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Literacy and numeracy skills and their use by the Australian workforce

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About the research

Literacy and numeracy skills and their use by the Australian workforce

Chris Ryan and Mathias Sinning, Australian National University

Against the backdrop of an ageing population, the focus of keeping older workers in the workforce has remained current, even though Australia has moved from an economic boom time into a downturn. One set of issues is the relationship between the skills of older workers and the skill requirements of jobs available to them. Of particular concern would be evidence of mismatch, since skills not used implies that our investment in education and training is not as effective as it should be. Furthermore, the challenge of keeping older workers in the labour force will be difficult to meet if the skill requirements of jobs exceed the skills of the workers.

This paper summarises the findings from two projects conducted in the first year of a three-year program of research. The first project looked at the relationship between literacy and numeracy skills and their use in the workplace. The analysis allows us to see whether workers in certain age groups are mismatched to their jobs, based on their literacy and numeracy skills. The second project investigated whether the relationship between skill level and skill use affects the propensity to undertake further education and training.

Key findings

- Older workers make as much use of their literacy and numeracy skills at work as younger workers. Skill mismatch is not a problem that affects older any more than younger workers.
- Workers who report that their jobs are demanding relative to their skills are more likely to participate in further education and training.
- Participation in further education and training is lower for older workers compared with younger workers, although they still show higher participation if their jobs are demanding relative to skills.

These findings suggest that older workers do not appear to be moving into less demanding 'transition' jobs in preparation for retirement. Lower participation of older workers in education and training is therefore not because they are in less demanding jobs, but is likely to be due to other factors such as fewer opportunities for training provided by employers or less time to recoup a return on investment in training.

Readers interested in further details of the analyses are pointed to the two full reports *Skill matches to job requirements* and *Job requirements and lifelong learning for older workers*, available from the NCVER website.

Tom Karmel
Managing Director, NCVER

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Literacy and numeracy skills and their use

How much do Australian workers use their literacy and numeracy skills in their jobs? How well matched are workers and jobs, in the sense that those with the best skills occupy jobs that make the most use of them? Are there some groups for whom we should be concerned about the quality of the match? What happens when workers and jobs are not well matched?

In this paper, we address the relationship between the skills of workers and the skill requirements of the jobs in which they work in the Australian labour market. We also examine the relationship between skill mismatches and the participation of workers in further education and training. We use two surveys conducted by the Australian Bureau of Statistics (ABS): the Survey of Aspects of Literacy (SAL) and the Adult Literacy and Life Skills (ALLS) Survey. These surveys, conducted ten years apart, 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 surveys are described in the box containing technical details below.

We pay particular attention to changes in skills and job requirements over time and the role of demographic aspects, such as age and gender. Ryan and Sinning provide a detailed analysis of these issues in the two reports which this overview summarises.

This paper commences with an analysis of the nature of the match between workers' skills and their jobs, followed by a consideration of whether mismatches induce people to undertake education and training. A final section sets out some implications of our analysis and directions for a future research program to look at some of the issues raised in more detail.

Skills and skill requirements

Understanding the nature of the relationship between worker skills and their use at work is important for a number of reasons. First, the Organisation for Economic Co-operation and Development (OECD) and others have argued that a skilled workforce is of most value where those skills are 'exercised' in people's jobs. If workers do not use their skills at work, these un-utilised skills tend to dissipate (OECD & Human Resources Development Canada 1997; Krahn & Lowe 1998). It appears that it is the use of those skills in employment that maintains them and allows them to deliver economic benefits (Green & Riddell 2007). Research has found that the literacy and numeracy skills of countries' workforces matter for economic performance, in terms of growth in gross domestic product (GDP) per capita and in productivity growth (Coulombe, Tremblay & Marchand 2004).

Second, skill mismatches may involve a loss in worker productivity or high stress rates among workers if they do not have the skills required by their jobs. Mismatches in either direction may create potential costs in terms of low job satisfaction among workers and consequent high turnover rates. An analysis of the skill content of jobs can provide evidence about the way job requirements differ between groups of workers and how skill demands may be changing over time. This may allow us to identify groups of workers particularly vulnerable to technological change, such as older workers. Further, workers whose skills may not appear to match the demands of their jobs may use

education and training as a way of upgrading their skills. Hence, the existence of a skills mismatch may be a good predictor of participation in education and training—in contrast to most of the existing literature on participation in education and training, where it is typically found that participation tends to be highest among more highly skilled workers.

