NCVER

Job requirements and lifelong learning for older workers

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Australian Government
Department of Education, Employment and Workplace Relations

A National Vocational Education and Training **Research** and **Evaluation** Program **Report**

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Publisher's note

Additional information relating to this research is available in *Job requirements and lifelong learning for older workers: Support document*. It can be accessed from NCVER's website <http://www.ncver.edu.au/publications/2186.html>.

To find other material of interest, search VOCED (the UNESCO/NCVER international database <http://www.voced.edu.au>) using the following keywords: Job requirements; job skill; lifelong learning, literacy, numeracy; older worker; skill analysis; workforce development.

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About the research

Job requirements and lifelong learning for older workers

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Australia's ageing population has prompted a policy focus on keeping older workers in the workforce longer. Of relevance to this is how older workers maintain and update their skills through participation in further education and training. The lower participation of older workers in training has been well documented. Reasons suggested for this have included fewer opportunities provided by employers and less time to recoup a return on the investment in training. A further factor may be whether or not there is a real need to upskill in order to stay in the labour force.

The first report from this research program looked at the relationship between individuals' literacy and numeracy skills and their use in the workplace, and paid particular attention to older workers. This second report investigates whether this relationship between skill level and skill use affects the propensity to undertake further education and training, especially for older workers.

Key findings

- Across all age groups, workers who report that their jobs are demanding, relative to their skills, are more likely to participate in further education and training. This finding suggests that, in addition to individual characteristics, features of the job also influence who undertakes training.
- Participation in further education and training is lower for older workers compared with younger workers, although they still show higher participation as relative skills use increases. The decline in participation for older workers is much stronger among workers with relatively low levels of education.

The first report from this program of research, which looks at the relationship between skill level and job requirements, is available from the NCVER website. An overview that summarises the findings from these two reports is also available.

Tom Karmel
Managing Director, NCVER

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Executive summary

This study investigates the relationship between job requirements, individual skills and the participation of workers in further education and training, paying particular attention to older workers in Australia. The empirical analysis allows inferences about the extent to which workers of different age groups participate in further education, given the relationship between their individual skills and the skills required in their jobs.

There are good reasons for studying the relationship between job requirements and lifelong learning for older workers, the foremost being that an analysis of skill-related tasks may provide evidence about the way job requirements and skill demands are changing over time; this contrasts with analysis based solely on occupational classifications. Such an analysis also allows inferences about the relationship between job requirements and the propensity of workers to undertake further education and training.

The empirical analysis of the relationship between skill (mis)matches and participation in education and training may also help to distinguish workers who have an incentive to upgrade their skills from those who do not. Such an analysis may also help in gaining a better understanding of the nature of careers.

A parallel study (Ryan & Sinning 2009) used the Survey of Aspects of Literacy (SAL) and the Adult Literacy and Life Skills (ALLS) Survey to investigate the match between individuals' numeracy and literacy skills and the skills used in their jobs. These surveys, conducted ten years apart, contain comparable information on measures of worker skills—notably their literacy skills. Measures of individuals' skills are based on the outcomes of tests designed to assess levels of numeracy and literacy, as well as on self-assessments about how good their skills are. This exceeds the information available for analysis in most studies, where educational attainment is used as a proxy for skills. Job requirements are measured by self-reports of individuals about their literacy and numeracy use at work.

Further information in these surveys permit an investigation of the extent to which—given a particular skill level—different measures of job complexity affect the likelihood of participating in further education and training. Since participation in further education and training may vary substantially over time and across age groups, these variations need to be addressed in the empirical analysis to separate period, birth cohort and ageing effects.

In this study, participation in education and training courses is measured by self-reports of individuals about:

- ✧ participation in education or training in the previous 12 months
- ✧ enrolment in a technical and further education (TAFE) or technical college in the previous 12 months.

The major findings and their implications are highlighted in the points below.

Skills and training

- The relative job complexity with respect to literacy is highest for workers whose skills are about average.
- The ratio between job complexity and skills is lower for low-skilled workers, suggesting that literacy use is less relevant in jobs for low-skilled workers.
- The ratio between job complexity and skills is also lower for high-skilled workers, because they tend to have fewer opportunities to apply their high skills at work.
- The relationship between the relative numeracy skill measure and numeracy skills is declining, indicating that low-skilled workers are required to apply their (relatively low) numeracy skills at work relatively often, while high-skilled workers have fewer opportunities to make use of their skills at work.
- The ratio between job complexity and skills increases for older workers.
- Workers who attended education or training courses in the previous 12 months report higher job requirements, relative to their skills, than workers who did not attend courses.

Determinants of education and training participation

- The proportion of workers who undertook education or training courses was higher at higher levels of education.
- The proportion of young workers who undertake further education is substantially higher than the proportion of older workers.
- The decline in the propensity to undertake education or training courses at higher ages is much stronger among relatively low-educated workers.
- Workers in occupations that typically require high skills are more likely to undertake education and training courses than workers in other occupations.
- Educational attainment is a strong predictor of further education and training participation, but does not seem to affect participation in formal vocational and educational training (VET) courses.
- While full-time employment and the size of the employer are strong predictors of training participation, these factors do not affect participation in formal VET courses.
- Workers are more likely to attend training courses if their job requirements increase in relation to literacy or numeracy use. By contrast, formal VET course participation only increases if relative literacy requirements increase.

Skill matches and the role of demographic factors

- A positive relationship between relative job complexity and the propensity to participate in further education and training may be observed for different measures.
- The effects of all relative measures of job complexity on the propensity to participate in further education and training courses vary considerably across age groups.
- An increase in the relative job complexity increases formal VET course participation only if workers are relatively young.
- Most participants in further education and training are working in jobs that require either both high literacy and high numeracy skills or both low literacy and low numeracy skills.

Introduction

This study investigates the relationship between the job requirements of individuals, relative to their skills, and their participation in further education and training in Australia. Our focus is on older workers. The empirical analysis addresses the extent to which workers of different age groups participate in further education, given the relationship between their individual skills and the skills required in their jobs.

There are good reasons for studying the relationship between job requirements and lifelong learning for older workers.

- The analysis may suggest another factor that contributes to their low participation in education and training and which may be amenable to influence through policy change.
- An analysis of skill-related tasks may also provide evidence about the way job requirements and skill demands are changing over time, in a way that is hidden by analysis based solely on skill-related occupational classifications.
- The empirical analysis of the relationship between skill (mis)matches and participation in education and training may also help to distinguish workers who have an incentive to upgrade their skills from those who do not. Such an analysis may also help us to gain a better understanding of the nature of careers.

Previous Australian and international studies of the characteristics of individuals that determine their participation in training (summarised in Roussel 2002 and Ryan & Watson 2003) have typically found that participation:

- broadly rises with prior educational attainment
- either falls with age and tenure with an individual's current employer or follows an inverted 'U' shape
- is lower for females with dependent children present in their households
- is higher among individuals who work in high-skill occupations (especially professionals and managers) and among full-time workers.

Of their employer characteristics, previous studies have found that participation in training:

- is higher in the public than the private sector, but within the private sector increases with firm size
- varies considerably by industry, with higher rates observed in finance, property and business, energy and water, communication, and community services.

We use two surveys conducted ten years apart by the Australian Bureau of Statistics (ABS) in our empirical analysis. The data contain comparable information on measures of worker skills and information on the frequency with which they undertake a range of literacy and numeracy-related tasks. The data used in the empirical analysis allow us to separate period, birth cohort and ageing effects. Previous research of the determinants of training in Australia has established that it is lower among older age groups (see the summaries in Roussel 2002 and Ryan & Watson 2003, for example), although the cause of this pattern is unclear. It is typically interpreted as reflecting the shorter period that older workers face to recoup their investment before their anticipated

retirement, although other factors may contribute to it. In our case, we are interested in the contribution that might come from older workers being over-skilled for their jobs, relative to younger workers. If being in a job with high-skill requirements relative to their observed skills induces workers to undertake further education and training, but older workers are typically not in such jobs, this may explain part of their low education and training participation.

In most empirical analyses of job requirements and worker skills, limited information about worker skills is available and therefore educational attainment is used as a proxy for skills. This study uses the outcomes of tests undertaken by individuals that cover their literacy and numeracy skills, as well as the assessments of the individuals themselves about how good their skills are for both the requirements of their jobs and the needs of daily life. Reports by workers of their use of skills in the workplace are used to construct measures of job requirements. Although indicators of skill usage do not necessarily capture all of the skill requirements of individuals in jobs, they capture some important aspects of literacy and numeracy skills usage. The information available in the data permit an investigation of the extent to which—given a particular skill level—different measures of job complexity affect the likelihood of participating in further education and training.

In this study, participation in education and training courses is measured through self-reports of individuals about their:

- ✧ participation in education or training in the previous 12 months
- ✧ enrolment in a technical and further education (TAFE) or technical college (formal VET) in the previous 12 months.

The data allow development of a rich picture of the relationship between skill matches and the participation of workers in further education and training.

The next chapter describes the data used for the analysis, while later chapters provide evidence on the relationship between skill requirements and the participation in further education or training for different age groups. A final chapter considers the implications of the findings.

