Declining Apprentice Training Rates: Causes, Consequences and Solutions

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Dr Phillip Toner
Senior Research Fellow
Australian Expert Group in Industry Studies
University of Western Sydney

ph.toner@uws.edu.au

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Executive Summary

The paper presents new data on long-run apprentice training rates by broad occupational group and demonstrates a statistically significant and sustained decline in the training rate over the last decade. There was a large and statistically significant decline of 16 percent in the long-run aggregate apprentice training rate over the last decade from 1993 onwards compared to the period 1974-1992. The major declines were in metals (19 per cent) and the electrical and electronics trades (close to a quarter after 1993).

The decline is contributing to the deficit in the supply of skilled trades and the resulting shortages can have severe economic impacts such as reducing the innovation capacity of the economy. Declining training rates have also reduced a source of full time job opportunities offering good career paths for young people. Had the training rate not declined nearly 19,000 additional job opportunities for young people aged 15-24 would be available.

Variation in training rates across the major trade occupations does not reflect a systemic problem with the apprenticeship institution, instead it suggests a range of industry and/or occupationally specific factors inhibiting employer investment in training. Structural changes over the last ten to fifteen years, disproportionately affecting those industries that employ metal, electrical and to a lesser extent construction apprentices, largely account for declining training rates. These changes include, the corporatisation and privatisation of public utilities, growth of 'lean production' systems and the associated reduction in firm size and expansion of JIT, outsourcing and labour hire.

The decline is not accounted for by a weaker demand for trade skills. Some trades, such as construction and electrical and electronics had modest growth in employment over the last decade, but a declining training rate. In Metals the decline in the training rate was three times the percentage decline in employed metal tradespersons.

A broad range of solutions are required to redress the problem including lifting the level of employer investment in training, adjusting incentive and subsidy arrangements and better entry level steps on the supply side. The multiplicity of causes will require a combination of measures to achieve a lift in trade training rates.

Declining Apprentice Training Rates: Causes, Consequences and Solutions

1. Introduction

The focus of policy makers' interest, and to some extent of VET research, over the last decade has been on the rapid growth of the New Apprenticeship system, and *traineeships* in particular. This growth, however, has masked divergent trends within the VET system.

This essay provides new data on long-run *apprentice* training rates by broad occupational group in the main trades, which shows there was a sustained break in the long-run apprentice training rate from the early 1990s to the present. This sharp fall in apprentice training rates is contributing to shortages of core vocational occupations, which are essential to production and maintenance in a modern knowledge based economy. The essay considers the implications of this decline and provides an overview and assessment of the key explanations of these trends. It also suggests policy recommendations to redress the decline.

1.1 Trends in Apprenticeship Training Rates

The apprentice training rate is the ratio of apprentices in-training to employed tradespersons, and measures the extent to which an occupation is reproducing itself through the domestic training system. The number of apprentices in-training is the stock of all apprentices at a given point in time. Numerous Australian studies have identified a sustained decline in apprenticeship training rates and/or intake over the last decade (Marshman 1996, 1998; AiG 2000; Smith 1998, 1999; Toner 1998, 2000a, 2000b). The view of these studies is that, following the 1991-92 recession, there was a sustained break in the long-run trend of apprentice training rates. The decline in GDP in the 1991-92 recession in Australia was the largest since the Depression of the 1930s. Representative of this view is the following:

> '…some fundamental changes in the relationship between apprenticeship numbers and the wider [trades] workforce are becoming evident. The historically close correlation between the size of the [trades] workforce and the number of apprentices in training has undergone a marked shift…from 1993 this ratio began to drop...Since then it has become evident that the number of apprentices in training has not kept up with [trades] workforce numbers' (Office of Training and Further Education 1998:4).