Box 1 The data, its features and other technical details

The surveys

The data are drawn from two surveys conducted by the ABS ten years apart. The surveys 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 first survey was the Survey of Aspects of Literacy (SAL), conducted between May 1996 and July 1996. The second survey was the Adult Literacy and Life Skills (ALLS) Survey, conducted between July 2006 and January 2007. Both surveys involved interviews with about 9000 individuals aged 15 to 74 years living in private dwellings throughout non-remote areas of Australia.

Both surveys sought information from respondents, 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 and personal and household income.

Measured literacy and numeracy skills

Respondents also undertook a series of tests that allowed an assessment of their literacy and numeracy skills. Since overlapping literacy-related questions were asked in the two surveys, it is possible to trace how the average literacy skill levels of Australians changed between the surveys. These literacy and numeracy skill scales were placed on 0–500 range in the 2006 survey, but were released on an ordinal 1–5 point scale for the 1996 survey. Hence it was necessary to estimate respondents' scores on the 0–500 scale for 1996 based on their ordinal value and the relationship between the ordinal and continuous scores from the 2006 data.

Literacy and numeracy tasks undertaken at work

The surveys also contained measures of job tasks that reflected the subjects' reports 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 they undertook 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'. These responses can be combined into summary measures or scales that capture the extent to which individuals undertake literacy and numeracy tasks in their jobs. These scales are placed on 0–500 range, consistent with the literacy and numeracy scales provided in the ABS data.

Participation in education and training

The surveys further contain similar, but not necessarily overlapping, information on participation in education and training by subjects. Given the information on the 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 the participation intensity. Two such 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 vocational education and training VET) in the previous 12 months (that is, whether a person was enrolled in technical and further education (TAFE) or technical college for a nominated qualification in the last 12 months).

More detailed descriptions of the surveys, characteristics of the data and how all relevant scales were generated are provided in the full reports.

Since the data in the ABS surveys allow us to identify objective measures of workers' skills from reports and the way they use them, we can assess the nature of the match between these phenomena and how they have changed over time.

In our research, we pay particular attention to the position of older workers. As a group, older workers can face problems remaining connected to the labour market, particularly in times of economic downturn. Employer demand for them can be weak (Borland 2005 summarises studies of employer attitudes towards older workers) and older workers tend not to upgrade their skills through participation in formal education and training the same way younger workers do (Roussel 2002).

Their re-employment probabilities if not employed are lower than for younger workers (OECD 2005), in part because they are less likely to be interviewed for jobs they apply for (Lahey 2008 estimated their probability of interview as 40 per cent lower than otherwise similar younger workers).

At the same time, older workers' labour supply behaviour appears subject to government policy intervention. If accessible sources of non-labour income are available to older people, their labour force participation is lower. Australian experience with War Service pensions and the increased availability of disability payments suggests that these payments lowered workforce participation rates among older males (O'Brien 2001), while small increases in female participation have been associated with the increase in the age of eligibility for the Aged Pension for females. This experience points to some scope for policy to influence the labour market behaviour of older people.

With well-documented demographic changes occurring in the Australian population, many commentators have argued for the need for the supply of older workers to increase. An important question is whether this can take place in 'transition' jobs, where older workers are employed in less demanding jobs or jobs with shorter hours than their 'career' jobs, or by workers remaining longer in their 'career' jobs (Borland 2005). It is important, consequently, to know if or how the skill requirements of the jobs of individuals change as they age and what the implications might be of these alternative scenarios (increased labour force participation in transition versus career jobs) for the re-skilling and lifelong learning needs of older workers.

The low participation rates of older workers in education and training compared with workers of other ages has already been noted. Whether the reason for this poor participation is because older people have fewer years to recoup the return on any investment or because their jobs become less demanding as they move towards retirement, either explicitly in new transition jobs or just through some wind-down process in their career jobs, is not clear. The various issues surrounding the match of workers' skills to the requirements of their jobs and the nature of the match of older workers relative to younger workers are discussed below in response to a series of specific questions.

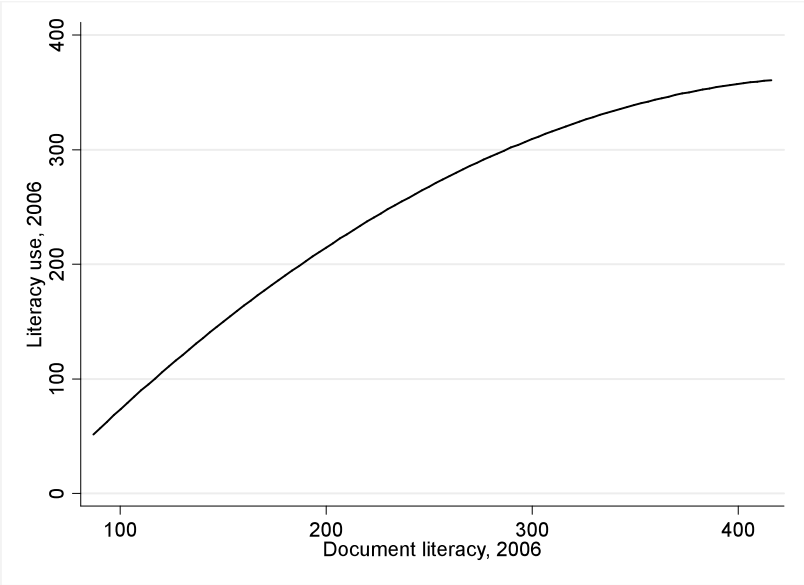
Are workers with the highest literacy and numeracy skills working in jobs that utilise their skills?