Description of the data

The analysis uses information from two comparable surveys of one person from Australian households conducted by the Australian Bureau of Statistics (ABS), the Survey of Aspects of Literacy (SAL) in 1996 and the Adult Literacy and Life Skills (ALLS) Survey in 2006, both undertaken as part of international projects.

Survey of Aspects of Literacy, 1996

The Survey of Aspects of Literacy was a national survey designed to measure certain aspects of the literacy and numeracy skills of Australians. Personal interviews were carried out over a nine-week period between May 1996 and July 1996. The sample consists of 9302 respondents aged 15 to 74 years living in private dwellings, but excluded persons living in remote and sparsely settled areas. The data include information about those literacy and numeracy skills held by individuals that are deemed necessary to use printed materials typically found at work, at home, and in the community (ABS 1997a, 1997b). The International Adult Literacy Survey (IALS)[1] was part of an international project led by Statistics Canada.

There were two major components to the survey:

- Self-assessed reports by individuals of their reading, writing and basic mathematical skills for the needs of daily life and their main job:
  - Respondents were asked a series of questions to obtain background socio-demographic information (such as age, gender etc.).
  - Respondents were asked to rate their reading, writing and basic mathematical skills.
  - Information was collected about the frequency with which respondents undertook selected literacy and numeracy activities in daily life and at work, and about their English and other language skills.
- An objective, test-based assessment of literacy and numeracy skills, with respondents asked to undertake a set of tasks:
  - Each respondent was asked to complete six relatively simple literacy-related tasks.
  - Those who completed two or more of these correctly were then given 46 additional tasks drawn from a pool of 108, using commonplace examples of printed material and which required varying degrees of comprehension and arithmetic skills.

The Survey of Aspects of Literacy data include three objective skill measures:

- document literacy: the effective use of information contained in materials such as tables, schedules, charts, graphs and maps
- prose literacy: the skills required to understand and use information from various kinds of prose texts, including texts from newspapers, magazines and brochures

[1] The questionnaire and task booklets were administered in English and people with poor English language were excluded from the survey. This might have excluded a lot of migrants, and probably Indigenous Australians. Since remote and very remote areas were excluded from the sampling frame, a significant proportion of the Indigenous population was excluded from the survey as well.

- quantitative literacy: the ability to perform arithmetic operations using numbers contained in printed texts or documents. This is a very narrow measure of the numeracy skills of individuals.

The Survey of Aspects of Literacy data further contain several variables that capture participation in education and training, as well as the participation intensity. These variables cover the following information:

- participation in education or training in the previous 12 months
- whether the respondent undertook study at a TAFE college in the previous 12 months
- the educational qualification towards which the first course was undertaken
- the number of courses the respondent participated in over the previous 12 months
- the number of weeks the first course lasted.

Adult Literacy and Life Skills Survey, 2006

The Adult Literacy and Life Skills (ALLS) Survey was conducted in Australia as part of an international study coordinated by Statistics Canada and the Organisation for Economic Co-operation and Development (OECD).[2] Personal interviews were carried out from July 2006 to January 2007 with individuals from private dwellings throughout non-remote areas of Australia. The sample consists of 8988 respondents aged 15 to 74 years.

The Adult Literacy and Life Skills Survey is divided into two sections:

- Each respondent was asked to complete a background questionnaire, including individual and household information such as general demographic information, linguistic information, parental information, labour force activities, literacy and numeracy practices in daily life and at work, frequency of reading and writing activities, participation in education and learning, social capital and wellbeing, information and communication technology, personal and household income.
- After the background questionnaire, each respondent was asked to complete a set of six basic questions. Only respondents who correctly answered a minimum of three questions of this basic component moved on a main component, consisting of three blocks designed to measure (ABS 2006):
  - document literacy: the efficient use of information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables and charts
  - prose literacy: the knowledge and skills required to understand and use information from various kinds of narrative texts, including texts from newspapers, magazines and brochures
  - numeracy: the ability to effectively manage and respond to the mathematical demands of diverse situations
  - problem-solving: goal-directed thinking and the ability to act in situations for which no routine solution is available
  - health literacy: the knowledge and skills required to understand and use information relating to health issues such as drugs and alcohol, disease prevention and treatment, safety and accident prevention, first aid, emergencies and staying healthy.

Like the Survey of Aspects of Literacy, individuals also provided self-assessments of their English reading and writing skills for the needs of daily life and of their main job.

[2] OECD (2005) provides an international comparison of participation in adult education and training, using data from the International Adult Literacy Survey (IALS). The results point to substantial differences in participation patterns among countries, suggesting that differences in adult learning policy matter. In this report, we concentrate on education and training patterns in Australia, which were not addressed by the OECD report.

The Adult Literacy and Life Skills Survey also includes indicators of participation in education and training and the participation intensity, including:

- whether the respondent undertook a qualification course and/or non-qualification course in the previous 12 months
- whether the respondent was studying for the most recent educational qualification in the previous 12 months
- whether the respondent had been enrolled in a TAFE institute or technical college in the previous 12 months
- the level of the most recent educational qualification studied in the previous 12 months
- the number of courses the respondent participated in over the previous 12 months
- the total number of hours spent on the most recent educational qualification in the previous 12 months.

Education and training participation indicators

Given the information on participation in further education and training in the two surveys, a number of variables covering common phenomena can be generated, reflecting information on education and training participation as well as participation intensity. Two of these variables are highly relevant for the empirical analysis of this study, since they enable us to investigate the relationship between skill requirements and lifelong learning in the vocational and educational training (VET) sector. These variables are:

- education and training participation in general over the past 12 months (that is, whether a person received education or training or undertook a qualification course and/or non-qualification course in the previous 12 months)
- participation in formal VET in the past 12 months (that is, whether a person was enrolled in a TAFE institute or technical college for a nominated qualification in the previous 12 months).

The first of these variables refers to a relatively broad group of workers participating in further education and training in general. The second variable is a subset of the first variable and represents a more specific group of workers who undertook education and training, namely those who were enrolled in TAFE or technical colleges to participate in VET courses. Since this rather narrow definition does not encompass other forms of VET, such as workplace learning etc., we will refer to this variable as 'formal VET participation' in the remainder of this study.

In addition, the following indicators can be constructed:

- currently studying (that is, whether currently studying the most recent educational qualification undertaken in the previous 12 months)
- Australian Qualifications Framework (AQF) level: higher education (that is, whether the level of the most recent educational qualification was bachelor degree, postgraduate degree, diploma etc.)
- other courses (that is, whether the number of courses participated in over the previous 12 months exceeded one)
- the number of weeks studying (that is, the number of weeks the first course lasted [1996 only])
- total hours studying or training (that is, the total hours spent on most recent educational qualification in the previous 12 months).

Table 1 contains the means and standard deviations of these indicators for male and female workers of both surveys. The data reveal that the proportion of workers participating in education and training (qualification and non-qualification courses) has increased over time. While 45.7% of the male workers undertook a course in 1996, their proportion increased to 53.0% in 2006. The

corresponding proportion of female workers rose from 50.4% in 1996 to 55.9% in 2006. The numbers further suggest that the proportion of workers who reported they were undertaking studies in the survey year doubled between 1996 and 2006. Specifically, the proportion of male workers currently studying grew from 5.2% in 1996 to 12.2% in 2006, while the proportion of female workers studying increased from 7.9% to 13.5% in 2006. By contrast, the proportion of male workers enrolled in TAFE or technical colleges (formal VET) in the 12 months prior to the survey declined from 9.8% in 1996 to 7.3% in 2006. Over the same period, the corresponding proportion of female workers who were formal VET students dropped from 8.1% to 5.4%. The proportion of male workers studying for a higher educational qualification in the 12 months prior to the survey increased from 6.2% in 1996 to 9.2% in 2006, while the corresponding proportion of female workers rose from 8.9% to 12.6%.

Overall, the numbers indicate a shift from formal VET studies towards other forms of VET. At the same time, the increasing shares of workers who undertake studies reveal that participation in further education and training has become more common over time. The decline in the percentage of persons enrolled in formal VET may partly be attributed to the restriction of the sample to the workforce population. Moreover, the relatively small number of individuals who report enrolment in formal VET may have caused an imprecise estimate of the population mean. Table 1 also includes information about the participation intensity of workers who undertake further education or training. While the weeks spent in studying for the recent qualification was observed in 1996, the 2006 survey includes the hours spent in studying for recent (qualification and non-qualification) courses. These variables suggest that female workers have a higher propensity to participate in further education and training, and also spent more time studying than male workers.[3]

Table 1 Education and training participation indicators, 1996 and 2006

	Mean value by gender and year			
	1996		2006	
	Males	*Females*	*Males*	*Females*
Participation				
Education and training participation	0.457	0.504	0.530	0.559
	(0.498)	(0.500)	(0.499)	(0.497)
Formal VET study	0.098	0.081	0.073	0.054
	(0.297)	(0.272)	(0.260)	(0.225)
Currently studying	0.052	0.079	0.122	0.135
	(0.223)	(0.270)	(0.327)	(0.342)
AQF level: higher education	0.062	0.089	0.092	0.126
	(0.241)	(0.285)	(0.288)	(0.332)
Other courses	0.233	0.258	0.070	0.086
	(0.423)	(0.438)	(0.254)	(0.280)
Intensity				
Weeks studying	12.356	14.084		
	(14.614)	(15.182)		
Hours studying			7.755	8.405
			(4.516)	(4.583)
Number of observations	2870	2589	2749	2537

Notes: Weighted numbers based on weights provided by ABS; standard deviations in parentheses.
Source: ABS (1997a, 2006, Basic Confidentialised Unit Record File).

