	Marginal effect	Coef.	Std Error	Marginal effect
Intercept	-1.413	0.472 *		-2.630	1.026 *	
Female	-0.128	0.081	-0.02	-0.491	0.156 *	-0.06
Aged 25-29	0.542	0.157 *	0.09	0.475	0.436	0.07
Aged 30-34	0.251	0.167	0.04	0.034	0.334	0.00
Aged 35-39	0.336	0.179	0.05	0.318	0.304	0.04
Aged 45-49	-0.101	0.142	-0.01	0.135	0.345	0.02
Aged 50-54	-0.475	0.184 *	-0.06	-0.015	0.334	0.00
Aged 55-59	-0.244	0.177	-0.03	0.017	0.262	0.00
Aged 60-65	-0.566	0.216 *	-0.07	-0.333	0.454	-0.04
Maori ethnic affiliation	0.537	0.150 *	0.09	0.714	0.270 *	0.11
Pacific ethnic affiliation	0.113	0.288	0.02	0.318	0.367	0.04
Asian ethnic affiliation	-0.148	0.242	-0.02	0.069	0.426	0.01
Recent immigrant	0.235	0.221	0.04	0.103	0.363	0.01
Speaks English as second language	0.142	0.238	0.02	-0.053	0.309	-0.01
Educational attainment						
Completed 5th form/year 11 only	-0.447	0.201 *	-0.06	-0.573	0.242 *	-0.07
Upper secondary school	-0.488	0.231 *	-0.06	-0.768	0.310 *	-0.08
Level 1, 2, or 3 qualification	0.138	0.229	0.02	0.347	0.284	0.05
Level 5, 6, or 7 qualification	0.103	0.193	0.01	-0.139	0.292	-0.02
Bachelors degree	-0.132	0.212	-0.02	0.164	0.448	0.02
Higher degree	-0.212	0.217	-0.03	0.616	0.464	0.09
Document literacy score in ALL/100	0.131	0.110	0.02	0.296	0.220	0.04
Self-employed	-0.412	0.135 *	-0.05	-0.386	0.272	-0.04
Employed part-time	-0.358	0.163 *	-0.05	-0.141	0.263	-0.02
Firm size 1-19 employees	-0.232	0.177	-0.03	0.021	0.310	0.00
Firm size 20-99 employees	-0.282	0.132 *	-0.04	0.009	0.291	0.00
Firm size 1000 or more employees	0.122	0.134	0.02	0.597	0.290 *	0.08
Industry						
Agriculture	0.346	0.482	0.05	1.012	0.960	0.17
Food manufacturing	0.196	0.367	0.03	0.453	0.729	0.06
Other manufacturing	-0.366	0.340	-0.05	0.081	0.786	0.01
Construction	0.115	0.436	0.02	0.889	0.841	0.14
Wholesale trade	-0.518	0.387	-0.06	-0.203	0.876	-0.02
Motor vehicle sales and service	0.076	0.461	0.01	-0.265	0.907	-0.03
Retail trade (excluding motor vehicles)	-0.782	0.385 *	-0.09	-0.980	0.826	-0.09
Accommodation and food services	-0.018	0.402	0.00	-0.214	0.673	-0.02
Transport	-0.294	0.361	-0.04	-0.406	0.835	-0.04
Commmuications	-0.411	0.329	-0.05	-0.249	1.005	-0.03
Business services	-0.109	0.311	-0.01	0.111	0.868	0.01
Public administration and defence	0.329	0.439	0.05	0.930	0.816	0.15
Education and training	0.796	0.396 *	0.14	1.605	0.747 *	0.30
Health care and social services	0.914	0.388 *	0.16	1.325	0.754	0.23
Cultural and recreational services	0.039	0.376	0.01	0.830	0.945	0.13
Other services	-0.502	0.455	-0.06	-0.813	0.829	-0.08
Occupational group controls (18)	Y			Y		
Log likelihood	-2057.0			-776.2		
Psuedo R2	0.087			0.147		
Number of observations	4561			1885		

Note: The dependent variable is '1' if the respondent studied for a qualification in the last 12 months and '0' otherwise. In addition to the explanatory variables shown in the table, all models included indicator variables for 18 occupational groups, 'industry not specified' and 'firm size not specified'. *Indicates that the coefficient was statistically significant at the 95 percent confidence level. Standard errors were calculated using the jackknife method and the official survey replicate weights.