Yes. On average, workers with the highest levels of skills do report that they work in jobs that make more use of their skills than other workers. This is true of both literacy and numeracy skills. The relationship for one dimension of literacy—document literacy—and the conduct of literacy tasks at work is shown in figure 1. Both variables range on a scale between 0 and 500, although the relationship is only shown over the ranges where there are enough observations to estimate it.

From figure 1, it is apparent that the relationship between worker skills and job requirements is non-linear. At low skill levels, the literacy usage in jobs grows quite strongly as the skill levels of individuals increase. However, among very highly skilled individuals, usage in jobs does not change as much as skill levels rise. This may reflect a number of phenomena. Workers with high literacy skills may also possess other skills that are used relatively more in their jobs, or there may be other dimensions of literacy that are not reflected in the measures used here that are used more by very highly skilled individuals, for example, those related to communication or presentation skills.

Analysis conducted by the OECD for other countries, including Canada and the United States, also shows a clear positive relationship between the literacy and numeracy skills of individuals and the extent to which they undertake literacy and numeracy tasks in their work (OECD 2005).

Figure 1 Literacy use and document literacy, 2006



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

Have the skills of the workforce changed over time?

There is little evidence that the average literacy skill levels of either the general population or the workforce have changed over time. The document literacy measure for workers exhibits a slight increase between 1996 and 2006, while the estimates that include non-workers were little different between the surveys, suggesting that average skills in the population have not changed substantially over the past decade. Since these skills increase with possession of educational qualifications and educational attainment in the population has increased over the past decade, these results imply some kind of decrease in the average skill levels associated with formal qualifications. While this seems broadly borne out in the changes in estimated skill level averages associated with educational attainment across the surveys, the changes are small and typically not statistically significant. These average changes also appear to be affected by life-cycle changes; for example, Green and Riddell (2007) find evidence that the literacy skills of individuals might decline as they age.

Have job requirements changed over time?

Studies designed to assess the way job requirements have changed over time often define particular occupations as 'high skill' (Cully 1999) or 'knowledge intensive' (OECD 2005) or involving 'symbolic analysts' (Reich 1991) and then trace how the share of employment among such occupations changes over time. This can be problematic if the skill requirements of occupations themselves change over time, or if the tendency of individuals to describe their occupations in particular ways change. An alternative is therefore to look at changes in the actual tasks individuals perform in their jobs over time, an analysis allowed here by the data collected in the ABS surveys.

Our analysis suggests that the average measures of literacy and numeracy use at work for both males and females increased between 1996 and 2006, with the increase appearing to be more substantial for employed females.

These changed requirements across the workforce appear to reflect changes within occupations, but not because the occupational distribution changed substantially over the decade. Although the occupational classification changed between the 1996 and 2006 surveys, there are three broad occupational categories that remained roughly comparable: managers and administrators,

professionals, and trade occupations. Literacy and numeracy use increased between surveys in each of these occupations for females and generally for males, with the exception that literacy use in trade occupations fell by a small amount for males. These estimates are presented in table 1.

Table 1 Skills use by workers: 1996 and 2006

	Mean value by gender and year			
	1996		2006	
	Males	*Females*	*Males*	*Females*
Literacy use				
Managers and administrators	342.3	296.0	353.1	343.3
	(87.1)	(104.3	(88.1)	(91.9)
Professionals	356.9	324.2	360.2	340.1
	(76.0)	(86.0	(76.4)	(85.7)
Trades	257.6	211.1	250.3	231.4
	(107.2)	(92.1	(123.7)	(142.5)
Total	284.4	264.9	292.3	290.3
	(112.7)	(108.3	(121.4)	(113.9)
Numeracy use				
Managers and administrators	316.6	279.1	343.1	319.1
	(69.0)	(79.5)	(69.6)	(79.3)
Professionals	283.0	240.9	304.4	266.3
	(81.9)	(85.5)	(76.8)	(88.6)
Trades	280.1	229.8	301.7	282.3
	(87.8)	(93.3)	(91.8)	(105.8)
Total	266.5	229.1	291.2	264.2
	(92.4)	(86.6)	(94.7)	(97.0)
Number of observations	2921	2648	2825	2594