[3] Since there are five plausible values for each literacy domain, we use the average of these values in our analysis. Robustness checks suggest that this procedure does not affect our results qualitatively.

Skills and training

This chapter contains a description of skill and job task measures and investigates the relationship between these measures and the propensity to participate in further education and training (that is, the first indicator of table 1). It concentrates on

- ✧ job task measures and individual skills
- ✧ the relationship between individual skills and relative job complexity
- ✧ the measurement of skill mismatches.

Job task measures and individual skills

Based on the information available in the two data sets, two types of scales were developed for use in the analysis that follows:

- ✧ measures of job tasks
- ✧ measures of individual literacy.

Ryan and Sinning (2009) provide a comprehensive description of the construction of these measures and analyse the relationship between workers' skills and the skill requirements of their jobs in Australia, paying particular attention to older workers.

Measures of job tasks reflect reports by individuals of the frequency with which they undertook literacy and numeracy tasks at work. Respondents in both surveys were asked a partially overlapping set of questions about the literacy and numeracy tasks undertaken at work. These included, for example, how often they wrote 'reports or articles', or 'letters or memos', or how often they filled in forms such as 'bills, invoices or budgets', or how often they calculated 'prices, costs or budgets'. Ryan and Sinning (2009[4]) provide a detailed description of the empirical approach that was applied to generate the job task measures.

The individual skill measures utilised in the empirical analysis here include document literacy and numeracy (using scales contained in the data), as well as self-assessed skills (based on a scale we developed).[5] We place all the scales we developed onto a 0–500 range, consistent with the literacy and numeracy scales provided in the ABS data.

While the measures of individual literacy in the 2006 data contain both an underlying, continuous score on a 0–500 range and a summary indicator in the form of a five-point scale (with known thresholds from the underlying scale), the literacy skill levels of the 1996 survey were only published in Australia on the same summary five-point scale used in 2006. To overcome this problem, a continuous scale is predicted for 1996, given the observed five-point scale scores of individuals and

[4] In the support document accompanying Ryan and Sinning (2009).

[5] The data also include information on prose literacy. However, since the relationship between literacy skills and literacy use at work seems to be very similar for document and prose literacy (Ryan & Sinning 2009), the report includes only the results for document literacy.

a small set of other characteristics. A detailed description of the prediction of continuous literacy measures is provided by Ryan and Sinning (2009[6]).

Table 2 includes the means and standard deviations of job task and individual literacy measures for male and female workers of both surveys. All measures range on a 0–500 scale. The numbers reveal that the average literacy use of males and females in their jobs has increased between 1996 and 2006, with the increase appearing to be more substantial for employed females. There also appears to be a substantial increase in average numeracy use.

Table 2 Measures of job tasks and individual literacy, 1996 and 2006

	Mean value by gender and year			
	1996		2006	
	Males	*Females*	*Males*	*Females*
Measures of job tasks				
Literacy use	288.5	268.8	295.5	292.9
	(110.9)	(105.8)	(121.2)	(113.6)
Numeracy use	270.6	233.2	288.1	260.3
	(91.1)	(85.5)	(94.6)	(97.5)
Measures of individual literacy				
Document literacy	285.4	286.5	286.8	288.5
	(48.4)	(45.4)	(51.3)	(45.5)
Prose literacy	280.8	291.8	280.8	291.3
	(47.4)	(46.2)	(48.9)	(44.1)
Numeracy			285.8	276.9
			(53.2)	(48.3)
Self-assessed skills	347.3	350.3	366.5	398.1
	(56.7)	(47.3)	(96.8)	(84.5)
Relative skill measures				
Literacy use/document literacy	1.014	0.945	1.034	1.020
	(0.384)	(0.375)	(0.429)	(0.411)
Literacy use/prose literacy	1.032	0.928	1.054	1.007
	(0.394)	(0.370)	(0.434)	(0.403)
Numeracy use/numeracy			1.028	0.953
			(0.364)	(0.380)
Number of observations	2870	2589	2749	2537

Notes: Weighted numbers based on weights provided by ABS; standard deviations in parentheses.
Source: ABS (1997a, 2007, Basic Confidentialised Unit Record File).

The table also contains summary estimates of the individual skill scales. While the difference in document literacy between male and female workers is relatively small, the average level of prose literacy is higher for women than for men. These measures show little change between 1996 and 2006.[7] Numeracy skills of male workers (only observed in 2006) are higher than those of female workers.[8] While self-assessed skills of men and women do not differ substantially in 1996, men report considerably lower skill levels than women in 2006. Finally, table 2 presents the ratio between job task measures and measures of individual literacy. These ratios reveal an increase in literacy use relative to literacy skills and show that male workers apply their skills more often at

[6] In the support document accompanying Ryan and Sinning (2009).

[7] This is consistent with the published data in ABS (2008). Table 16 of ABS (2008) contains a comparison of the prose and document literacy levels of employed people in the two surveys on the five-point scale. The distributions in the two surveys show no obvious change.

[8] The quantitative literacy domain, derived from the 1996 SAL, cannot be compared with the expanded measure of adult numeracy of the 2006 ALLS (ABS 2006). For that reason, this report only considers the measure of the 2006 survey.

work than female workers. The remainder of this chapter provides a detailed discussion of relative skill measures.

Relative skill measures

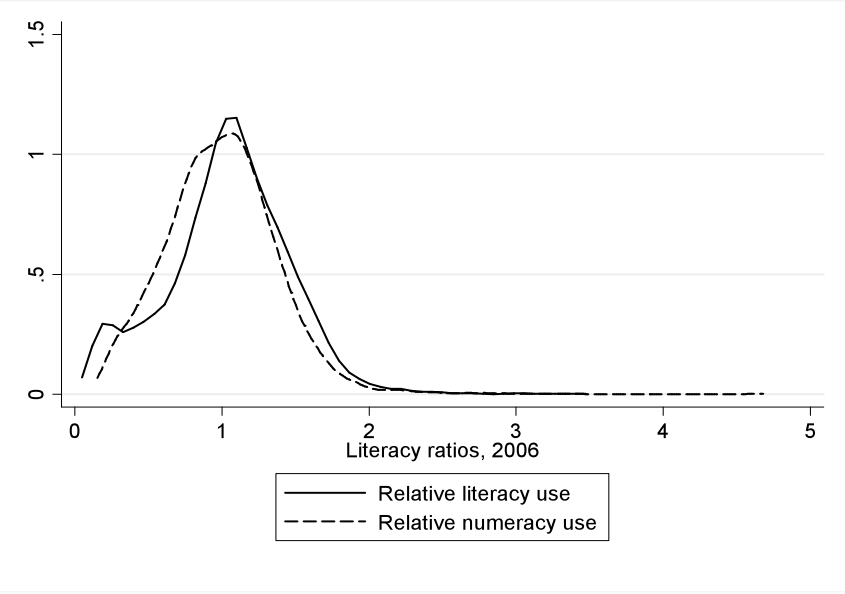
If we have a measure that indicates how well workers are matched to their job, we can investigate the extent to which workers undertake education and training when they find themselves in complex jobs relative to their skill level. Two measures of relative job complexity are used in the analysis:

- ✧ relative literacy use, that is, literacy use at work, relative to document literacy skills
- ✧ relative numeracy use, that is, numeracy use at work, relative to numeracy skills.

Figure 1 includes the density functions of these measures. Since all ratios are based on variables that range on a 0–500 scale, the median of the relative measures is at around one. At the same time, the measures presented in figure 1 do not differ substantially from each other.

It is important to note that the differences between the relative job task measures in figure 1 may not be attributed to differences in the relationship between different skills and job tasks. Instead, they are the result of the construction and scaling of the different skill and job task measures. This also implies that a 1:1 relationship between individual skills and job tasks does not necessarily imply the 'best match'. As a consequence, the following analysis will concentrate on differences *within* scales rather than differences *between* them.

Figure 1 Relative skill use measures, 2006

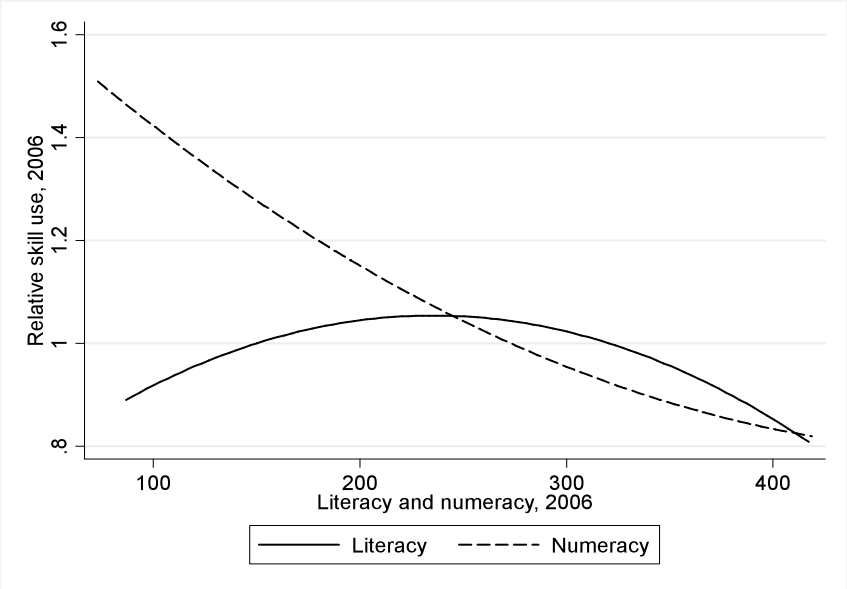


Note: kernel = epanechnikov, bandwidth – 0.0602
Source: ABS (2006, Basic Confidentialised Unit Record File).