However, there was an element of uncertainty about these claims as the data used in these studies were restricted to the period from 1986 onwards (see for example, Smith 1998, OTFE 1998; BVET 2001). This uncertainty led to speculation that the low training rates evident over the last decade were not unusual if a longer-run perspective had been used.[1] The period of the mid-to-late 1980s had experienced one of the highest levels of apprentice commencements since the 1960s. It was possible the training rates of the

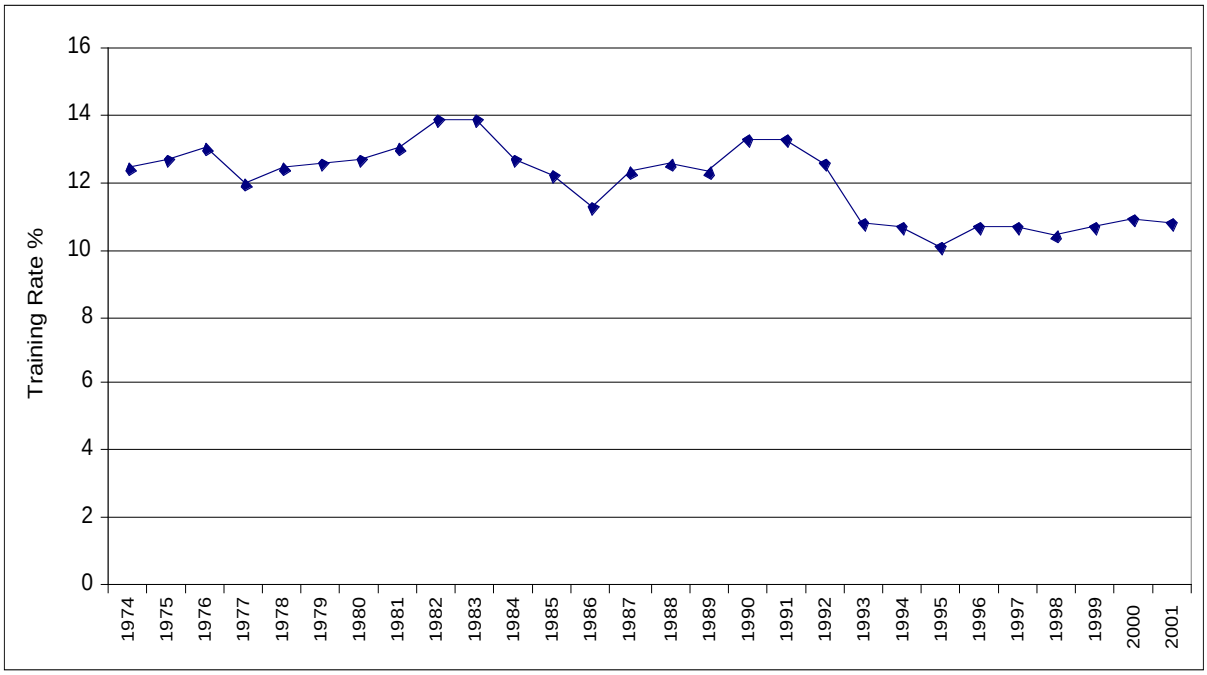
1990s could simply have appeared low without this necessarily reflecting any structural break with previous longer-run trends.

The present study overcomes this by providing data on aggregate apprentice and selected trade occupation training rates from 1974 to 2001, and incorporates the effect of several business cycles.[2] An Australian Bureau of Statistics concordance, which permitted the construction of a consistent time series of Trade occupations, was used to overcome otherwise incommensurable occupational classifications (see notes to Table 1).[3] The data confirm the existence of a sustained break in the long-run apprentice training rate from the early 1990s to the present. There were significant variations in training rates across the occupational groups, with some groups experiencing large declines, others a small fall and one group, Food, having considerable growth. Over two-thirds of the aggregate decline is due to the fall in training rates for metal, electrical and construction apprentices.