Table A9: Logistic regression model estimates for the probability of having taken a course

	All workers aged 25 and over			Level 1 or 2 document literacy		
	Coef.	Std Error	Marginal effect	Coef.	Std Error	Marginal effect
Intercept	-1.458	0.481 *		-0.803	0.945	
Female	0.187	0.088 *	0.04	0.202	0.158	0.03
Aged 25-29	-0.286	0.172	-0.06	-0.134	0.361	-0.02
Aged 30-34	-0.140	0.130	-0.03	-0.540	0.283	-0.08
Aged 35-39	-0.118	0.131	-0.03	-0.240	0.230	-0.04
Aged 45-49	-0.058	0.122	-0.01	-0.522	0.268	-0.08
Aged 50-54	-0.049	0.157	-0.01	-0.455	0.338	-0.07
Aged 55-59	-0.408	0.145 *	-0.09	-0.185	0.281	-0.03
Aged 60-65	-0.173	0.194	-0.04	0.080	0.345	0.01
Maori ethnic affiliation	0.066	0.146	0.02	0.046	0.208	0.01
Pacific ethnic affiliation	-0.522	0.240 *	-0.11	-0.689	0.296 *	-0.10
Asian ethnic affiliation	-0.290	0.206	-0.06	-0.566	0.369	-0.08
Recent immigrant	-0.030	0.171	-0.01	-0.094	0.325	-0.02
Speaks English as second language	-0.269	0.169	-0.06	-0.291	0.323	-0.05
Educational attainment						
Completed 5th form/year 11 only	-0.527	0.141 *	-0.11	-0.523	0.308	-0.08
Upper secondary school	-0.386	0.166 *	-0.08	-0.354	0.379	-0.05
Level 1, 2, or 3 qualification	-0.204	0.199	-0.05	0.053	0.327	0.01
Level 5, 6, or 7 qualification	0.029	0.160	0.01	-0.072	0.384	-0.01
Bachelors degree	0.010	0.221	0.00	0.278	0.544	0.05
Higher degree	0.125	0.197	0.03	0.548	0.453	0.10
Document literacy skill/100	0.419	0.140 *	0.10	0.250	0.233	0.04
Self-employed	-0.039	0.096	-0.01	0.162	0.231	0.03
Employed part-time	-0.224	0.148	-0.05	-0.175	0.249	-0.03
Firm size 1-19 employees	-0.410	0.127 *	-0.09	-0.737	0.269 *	-0.12
Firm size 20-99 employees	0.006	0.155	0.00	-0.353	0.282	-0.05
Firm size 1000 or more employees	0.131	0.130	0.03	0.188	0.217	0.03
Industry						
Agriculture	-0.018	0.439	0.00	-0.598	0.697	-0.09
Food manufacturing	0.052	0.391	0.01	-0.659	0.550	-0.09
Other manufacturing	-0.178	0.343	-0.04	-0.857	0.495	-0.12
Construction	-0.083	0.450	-0.02	-0.311	0.654	-0.05
Wholesale trade	-0.410	0.339	-0.09	-1.082	0.722	-0.13
Motor vehicle sales and service	-0.112	0.387	-0.03	-0.526	0.572	-0.08
Retail trade (excluding motor vehicles)	-0.089	0.408	-0.02	-0.663	0.677	-0.09
Accommodation and food services	0.105	0.438	0.02	0.377	0.523	0.07
Transport	-0.107	0.414	-0.02	-0.342	0.600	-0.05
Commmuications	0.112	0.478	0.03	-1.030	0.692	-0.13
IT and scientific services	-0.224	0.476	-0.05	-0.586	1.250	-0.08
Business services	0.051	0.381	0.01	-0.266	0.673	-0.04
Public administration and defence	0.421	0.416	0.10	-0.566	0.565	-0.08
Education and training	0.117	0.435	0.03	0.117	0.587	0.02
Health care and social services	0.520	0.398	0.12	-0.001	0.643	0.00
Cultural and recreational services	-0.071	0.450	-0.02	-0.043	0.674	-0.01
Other services	0.757	0.476	0.18	-0.288	0.814	-0.04
Occupational group controls (18)	Y			Y		
Log likelihood	-2691.1			-929.4		
Psuedo R^2	0.109			0.108		
Sample size	4561			1885		

Note: The dependent variable is '1' if the respondent undertook a course or courses that were not linked to formal qualifications in the last 12 months and '0' otherwise. In addition to the explanatory variables shown in the table, all models included indicator variables for 18 occupational groups, 'industry not specified' and 'firm size not specified'. *Indicates that the coefficient was statistically significant at the 95 percent confidence level. Standard errors were calculated using the jackknife method and the official survey replicate weights.