Figure 2 presents the relationship between the relative literacy use and (document) literacy skills and the relationship between relative numeracy use and numeracy skills. The functional relationship between the relative literacy skill use measure and literacy skills is an inverted 'U' shape, suggesting that the relative job complexity is highest for workers whose skills are about average. The ratio between job complexity and skills is lower for low-skilled workers, suggesting that literacy use is less relevant in jobs for low-skilled workers. The ratio between job complexity and skills is also lower for high-skilled workers, suggesting that they may have fewer opportunities to apply their high skills at work.

By contrast, the relationship between the relative numeracy skill use measure and numeracy skills is declining, indicating that the relative job complexity with respect to numeracy is highest for low-skilled workers; that is, low-skilled workers are required to apply their low numeracy skills at work relatively often, while high-skilled workers make less use of their skills at work.

Figure 2 Relative skill use and skills, 2006



Source: ABS (2006, Basic Confidentialised Unit Record File).

Figure 3 provides box plots of the measure of relative literacy use observed in 2006 for workers of each of nine birth cohorts who participated in further education or training (qualification and non-qualification courses) over the previous 12 months. Each box plot depicts the relative literacy use measure of a birth cohort through five summary statistics (outliers were removed):

- the smallest observation
- the 0.25-percentile
- the 0.5-percentile (median)
- the 0.75-percentile
- the largest observation.

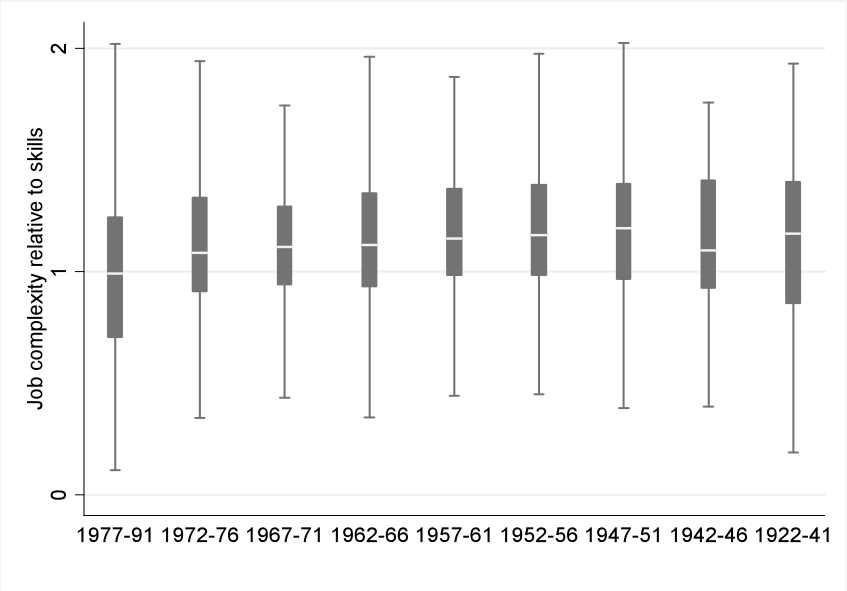
Figure 3 reveals that the median of the relative literacy use measure tends to be slightly higher for older workers, reflecting that the ratio between job complexity and skills increases for older workers. While the relative literacy use measure is much lower for the youngest birth cohort, the differences seem to be less severe for older birth cohorts. However, the box plots also indicate that the relative literacy use measure seems to decline in old age.

The median of the relative literacy use measure of the youngest birth cohort presented in figure 3 is close to 1, suggesting that the median of the scales of literacy use at work and document literacy is about the same. By contrast, the median of relative literacy use of older birth cohorts is above 1, indicating that the literacy use scales are higher relative to the scales measuring document literacy.

Although a comparison of absolute differences between scales is difficult (since the underlying items are different), it is still possible to compare relative differences. Specifically, we may compare the relative literacy use measure of education and training participants (figure 3) to the relative literacy use measure of workers who did not participate in further education or training over the previous 12 months. The box plots of the latter group are presented in figure 4. The median level

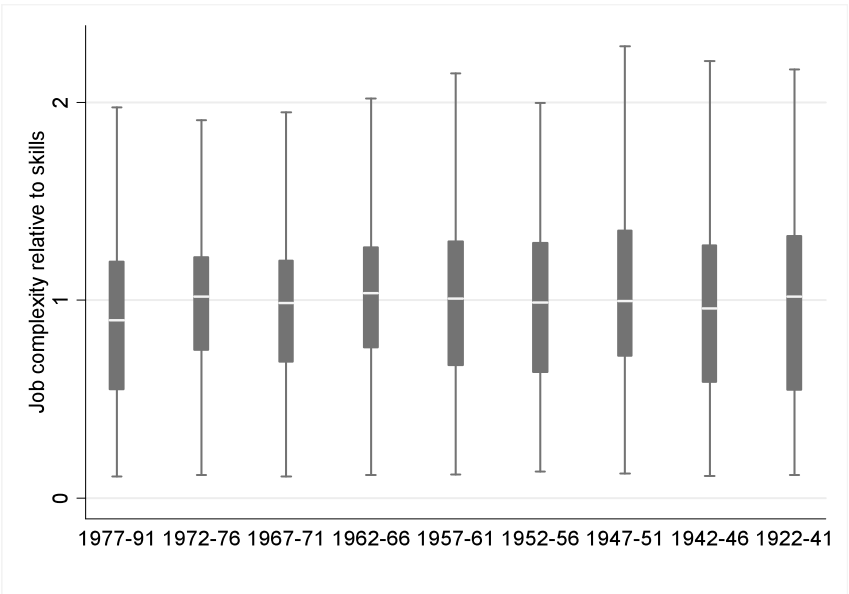
of these box plots is about 1 or even below 1 in some cases, suggesting that workers who attended education or training courses in the previous 12 months are facing higher job requirements relative to their skills than workers who did not attend courses.

Figure 3 Relative literacy use measure of training participants by age group, 2006



Note: Excludes outside values.
Source: ABS (2006, Basic Confidentialised Unit Record File).

Figure 4 Relative literacy use measure of training non-participants by age group, 2006



Note: Excludes outside values.
Source: ABS (2006 Basic Confidentialised Unit Record File).

In addition to the relative literacy use measure, the relative numeracy use may be considered as an additional measure of skill mismatches. However, since the relative numeracy use measures of workers who undertake further education and training courses do not differ substantially from those who do not, the figures of the relative numeracy use measures were omitted. They are provided in the support document to this study.

Summary

This chapter describes job task and individual skill measures and investigates the relationship between these measures and the propensity to participate in further education and training.

The results may be summarised as follows:

- The relative job complexity with respect to literacy is highest for workers whose skills are about average.
- The ratio between job complexity and skills is lower for low-skilled workers, suggesting that literacy use is less relevant in jobs for low-skilled workers.
- The ratio between job complexity and skills is also lower for high-skilled workers, suggesting that they may tend to have fewer opportunities to apply their high skills at work.
- The relationship between the relative numeracy skill measure and numeracy skills is declining, indicating that low-skilled workers are required to apply their (relatively low) numeracy skills at work relatively often, while high-skilled workers make less use of their skills at work.
- The ratio between job complexity and skills increases for older workers.
- Workers who attended education or training courses in the previous 12 months report higher job requirements relative to their skills than workers who did not attend courses.

Determinants of education and training participation

This chapter contains an analysis of education and training participation. It focuses on:

- the role of educational attainment and occupation
- an investigation of the determinants of further education and training.

Two indicators of education and training participation are considered in the empirical analysis of this chapter:

- education and training participation in general (that is, whether a person undertook a qualification course and/or non-qualification course in the previous 12 months)
- participation in formal VET in the previous 12 months (that is, whether a person was enrolled in TAFE or a technical college for the most recent qualification).

Roussel (2002) contains a detailed study of the participation of Australians in education and training. Roussel used three ABS surveys that contained similar training indicators to those used here. Roussel (2002) analysed the determinants of three measures of individual involvement in education and training: participation in some form of education and training in the 12 months prior to the survey; participation in education in the calendar year prior to the survey; and participation in an in-house or external training course in the 12 months prior to the survey. Roussel also provided a comprehensive survey of the determinants of individual participation in education and training from earlier studies. Among other factors, these studies have typically found that participation:

- broadly rises with prior educational attainment and the skill level of occupation the individual works in
- either falls with age and tenure with an individual's current employer, or follows an inverted 'U' shape
- is higher among full-time workers.