1.2 Break in Aggregate Trend Training Rate in the 1990s

Table 1 and Figure 1 show that there has been a sustained decline in the aggregate apprentice training rate following the severe recession in the early 1990s. Over the nineteen years between 1974 and 1992 the training rate averaged 12.7 percent. From 1993 to 2001 the total annual average training rate was 10.6 percent. This represents a decline of 16 percent. The change between the two periods 1974/1992 and 1993/2001 is highly statistically significant.[4]

Figure 1
Annual Apprentice Training Rate. Australia. 1974-2001



Source: Table 1

Table 1
Apprentice Training Rates. Australia. 1974-2001

June 30 of each year	**Metal**	**Electrical/ Electronic**	**Construction**	**Print**	**Vehicle**	**Food**	**Other**	**Total**
1974	20.4	13.8	12.8	13.4	5.8	7.6	11.1	12.4
1975	21.1	12.9	13.0	13.2	6.0	8.2	11.9	12.7
1976	22.0	13.4	12.9	12.0	6.2	8.2	12.3	13.0
1977	20.6	11.7	11.1	10.3	6.1	7.9	12.2	11.9
1978	20.8	12.3	11.3	10.9	6.4	8.7	12.9	12.4
1979	21.8	11.9	10.9	10.1	6.7	9.3	13.9	12.6
1980	23.1	11.5	10.7	10.8	5.7	8.9	14.5	12.7
1981	23.9	12.9	10.7	8.7	5.1	10.2	13.4	13.0
1982	25.2	14.1	11.5	8.9	5.0	10.2	15.1	13.9
1983	25.4	13.2	12.1	8.0	5.1	10.5	16.0	13.9
1984	22.7	12.9	10.3	9.4	4.7	10.0	14.2	12.7
1985	20.7	11.7	9.6	10.1	4.9	11.2	15.0	12.2
1986	18.1	10.0	9.3	9.3	4.7	12.2	14.8	11.3
1987	11.0	12.0	9.8	9.5	16.0	12.7	17.4	12.3
1988	11.3	11.2	11.2	11.5	17.2	13.8	16.9	12.5
1989	11.2	12.7	10.5	7.4	17.2	12.3	17.0	12.3
1990	12.9	12.4	12.5	9.5	18.8	12.6	17.2	13.3
1991	13.0	12.8	13.0	9.6	17.3	13.8	16.3	13.3
1992	12.8	12.3	11.7	8.4	15.8	12.6	15.9	12.6
1993	11.1	10.2	9.4	5.4	13.7	12.1	14.4	10.8
1994	9.9	9.9	9.9	5.2	13.6	12.2	14.8	10.7
1995	9.2	8.9	9.9	7.2	14.1	12.5	12.9	10.1
1996	10.4	9.4	9.5	9.6	15.3	13.3	13.2	10.7
1997	10.3	9.3	10.1	8.2	15.5	14.2	12.2	10.7
1998	10.2	9.0	8.9	6.9	17.9	13.6	10.1	10.4
1999	10.0	9.0	9.4	5.8	17.8	15.2	11.4	10.7
2000	8.5	9.2	10.4	5.5	18.8	15.1	11.4	10.9
2001	8.2	9.3	10.4	9.0	16.4	14.4	11.6	10.8

Source: Data for trades' employment was derived from *Labour Force Australia. Historical Summary 1966-1984* (ABS Cat. No. 6204.0) and *Labour Force Australia* (ABS 6203.0, various issues). Conversion of pre-1986 CCLO occupational classification to ASCO (First edition) is based on the ABS concordance (ABS Cat. No. 2182.0). Data on apprentices in-training was derived from COSTAC/DEET *Apprenticeship Statistics* for data from 1974 to 1993, from 1994-1998 NCVER (1998) *Apprentices and Trainees in Australia 1985-1997* and NCVER unpublished data 1998-2001 inclusive. The NCVER data from 1999 to 2001are based on ASCO (Second Edition) Major Group 4 New Apprentices in-training, Australia (December 2001 estimates). Note: in 1987 Automotive Electrical apprentices were allocated from Metal to Vehicle. This had the effect of greatly reducing the training rate of the former and increasing the training rate of the latter from 1987 inclusive. ASCO (Second Edition) introduced in 1996 allocated Chefs from Trades to Associate Professionals. Data from 1996 inclusive has been corrected for this.
Further discussion of the data sources is provided in Appendix A.