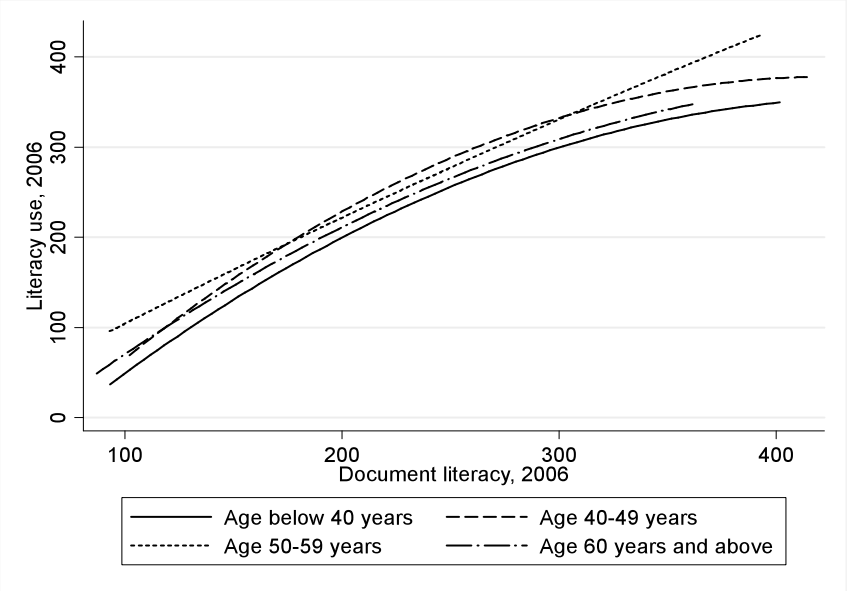
Notes: Weighted numbers are based on weights provided by ABS; standard deviations in parentheses.
Source: ABS (1996, 2006, Basic Confidentialised Unit Record File).

Do older workers apply their literacy and numeracy skills at work in the same way as younger workers?

Yes. Older workers seem to make as much use of their skills at work—both their literacy and their numeracy skills—as do younger workers. Figure 2 shows the relationship between document literacy and literacy use for four different age groups. The lines for older workers tend to lie above the line for workers aged less than 40 years of age, although the differences are not significant. Similarly for numeracy skills, the differences between the age groups are not significant. Hence, for workers with common measured literacy and numeracy skills, there are no substantial differences in how they use those skills in their jobs.

Our concern, highlighted in the introduction, then, about how well older workers are able to use their skills seems to be misplaced. While there are concerns about older workers being disadvantaged in the labour market in other dimensions, including their experience if displaced from their jobs, their ability to use their literacy and numeracy skills if they are employed is not one of them—older workers with the same measured literacy skills as younger workers do not report they make less use of their skills at work.

Figure 2 Literacy use and document literacy by age group, 2006



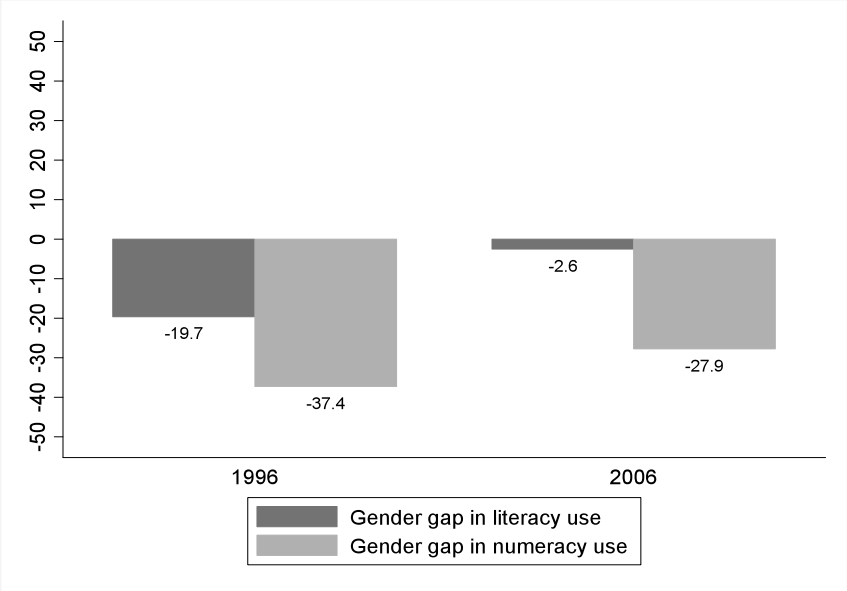
Source: ABS (2006 Basic Confidentialised Unit Record File).