Of their employer characteristics, previous studies have found that participation in training is higher in the public than the private sector, but in the private sector increases with firm size and varies considerably by industry.

Roussel's results confirmed these individual and employer effects on individual participation in training. Roussel, along with many others, emphasises the role of prior educational attainment in determining participation in training. Blandy et al. (2000) found that, while prior educational attainment and receipt of training were positively related in ABS data, the relationship between prior attainment and the actual hours of training undertaken was not. That is, employees with higher prior levels of education were more likely to be trained than others, but received shorter periods of training than their less educated co-workers. Blandy et al. (2000) found that workers who completed secondary school received longer periods of training than those who had attained either higher or lower levels of education. This result was matched in data collected on new hires by firms, which indicated that recently employed individuals with better prior vocational preparation received less training than other new workers. These findings were similar to the studies that use the United States data that the pilot data collected by Blandy et al. (2000) were based on (for example, Bishop 1994).

The results in Ryan and Watson (2003) were similar in many regards to those already described. In addition, they found that the likelihood of employees undertaking training was higher if:

- The average skill level of their work colleagues was low.
- They worked in an occupation that tended to be affected significantly by workplace change.
- They worked in a segment of the workforce with a high personal computer-to-employee ratio.
- They worked in a segment of the workforce where employers did not consider their workforce to be adequately trained.

The direction of these effects was quite consistent. Employers provided training to those individuals with the greatest needs—those in low-skill-level areas of the economy, whose jobs were changing and who used new technology. The occupational skill level and personal computer ratio had quite substantial effects on the probability of participation in training among employees.

The role of educational attainment and occupation

Educational attainment

Ryan and Sinning (2009) have shown that relatively high-skilled workers apply their skills more often at work than less skilled workers. Since skill requirements change over time, we may expect that highly educated workers need to undertake education and training courses more often to update their skills than less educated workers. Table 3 presents the shares of workers participating in further education or training courses by the highest level of education and age group of employed respondents in 2006.

Like previous studies, the data indicate that:

- The proportion of workers undertaking education or training courses increases at higher levels of education.
- The proportion of young workers who undertake further education is substantially higher than the proportion of older workers, suggesting that the propensity to undertake further education decreases over the life cycle.
- The decline in the propensity to undertake education or training courses at higher ages is much stronger among relatively low educated workers.

Overall, the data show substantial differences in the propensity to participate in further education between age groups, indicative of older workers having much lower incentives to undertake education or training courses than younger workers. The magnitude of these differences varies considerably across levels of educational attainment, with relatively low-educated workers being much less likely to undertake further education.

Table 3 Education and training participation by highest educational attainment and age group, 2006

	Education and training participation by age group			
	Below 40 years	40–49 years	50–59 years	60 years and above
Education and training participation				
Postgraduate degree, graduate diploma/graduate certificate	71.0%	75.3%	66.4%	61.0%
Bachelor degree	68.3%	67.1%	61.5%	60.8%
Advanced diploma/diploma	69.0%	62.3%	56.4%	50.1%
Certificate III/IV	62.1%	49.4%	43.7%	34.9%
Certificate I/II	53.8%	26.0%	47.6%	25.5%
Year 12	59.6%	50.8%	47.7%	20.8%
Year 11	60.7%	35.6%	32.2%	16.4%
Year 10	41.9%	36.2%	33.7%	28.8%
Year 9	45.3%	37.0%	26.9%	20.8%
Year 8 or below	40.7%	16.5%	25.5%	5.6%
Total	61.0%	51.8%	46.3%	34.7%
Formal VET study				
Postgraduate degree, graduate diploma/graduate certificate	1.1%	2.2%	4.3%	1.5%
Bachelor degree	2.7%	2.3%	0.7%	<0.1%
Advanced diploma/diploma	7.8%	5.4%	0.9%	3.7%
Certificate III/IV	16.7%	8.0%	6.8%	0.8%
Certificate I/II	24.9%	8.8%	<0.0%	<0.1%
Year 12	10.1%	4.0%	3.2%	3.9%
Year 11	10.2%	5.3%	2.5%	<0.1%
Year 10	12.2%	4.8%	1.5%	4.8%
Year 9	10.8%	<0.1%	<0.1%	<0.1%
Year 8 or below	<0.1%	<0.1%	<0.1%	<0.1%
Total	9.3%	4.5%	2.7%	1.7%
Number of observations	2483	1336	1044	423

Notes: Weighted numbers based on weights provided by ABS.
Source: ABS (2006, Basic Confidentialised Unit Record File).

Occupation

In addition to educational attainment, participation in education and training courses may vary substantially across occupational groups. Table 4 summarises the shares of workers who undertake further education by occupation and age group in 2006.

Again, like earlier studies, the numbers suggest that:

- ✧ High-skilled workers (managers and professionals) are more likely to undertake education and training courses than workers in other occupations (such as machine operators and labourers).
- ✧ The share of young workers who undertake further education is substantially higher than the share of older workers.
- ✧ The magnitude of the decrease in further education participation rates at higher ages varies considerably across occupations.

Table 4 Education and training participation by occupation and age group, 2006

	Education and training participation by age group			
	Below 40 years	40–49 years	50–59 years	60 years and above
Education and training participation				
Managers	56.2%	50.5%	50.7%	25.7%
Professionals	71.3%	71.3%	57.3%	54.1%
Technicians and trades workers	64.0%	39.9%	46.8%	19.6%
Community and personal service workers	70.4%	65.5%	54.5%	84.1%
Clerical and administrative workers	52.5%	50.9%	44.7%	37.2%
Sales workers	63.0%	40.6%	43.1%	17.8%
Machinery operators and drivers	47.9%	46.0%	20.9%	26.0%
Labourers	48.5%	24.7%	25.7%	24.3%
Total	61.0%	51.8%	46.3%	34.7%
Formal VET study				
Managers	7.0%	4.0%	2.6%	1.3%
Professionals	3.4%	0.8%	2.7%	4.4%
Technicians and trades workers	26.8%	5.2%	1.8%	2.2%
Community and personal service workers	13.2%	11.3%	5.3%	0.8%
Clerical and administrative workers	3.9%	5.5%	2.2%	<0.1%
Sales workers	4.8%	3.4%	2.8%	<0.1%
Machinery operators and drivers	5.7%	7.4%	1.5%	2.1%
Labourers	6.6%	6.1%	3.8%	<0.1%
Total	9.3%	4.5%	2.7%	1.7%
Number of observations	2483	1336	1044	423

Notes: Weighted numbers based on weights provided by ABS.
Source: ABS (2006, Basic Confidentialised Unit Record File).

Regression analysis

So far, we have shown that the relationship between skill matches and training participation of workers has a number of predictable features. The functional relationship between different skills and their use at work appears to be quadratic rather than linear, indicating that levels of skill use at work are increasing with higher skills, but at a declining rate. We have also shown that a higher relative job complexity increases the likelihood of training participation. Finally, the likelihood of undertaking further education and training increases with educational attainment and in higher skills occupations, but declines with age. To investigate whether these patterns remain when other determinants of training participation are taken into account, it is necessary to estimate a multivariate regression model. The estimates of such a model can answer a number of interesting questions, such as:

- ✧ Are there significant differences in training propensities between male and female workers?
- ✧ Does the relationship between educational attainment and training participation remain once the relative skills of workers are taken into account?
- ✧ Do participation probabilities differ significantly between full-time and part-time workers?
- ✧ Are participation probabilities associated with employer size?
- ✧ Are the measures of relative job complexity associated with an increased likelihood of training participation once other factors taken into account?
- ✧ Are higher self-assessed skills also associated with an increased training propensity?

- ✧ Do training propensities differ significantly over time and across birth cohorts?
- ✧ To what extent do ageing effects contribute to observed patterns in training participation?

To answer these questions, the following regression equation is estimated for the pooled data from the 1996 and 2006 surveys (all explanatory variables have an associated parameter that we estimate):

		intercept + year or survey indicator
		+ relative literacy use + relative literacy use squared
		+ self-assessed skills + self-assessed skills squared
		+ female indicator + female x year indicator
Training	=	+ highest level of education indicators
participation		+ full-time employment indicator
		+ employer size indicators
		+ birth cohort indicators
		+ birth cohort x year or survey indicators
		+ residuals

Table 5 shows the estimates of linear probability models. The first two columns report the estimates of the education and training participation indicator, while the last two columns include the results using an indicator variable for undertaking formal VET studies as a dependent variable. The coefficients of relative literacy use and relative literacy use squared exhibit a quadratic relationship between relative job complexity and training participation, indicating that an increase in job complexity relative to literacy skills increases the training propensity at a declining rate. The coefficients of self-assessed skills and self-assessed skills squared exhibit a similar relationship.

In general, variables are interpreted to have a significant effect on the dependent variable of a regression equation where their t-value (parameter estimate/standard error) exceeds 1.96. The parameters on such variables are said to be statistically different from zero at the 95% level. Using this criterion, the coefficients on relative literacy use can be considered significantly different from zero, while the effect of self-assessed skills is only significant for the linear term in the formal VET study regression, reflecting a linear relationship between self-assessed skills and formal VET studies. Since the estimates of both models are influenced strongly by the way in which the models are specified, it is necessary to take a closer look at all variables that were included in the regression equation:

- ✧ *Intercept*: the intercept denotes a constructed level of training participation for a hypothetical observation, given that all variables of the models are equal to zero. Since some of the variables in the regression models are different from zero for all observations, an economic interpretation of the intercept is not possible.
- ✧ *Year indicator*: the coefficient of the year indicator suggests that the probability of undertaking further education and training courses has declined between 1996 and 2006.
- ✧ *Female indicators*: after controlling for relevant determinants, gender differences in participation probabilities are not significant.