1.3 Trends Across the Broad Trade Occupations

While there was a reduction in the aggregate apprentice training rate from 1993, Table 2 shows there was also considerable variation in training rates across the major occupational groups. The Metal training rate declined by nearly 19 percent after 1993 compared to the latter 1980s.[5] Training in Electrical and Electronic trades declined by close to a quarter after 1993. The training rate for Construction fell by close to 15 percent, even though the industry recorded a significant increase in trades employment over the 1990s (Table 3) and the industry had a sustained record level of real construction output over much of the 1990s and early 2000 (Toner 2000a). The Vehicle category had a modest decline compared to the aggregate fall in training rates. Food experienced an increase of just over five percent during the last decade. In the volatile Printing trade the training rate rate fell by 25 per cent. Hairdressing apprenticeships, which comprise the bulk of the 'Other' category, also declined significantly since 1993.

Table 2
Apprentice Training Rates. 1987-1992/1993-2001. Australia.

	Average Training Rate 1987-1992	Average Training Rate 1993-2001	Percentage Change 1987-92/1993-2001
Metal	12.0	9.8	-18.9
Electrical	12.2	9.4	-23.5
Building	11.5	9.8	-14.7
Printing	9.3	7.0	-25.1
Vehicle	17.1	15.9	-6.7
Food	13.0	13.6	+5.1
Other	16.8	12.4	-25.9
Total	12.7	10.6	-16.3

Source: Derived from Table 1

An analysis was also undertaken of longer-run trends in the number of apprentices in-training by broad occupational group. The annual average number of apprentices in-training from 1993-2001 declined by 15 percent compared with that for 1987-1992 (Table 3, column 5). There was also considerable variation in the level of apprentices in-training across the major occupational groups. For example, the level of Metal and Electrical apprentices declined by 26 percent and 23 percent respectively, by contrast Food increased by 22.5 percent.

An examination was also made of the contribution of the various occupational groups to the total reduction in the annual average level of apprentices in-training (Table 4). Metal and Electrical contributed 31.5 percent and 21.7 percent respectively to the total decline in the annual average level of apprentices in-training over the two periods. Construction accounted for 12.0 percent of the total decline. These three broad occupational groups combined represented 50 percent of total apprentices in-training over 1993-2001 but contributed 65 percent of the decline in annual average level of apprentices in-training over the period. The other principal contributor to the decline was Other.

Table 3
Trades Employment and Percent Change in Trades Employment and Apprentices In-Training. Australia

	Average Trades Employment 1987-1992	Average Trades Employment 1993-2001	Percentage Change in Average Trades Employment 1987-1992 to 1993-2001	Percentage Change in Average Apprentices In-Training 1987-1992 to 1993-2001
Metal	226833	206100	-9.1	-26.3
Elec	175567	176833	.7	-23.0
Building	254950	270322	6.0	-9.3
Print	43850	36622	-16.5	-38.2
Vehicle	142783	137456	-3.7	-10.4
Food	106900	124011	16.0	22.5
Other	218217	209111	-4.2	-24.0
Total	1169100	1160456	-0.7	-15.2

Table 4
Contribution to Decline in the Total Level of Apprentices In-Training

	Average Level of Apprentices In-Training. 1987-1992	Average Level of Apprentices In-Training.1993-2001	Contribution to Decline. Percent
Metal	27195	20054	31.5
Elec	21473	16540	21.7
Building	29129	26405	12.0
Print	4070	2514	6.9
Vehicle	24317	21790	11.1
Food	13817	16927	-13.7
Other	28780	21869	30.5
Total	148780	126099	100

As will be described below, the very large variation in the performance of the apprentice occupations in terms of training rates and numbers in-training over the period has important implications for assessing the validity of competing explanations of declining training rates.

2. Implications of the Decline in Training Rates

2.1 Higher Vocational Skills and Innovation

Higher level vocational skills are central to the development of innovation, quality product design and production processes and higher productivity.[6] In turn, these skills are crucial to success in world trade in innovation-intensive manufactures. In world trade quality, reliability, timeliness of supply, and customisation differentiate economies. Higher level VET skills help determine the increased share of countries' production that is exported, the shift towards more skill and innovation intensive products, and vulnerability to lower skilled mass production commodities from developing countries. These are products, which 'require a well-qualified workforce capable of rapid adjustment in the work process and continual product innovation' (Finegold and Soskice 1988: 21).