Do we observe gender differences in literacy and numeracy use at work?

Yes, although the patterns may be changing. Males reported more use of their numeracy skills in both surveys, and more use of their literacy skills than females in 1996, but not 2006. These estimates also appear in table 1.

Simple linear regression models were estimated to investigate differences in the use of literacy and numeracy skills at work between male and female workers. Figure 3 presents the estimated gap between females and males for skills usage in both surveys. While the negative coefficient for literacy use at work in 1996 for females is substantial (19.7 points), the corresponding coefficient is close to zero in 2006. These findings suggest that the gender gap in literacy use at work has diminished over time. In contrast, we observe a relatively large gender gap in numeracy use in both years, suggesting that differences in numeracy use at work between male and female workers are more persistent.

Figure 3 Gender differences in literacy and numeracy use, 1996 and 2006



Notes: The estimated coefficients denote the unconditional gap between men and women. Weighted linear regression models are based on weights provided by ABS.

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

Job requirements and lifelong learning

Workers in jobs with high requirements relative to their skills may respond by undertaking more education and training and to upgrade their skills and therefore narrow the gap. The relationship between relative skills and job requirements and the propensity of workers to undertake further education and training can be investigated using the same ABS data. Participation in education and training may depend on a number of factors, such as educational attainment, occupation, employer size and so on (see Ryan & Sinning 2008b). In addition, education and training decisions may depend on the relationship between individual skills relative to the skills required at work. Once more, we address a series of specific questions about the nature of this relationship.

Do skill mismatches increase the propensity to participate in further education and training?

Yes, workers who report that their jobs are demanding relative to their skills are more likely to participate in further education and training.

The data allow the derivation of a *relative* skill use measure, which is the ratio of the skill use measure to the measure of individual skills. Higher values of the *relative* skill use measure indicate that the worker reports higher use of skills in their jobs relative to their observed skills. Taking account of other factors like the education level of workers, the propensity to participate in further education and training increases with this relative skills use measure. Where workers' usage exceeds their apparent skill level, they are more likely to participate in further education and training. Where their usage is less than their apparent skill level, their participation in education and training is lower. So whether it is the demands of the job relative to individual skills, or just demanding jobs in general, the features of the job influence who undertakes training.

Is it only already highly skilled workers who participate in education and training?

No. While participation in education and training is higher among workers with higher levels of completed qualifications, the positive relationship between the relative skills use measure and participation indicates that, on average, those in need of further skills development undertake it.

As in other studies, workers in high-skill occupations and with higher levels of education and training qualifications are the most likely to be participating or to have recently participated in education and training. However, our results also suggest that the propensity to undertake education and training reflects worker skill needs—those with low skills relative to the requirements of their jobs tended to undertake education and training. This is consistent with Ryan and Watson (2003), who found that 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. Specifically, 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; and they worked in a segment of the workforce where employers did not consider their workforce to be adequately trained.

Do older workers participate in further education and training when faced with high-skill job requirements?

Yes. Like younger workers, the propensity to participate in further education and training increases with the relative skills use measure for older workers.

However, while this pattern for older workers seems similar to younger ones, their participation is lower at all values of relative skill use. 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 the lowest propensity to undertake further education and training, presumably because they are close to retirement age. Hence, it seems that the low propensity of older workers to undertake education and training reflects factors other than the skill requirements of their jobs.

Implications of skill mismatches

Workers appear to respond to skill mismatches in predictable ways. If they are in demanding jobs relative to their skills, workers are more likely to undertake further education and training. If their jobs are less demanding, they are less likely to participate. Skill mismatch does not seem to be a problem that affects older workers any more than younger ones. Further, older workers do not have low education and training participation rates because they are in mismatched jobs. Hence, while there might reasonably be concerns about older workers being disadvantaged in the labour market in other dimensions, their ability to use their literacy and numeracy skills if they are employed does not appear to be an area of disadvantage for them.

This paper provides a preliminary, descriptive analysis of the state of a number of relationships that have not been analysed previously in Australia. We present evidence that skills mismatches exist and affect some forms of behaviour. They may be costly for individuals in ways we have not yet studied. Future research will assess the extent to which these mismatches are associated with phenomena with more serious policy implications, including the extent to which they are related to the education of individuals. Such analysis will address how well our education system prepares individuals for the world of work.

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