Table 5 Determinants of education and training participation

	Education and training		Formal VET study	
	Estimate	t-value	Estimate	t-value
Intercept	0.418	4.33	0.053	0.98
Year 2006	-0.367	-3.01	-0.054	-0.87
Relative literacy use				
Relative literacy use	0.242	2.91	0.054	1.06
Relative literacy use squared/100	-0.054	-1.31	-0.019	-0.79
Self-assessed skills				
Self-assessed skills	0.001	1.60	0.0005	1.97
Self-assessed skills squared/100	-0.0001	-1.49	-0.00007	-1.45
Female				
Female	-0.007	-0.42	0.002	0.26
Female x Year 2006	-0.017	-0.69	-0.009	-0.71
Highest level of education				
Year 12	0.125	5.51	0.034	2.17
Certificate I/II/certificate not further defined	0.018	0.55	0.027	1.29
Certificate III/IV	0.047	2.08	0.019	1.24
Advanced diploma/diploma	0.131	4.90	0.039	2.25
Bachelor degree	0.141	4.70	-0.005	-0.32
Postgraduate degree, graduate diploma/ graduate certificate	0.185	4.88	0.005	0.29
Full-time employed	-0.032	-1.72	0.023	2.10
Employer size				
20–99	0.083	3.46	0.028	1.68
100–499	0.103	3.87	0.007	0.44
500 and over	0.163	8.38	-0.014	-1.16
Birth cohort*				
Birth cohort 1972–76	-0.333	-8.63	-0.086	-2.60
Birth cohort 1967–71	-0.436	-11.64	-0.123	-3.82
Birth cohort 1962–66	-0.447	-12.02	-0.149	-4.80
Birth cohort 1957–61	-0.464	-12.51	-0.152	-4.88
Birth cohort 1952–56	-0.480	-12.75	-0.178	-5.81
Birth cohort 1947–51	-0.542	-14.12	-0.174	-5.64
Birth cohort 1942–46	-0.547	-13.71	-0.188	-5.95
Birth cohort 1922–41	-0.598	-15.78	-0.181	-5.60
Interaction with time effect*				
Birth cohort 1972–76	0.177	3.68	0.014	0.39
Birth cohort 1967–71	0.286	6.21	0.055	1.56
Birth cohort 1962–66	0.279	6.01	0.061	1.78
Birth cohort 1957–61	0.310	6.70	0.081	2.31
Birth cohort 1952–56	0.259	5.42	0.082	2.41
Birth cohort 1947–51	0.343	6.94	0.072	2.11
Birth cohort 1942–46	0.271	5.18	0.068	1.95
Birth cohort 1922–41	0.294	4.77	0.077	2.05
R-squared	0.1737		0.0679	
F-value	25.19		3.81	

Notes: Number of observations: 10 721; weighted linear regression based on weights provided by ABS. The regression further includes occupation, industry indicators and interaction terms between all variables and year indicators.
*Reference group: birth cohort 1977–91.

Source: ABS (1997a, 2006, Basic Confidentialised Unit Record File).

✧ *Highest level of education*: the coefficients on the indicator variables for the highest level of education of individuals suggest that education is positively associated with education and

training participation. Compared with the reference group (that is, the group of workers with education below Year 12), almost all levels of education considered in the first regression model are associated with higher training propensities, indicating that high-skilled workers are more likely to undertake further education and training than low-skilled workers. This result is in line with the descriptive statistics presented in table 3. While educational attainment represents a strong predictor of education and training participation, it does not seem to have a strong effect on the propensity to undertake formal VET studies.

- *Full-time employment*: part-time workers have a higher propensity to undertake further education and training than full-time workers, suggesting that part-time workers have more time and maybe even higher incentives to undertake training courses. However, this effect is only significant at a 10% level of significance (that is, the t-ratio is larger than the critical value at the 10% level of significance of 1.645). By contrast, full-time workers seem to be more likely to participate in formal VET courses than part-time workers.
- *Employer size*: the coefficients of the variables denoting the number of persons employed at the location of the individual's main job suggest that employer size is a strong predictor of participation in education and training courses, while formal VET course participation is not affected by the size of the company. Employment at larger establishments is positively associated with increased training propensities, suggesting that workers in large companies have higher incentives to participate in further education than workers in relatively small companies.
- *Birth cohort effects*: all coefficients of the birth cohort indicators are significantly negative in both models, indicating that differences between birth cohorts are important in analysing the determinants of further education and training. The coefficients are steadily declining for older birth cohorts, suggesting that older workers are significantly less likely to undertake training or formal VET courses than the reference group, which consists of workers who were born between 1977 and 1991.
- *Ageing effects*: the coefficients of the birth cohort indicators show that participation probabilities differ across birth cohorts. Given this result, one might also expect variations in participation probabilities over the life cycle. It is important to note that the coefficients of the birth cohort indicators do not represent life-cycle effects, because they measure differences *between* birth cohorts at a point in time. Life-cycle (or ageing) effects may only be identified by considering changes *within* a birth cohort over time. This can be achieved by interacting birth cohort and time indicators. A joint consideration of the (positive) coefficients of these indicators and the (negative) coefficient of the overall year indicator suggests that the youngest cohort of workers has become less likely to undertake training or formal VET courses, while participation has remained about the same for all other birth cohorts.

In sum, the results of the regression analysis answer a number of interesting questions. Training propensities increase with relative literacy use at work, although at a declining rate, while the relationship between self-assessed skills and formal VET studies is linear. Moreover, differences between male and female workers are not significant. Educational attainment appears to be a strong predictor of further education and training participation, as other studies have found, but does not seem to affect the participation in formal VET courses. In addition, while part-time employment and the size of the employer positively affect training participation, these factors do not influence the participation in formal VET courses negatively. Finally, older birth cohorts are less likely to undertake training or formal VET courses than younger birth cohorts, although their participation did not change between surveys as they grew older, while the participation of the youngest cohort fell between surveys. The following chapter provides a more detailed discussion of the relationship between demographic factors and training participation.

Table 6 summarises the estimates of the effects of different job complexity measures on education and training participation in 2006. The complete estimates of these models are provided in the support document to this study. The data in table 6 (models 1–2) confirm the quadratic relationship between the relative literacy use measure and both training and formal VET course participation. Moreover, including a quadratic function of relative numeracy use in the regression equation

(model 2) does not change the coefficients of relative literacy use substantially. The relative numeracy use measure increases the training propensity at a declining rate, but does not affect the participation in formal VET courses significantly. This result indicates that a relative increase in literacy use at work increases the training propensity in a similar way as a relative increase in numeracy use, while formal VET course participation depends on literacy use rather than numeracy use.

Overall, these findings suggest that workers are more likely to undertake training courses if the job requirements increase with respect to literacy use or numeracy use. In contrast, formal VET course participation only increases if relative literacy requirements increase.

Table 6 Determinants of education and training participation, 2006—selected variables

	Model 1		Model 2	
	Estimate	t-value	Estimate	t-value
Education and training participation				
Relative literacy use				
Relative literacy use	0.338	4.99	0.268	3.63
Relative literacy use squared/100	-0.112	-3.82	-0.085	-2.67
Relative numeracy skills				
Relative numeracy use			0.203	2.77
Relative numeracy use squared/100			-0.084	-2.91
Self-assessed skills				
Self-assessed skills	0.0006	1.80	0.0005	1.39
Self-assessed skills squared/100	-0.00001	-0.25	0.000002	0.05
R-squared	0.1533		0.1550	
F-value	20.24		19.85	
Formal VET study				
Relative literacy use				
Relative literacy use	0.092	2.49	0.095	2.45
Relative literacy use squared/100	-0.031	-2.25	-0.034	-2.27
Relative numeracy skills				
Relative numeracy use			-0.008	-0.24
Relative numeracy use squared/100			0.007	0.51
Self-assessed skills				
Self-assessed skills	0.0002	1.85	0.0003	1.94
Self-assessed skills squared/100	-0.00002	-0.92	-0.00002	-1.03
R-squared	0.0745		0.0746	
F-value	3.36		3.22	

Notes: Number of observations: 5286. Weighted linear regression based on weights provided by ABS. The regression further includes the same set of control variables as table 5 except interaction terms.

Source: ABS (1997, 2006, Basic Confidentialised Unit Record File).

Summary

This chapter analyses the relationship between educational attainment, occupation and the participation of workers in further education and training and investigates the relevance of different determinants of education and training participation.

The main results obtained from this analysis may be summarised as follows:

- ✧ The proportion of workers undertaking education or training courses is higher for people with higher levels of prior education.
- ✧ The proportion of young workers who undertake further education is substantially higher than the proportion of older workers.