A number of studies have identified national differences in VET performance and national differences in innovation and productivity. For example, a series of 'matched plant' studies in the U.K and Europe, undertaken by the National Institute of Economic and Social Research (NIESR), found that the significantly lower level of formal vocational skills across a range of manufacturing and service industries in the UK adversely affected productivity and product quality (Prais 1995). Depending on the commodity, productivity differentials between British and European plants of 35 percent to 100 percent were observed. (Prais 1995: ch.3).

These differences went beyond how commodities were produced, to what commodities were produced. This interaction is summarised as follows:

'More highly skilled labour force not only enables companies to produce small batch sizes of customised products, but also to switch easily to new processes thereby promoting product and process innovation and economic growth…In Britain, complexity in the average production process tends to be avoided and preference is given to mass-produced products for which a mainly semi-skilled workforce is sufficient…products are mainly sold in competition with those from low-wage countries' (Wagner 1991: 146).

This strong nexus between the product-market strategies of firms and the quality and quantity of vocational skills available to them raises a major potential concern. The current failure to adequately reproduce trade skills essential in the production and maintenance of sophisticated manufactures in Australia, and especially in areas such as metal and electrical trades, could lead managers to develop alternative strategies such as informal upgrading of employees into positions previously held by people who had undergone appropriate training. This 'making do' with lesser skilled staff could shift firms' product-market strategies towards less sophisticated and less innovation-intensive products and to alter production techniques towards a more intensive use of less skilled labour.

2.2 Loss of Full-Time Quality Youth Jobs

One obvious implication of declining training rates is declining employment opportunities in apprenticeships and, consequently, trade occupations. If the training rate for each of the trade occupations for 1987-1992 had been maintained in 2001 there would

have been an additional 21,700 apprentices in-training in 2001 (Table 5). Moreover, despite the increase in the proportion of adult apprentices that occurred over the last decade, 86 percent or 18,700 positions would have been filled by persons aged under 25.[7]

The decline in apprentice training positions represents a significant loss of nearly 19000 full-time positions from the Australian youth labour market.[8] Had the training rate not declined the share of young people, aged 15-24 in full time employment would have increased by 5 percent in 2001. Alternatively, the number of young people in trades occupations would have been 8 percent higher in 2001.

Table 5
Actual and Projected Level of Apprentices In-Training

	Level of Apprentices In-Training. 2001	Projected Level of Apprentices In-Training With No Decline in Training Rate. 2001	Difference Between Actual and Projected Levels
Metal	16490	24151	7661
Electrical	15610	20491	4881
Building	30000	33194	3194
Printing	2210	2301	91
Vehicle	23310	24194	884
Food	19400	18400	-1000
Other	23250	29254	6004
Total	130270	151984	21714

In addition, the 'quality' of these jobs is high. A recent NCVER (2001) report found people in trade occupations defined as Australian Qualifications Framework (AQF) level III or IV have a much higher probability of employment than do the holders of other vocational qualifications holders; have the highest rates of full-time employment and self-employment; earn on average 16 percent more than average weekly earnings and have higher rates of upward occupational mobility into Management and Associate Professional occupations than do holders of lower level vocational qualifications (NCVER 2001:141-158)[9].

2.3 Training Rates and Skill Shortages

The reduction in the supply of new tradespersons from domestic training sources is contributing to current skill shortages in trades occupations. The principal sources of qualified tradespersons are the domestic apprenticeship system and skilled migration, with the former accounting for around 80-85 percent of the flow of trade's skills over recent years.[10] Numerous surveys and reports from employer associations; government and academics have identified persistent skills shortages, notably in metal and electrical trades (AiG 1999; Worland and Doughney 2001; ACIRRT 2001; DETYA 2000a,b, DETYA 2002; Construction Training Australia 2001). A combination of reduced apprentice intake over the 1990s, continuing high wastage rates from the trades (that is,

trades employees electing to work in other occupations) and economic growth over the last decade has resulted in significant trade skill shortages (DETYA 2001).