- ✧ The decline in the propensity to undertake education or training courses at higher ages is much stronger among relatively low-educated workers.
- ✧ Workers in occupations that typically require high skills are more likely to undertake education and training courses than workers in other occupations.
- ✧ The magnitude of the decrease in further education participation rates at higher ages varies considerably across occupations.
- ✧ Training propensities increase with relative literacy use at work, although at a declining rate, while the relationship between self-assessed skills and formal VET studies is linear.
- ✧ Differences in participation rates in further education and training between male and female workers are not significant.
- ✧ Educational attainment appears to be a strong predictor of further education and training participation, but does not seem to affect formal VET participation.
- ✧ While part-time employment and the size of the employer positively affect training participation, these factors do not influence participation in formal VET courses.
- ✧ Workers are more likely to attend training courses if the job requirements increase with respect to literacy use or numeracy use. By contrast, formal VET course participation only increases if relative literacy requirements increase.

Skill matches and the role of demographic factors

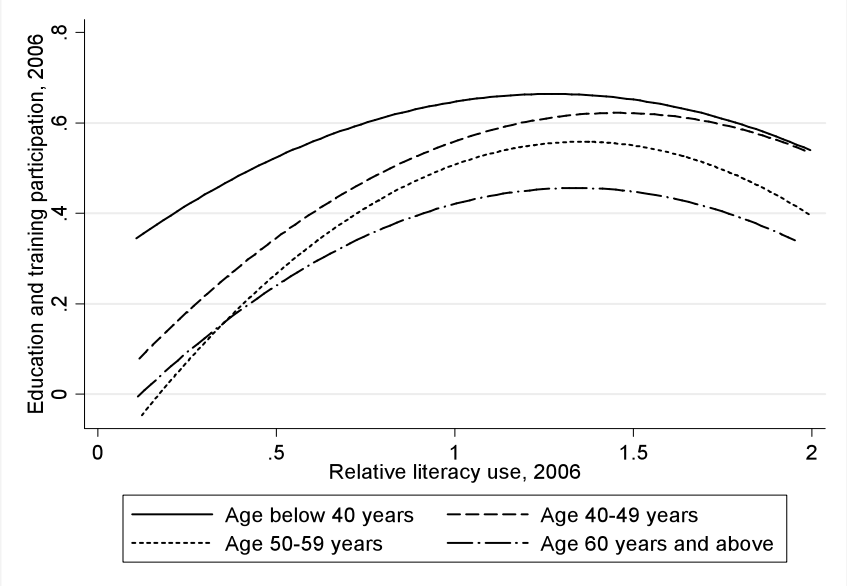
This chapter contains an analysis of the relationship between skill matches and demographic factors. It focuses on:

- the relationship between relative job complexity measures and training participation
- the relationship between relative job complexity measures and formal VET course participation
- the relevance of combining job complexity measures to explain training and formal VET course participation.

Relative literacy use and training

The regression results presented in the last chapter provide evidence for a quadratic relationship between further education and training and the job complexity relative to skills, suggesting that a relative increase in job complexity enhances participation probabilities at a declining rate.

Figure 5 Education and training participation and relative literacy use by age group, 2006



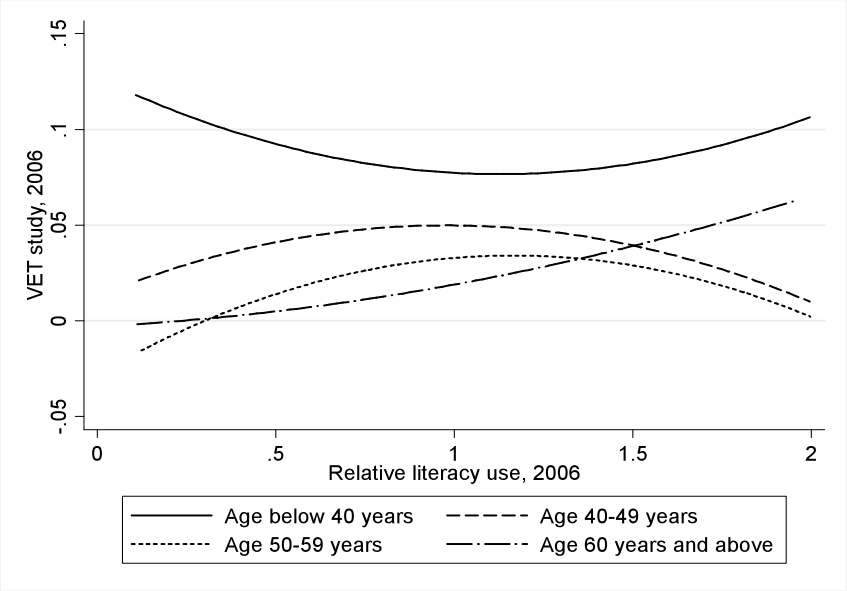
Source: ABS (2006, Basic Confidentialised Unit Record File).

Figure 5 reveals that this relationship is not the same for different age groups. Specifically, workers below 40 years have a higher propensity to undertake further education and training than workers above 40 years. Moreover, workers aged 60 years and above seem to have a relatively low propensity (below 50%) to undertake further education and training, presumably because they are approaching retirement age. The quadratic functions in figure 5 are increasing up to a relative literacy use level of about 1.5. Since we impose a quadratic relationship between relative job complexity and participation probabilities, the functions may become negative at very high levels of

relative job complexity. However, it is important to note that the share of workers exhibiting a relative job complexity measure above 2 is very small (see figure 1).

Figure 6 includes the functions that describe the relationship between the relative literacy use measure and the probability of undertaking formal VET studies. Similar to figure 5, younger workers have a higher propensity to attend formal VET courses than older workers. However, in contrast to figure 6, the probability of attending formal VET courses is only at or below 10%. Due to the large share of workers below 40 years in jobs with low literacy requirements who attend formal VET courses, the imposed quadratic function of young workers is U-shaped.

Figure 6 Formal VET study and relative literacy use by age group, 2006



Source: ABS (2006, Basic Confidentialised Unit Record File).

Overall, the functions presented in figures 5 and 6 confirm the findings of the regression analysis and provide evidence for differences between age groups with regard to the relationship between the relative literacy use measure and training participation. In the following, we investigate whether such a relationship may also be observed for other relative job complexity measures.

Skill matches and training

The degree to which individual literacy and numeracy skills match the requirements of a job plays a crucial role in defining individual training needs. Table 7 includes a summary of the effects that different job complexity measures have on the propensity to participate in further education and training, paying particular attention to differences between age groups. The regression models that were used to obtain these estimates are similar to the underlying model of table 5. However, in contrast to the specification of table 5, interaction terms were removed and the sample was reduced to 2006, because the relative measures of numeracy use cannot be observed in 1996. Moreover, the quadratic functions of the relative skill use measures were included separately for each age group. As a consequence, the overall measure of relative literacy use and the birth cohort indicators were removed from the model.

Table 7 Education and training participation and relative skill use, 2006

	Relative literacy use		Relative numeracy use	
	Estimate	t-value	Estimate	t-value
Age below 40 years				
Relative skill use	0.448	5.33	0.393	4.65
Relative skill use squared/100	-0.173	-3.97	-0.139	-3.21
Age 40–49 years				
Relative skill use	0.316	4.02	0.296	4.01
Relative skill use squared/100	-0.117	-2.95	-0.120	-3.85
Age 50–59 years				
Relative skill use	0.152	1.95	0.155	1.86
Relative skill use squared/100	-0.016	-0.43	-0.030	-0.75
Age 60 years and above				
Relative skill use	0.188	2.10	0.171	1.73
Relative skill use squared/100	-0.101	-2.21	-0.118	-2.23

Notes: Number of observations: 5286. Weighted linear regression based on weights provided by ABS. The regression further includes the same set of control variables as table 5 except interaction terms and cohort indicators.

Source: ABS (2006, Basic Confidentialised Unit Record File).

The estimates of the different models suggest that the effects of all relative measures of job complexity on the propensity to participate in further education and training courses vary considerably across age groups. Specifically, an increase in job complexity relative to skills has a much stronger effect on the participation propensity of workers below 40 years compared with older workers. While the effects of the different measures are still relatively high among workers aged 40–49 years, they are substantially lower among workers at or above 50 years. These findings are in line with the functions presented in figure 5. Moreover, the estimates reveal that the relationship between relative job complexity and the propensity to participate in further education and training may be observed for different measures.

Table 8 Formal VET study and relative skill use, 2006

	Relative literacy use		Relative numeracy use	
	Estimate	t-value	Estimate	t-value
Age below 40 years				
Relative skill use	0.129	3.03	0.035	0.81
Relative skill use squared/100	-0.049	-2.42	0.007	0.30
Age 40–49 years				
Relative skill use	0.059	1.50	0.004	0.14
Relative skill use squared/100	-0.023	-1.39	-0.005	-0.38
Age 50–59 years				
Relative skill use	0.018	0.49	-0.025	-0.67
Relative skill use squared/100	-0.002	-0.20	0.005	0.35
Age 60 years and above				
Relative skill use	-0.004	-0.11	-0.051	-1.29
Relative skill use squared/100	0.003	0.18	0.012	0.72

Notes: Number of observations: 5286. Weighted linear regression based on weights provided by ABS. The regression further includes the same set of control variables as table 5 except interaction terms and cohort indicators.

Source: ABS (2006, Basic Confidentialised Unit Record File).

Table 8 includes the effects of different measures of relative job complexity on the propensity to undertake formal VET courses. In contrast to table 7, the only significant effects are those of relative literacy use measures of workers below 40 years. This result suggests that an increase in the relative job complexity may only increase formal VET course participation if workers are relatively young.

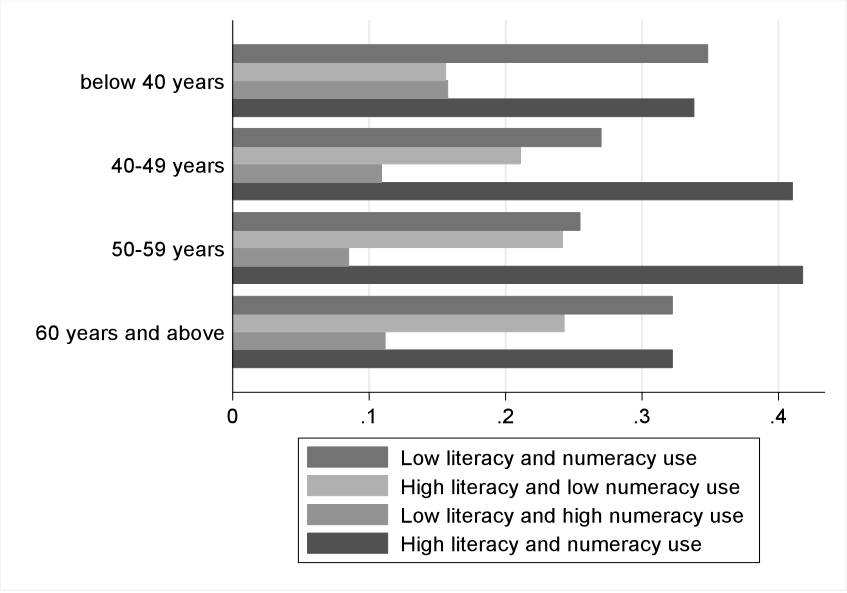
Joint consideration of job complexity measures

So far, different measures of relative job complexity have been considered separately, that is, the effect of a change in a job complexity measure on the propensity to participate in further education was considered when all other factors remain unchanged. In the following, we investigate the joint relevance of relative literacy and numeracy use at work to explain the propensity to participate in further education. Specifically, we construct two indicators measuring high or low relative literacy and numeracy use at work. The level of relative literacy or numeracy use is considered to be high if a value of the measure is above the median, while a low level corresponds to a value below the median. These indicators and the distinction between high and low levels of job complexity may be used to define the following types of jobs:

- ✧ jobs with low literacy and low numeracy requirements
- ✧ jobs with high literacy and low numeracy requirements
- ✧ jobs with low literacy and high numeracy requirements
- ✧ jobs with high literacy and high numeracy requirements.

Figure 7 depicts the share of workers undertaking further education and training in each type of job by age group. It becomes clear that most participants in further education and training are working in jobs that require either both high literacy and high numeracy skills or both low literacy and low numeracy skills. It seems likely that workers in jobs with high-skill requirements need to undertake further education and training to keep their skills up to date, while workers in jobs with low-skill requirements have an incentive to improve their skills and consequently their earnings and employment prospects.

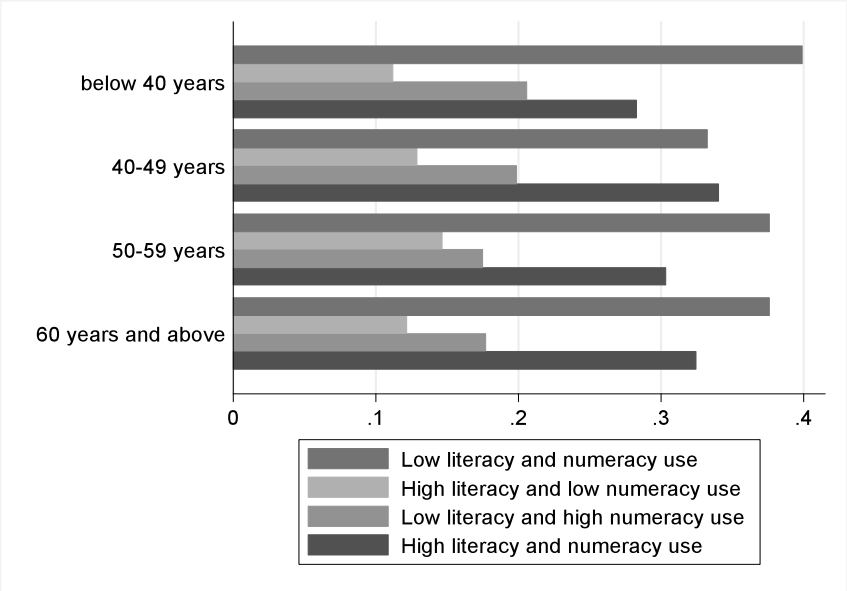
Figure 7 Share of workers undertaking further education and training by age group, 2006



Source: ABS (2006, Basic Confidentialised Unit Record File).

Figure 8 reveals that the share of workers in jobs with low literacy and numeracy requirements who do not undertake further education or training is relatively high—workers in those jobs are over-represented among the non-training group, given the share of such jobs in the economy. By contrast, workers in jobs with high literacy and/or high numeracy requirements are under-represented, which reflects their need to undertake further education and training more often. These results are in line with the findings in tables 3 and 4, which suggest that high-skilled workers are more likely to undertake further education and training than low-skilled workers.

Figure 8 Share of workers not undertaking further education and training by age group, 2006



Source: ABS (2006, Basic Confidentialised Unit Record File).

Summary

This chapter has analysed the relationship between skill matches and demographic factors. The main findings may be summarised as follows:

- The effects of all relative measures of job complexity on the propensity to participate in further education and training courses vary considerably across age groups.
- An increase in the relative job complexity increases formal VET course participation only if workers are relatively young.
- Most participants in further education and training are working in jobs that require either both high literacy and high numeracy skills or both low literacy and low numeracy skills.
- The share of workers in jobs with low literacy and numeracy requirements who do not undertake further education or training is relatively high—workers in those jobs are over-represented among the non-training group, given the share of such jobs in the economy.

Implications

This study explores the relationship between job requirements and participation in further education and training in the Australian labour market, paying particular attention to differences between age groups. Job requirements are measured through self-reports of individuals about their literacy and numeracy use at work. The study uses two surveys conducted ten years apart, in 1996 and 2006, which contain comparable information on measures of worker skills, notably their literacy skills, as well as information on the frequency with which they undertake a range of literacy- and numeracy-related tasks. The observed variables were used to construct measures of relative job complexity, that is, the skills required in the workplace relative to the skills of an individual. These measures could be used to investigate the relationship between skill (mis)matches and the propensity of workers to participate in further education or training.

The findings drawn from the analysis include:

- *Skills and training*: the relative job complexity with respect to literacy is highest for workers with whose skills are about average. The ratio between job complexity and skills is lower for low-skilled workers, suggesting that literacy use is less relevant in jobs for low-skilled workers. The ratio between job complexity and skills is also lower for high-skilled workers. The relationship between the relative numeracy skill measure and numeracy skills is declining, indicating that low-skilled workers are required to apply their (relatively low) numeracy skills at work relatively often, while high-skilled workers apply their skills less often. The ratio between job complexity and skills increases for older workers. Workers who attended education or training courses in the previous 12 months report higher job requirements relative to their skills than workers who did not attend courses.
- *Determinants of education and training participation*: the proportion of workers who undertook education or training courses was higher at higher levels of education. The proportion of young workers who undertook further education is substantially higher than the proportion of older workers who undertook further education. The decline in the propensity to undertake education or training courses at higher ages is much stronger among relatively low-educated workers. Workers in occupations that typically require high skills are more likely to undertake education and training courses than workers in other occupations. Educational attainment is a strong predictor of further education and training participation, as other studies have found, but does not seem to affect participation in formal VET courses. While full-time employment and the size of the employer are strong predictors of training participation, these factors do not affect the participation in formal VET courses. Workers are more likely to attend training courses if job requirements increase. By contrast, formal VET course participation only increases if relative literacy requirements increase. These findings suggest that, in addition to individual characteristics, features of the job influence who undertakes training.
- *Skill matches and the role of demographic factors*: a positive relationship between relative job complexity and the propensity to participate in further education and training may be observed for literacy and numeracy measures. The effects of all relative measures of job complexity on the propensity to participate in further education and training courses vary considerably across age groups. An increase in the relative job complexity increases formal VET course participation

- only if workers are relatively young. Most participants in further education and training are working in jobs that require either both high literacy and high numeracy skills or both low literacy and low numeracy skills.

The analysis undertaken in this paper clearly adds to our understanding of the determinants of training among workers. In taking account of relative job complexity, differences in the propensity to undertake training remained between workers of differing ages. In particular, older workers were less likely to undertake education and training, for any level of relative job complexity.

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Support document details

Additional information relating to this research is available in *Job requirements and lifelong learning for older workers: Support document*. It can be accessed from NCVER's website <http://www.ncver.edu.au/publications/2186.html>. It contains:

- Definitions of variables
- Descriptive statistics
- Additional figures

NCVER

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