The economic implication of these shortages are severe. ‘Skill shortages, if extensive and sustained, can limit investment and growth opportunities, give rise to upward pressure on earnings and, thereby, dampen the pace of economic and jobs growth and make it more difficult to reduce unemployment’ (DEETYA 1999a:2). The National Skills Shortage List (2002) produced by the Department of Employment, Workplace Relations and Small Business, which is used for a range of purposes, including the targeting of occupations for the Skilled Migration Program, identifies shortages across all trade areas, with notable shortages in metal, electrical and construction.

3. Causes of Declining Training Rates

In explaining declining training rates a broad range of factors are at play, but the most important are structural changes in the economy which have reduced the capacity of employers to engage apprentices. These changes include a set of self-reinforcing factors, such as greatly increased competition leading to increased down-sizing and contracting out; growth of labour hire companies; increase in the proportion of small firms; and privatisation and corporatisation of public services. Some of these major structural changes are summarised below.

3.1 Reduced Demand for Trade Skills

It is crucial to note that the decline in training rates and absolute level of apprentices does not reflect a proportionate reduction in demand in the economy for trade skills. It would be expected that a trend decline in the *stock* of employed tradespersons would be accompanied by a similar proportional decline in the *flow* of new entrants into the trade. This is clearly not the case. The average total trades employment between 1987-92 and 1993-2001 fell by under one percent, while the total number of apprentices in-training fell by 15 percent (Table 3, column 4). In particular, the percentage fall in the level of Metal and Vehicle apprentices in-training was nearly three times the percentage decline in the number of Metal and Vehicle tradespersons employed. The number of Electrical apprentices in-training declined by nearly one quarter but employment of Electrical trades increased by nearly one percent. The average number of building trades declined by 9.3 percent over the period but employment of building tradespersons increased by 6 percent.

3.2 Excessive Apprentice Wages

As is well known, the relationship between wages and employment levels is one of the most contentious in labour economics. It is sometimes suggested that small relativities between apprentice and tradepersons wages are a disincentive for employers to invest in training. Some studies, which apply a neoclassical approach to explain employers' recruitment behavior by estimating the difference between apprentice marginal productivity and marginal cost, have produced anomalous results (Dockery, Koshy and Stromback 1996; DEETYA 1997). This approach led to the finding that over the full four years of an apprenticeship the average net benefit to the employer was marginally positive. For many trades, including building, printing and horticulture, over the four years the apprentice is a net cost. These results, however, were contradicted by employers' assessments of the benefit of employing an apprentice, with a large majority indicating that they thought apprentices were a net financial benefit over the full term. Furthermore, the study found 'very little support among employers for the notion of a reduction in apprentice wages' (DEETYA 1997:45). This was because such a fall 'would be accompanied by a decline in the average quality of the apprentice intake. Second, many respondents stated that the apprentice wage should not be reduced as it would be inequitable to do so' (DEETYA 1997:48).

The study also estimated the elasticity of apprentice employment with respect to apprentice wages and found the elasticity is significantly less than unity (see DEETYA 1997:85). A 10 percent reduction in apprentice wages would increase the stock of apprentices by between 5 and 7 percent. To increase the current level of apprentice intake by 15 percent, so that the current training rate would equal the long-run rate prior to 1993, would require apprentice wages to fall by between 24 and 34 percent. Such reductions could give rise to concerns over applicant quality and equity.

Rather than wage levels the 'major single influence on the number of apprentices employed is the expected level of sales or activity. The demand for apprentices is thus derived directly from the demand for the firm's product' (DEETYA 1997:31).[11] In addition to demand the study found an important non-economic factor in firms' decisions to engage apprentices: 'firms appear strongly influenced in their decision to hire apprentices by what may be termed social or community influences, such as a perceived obligation to provide training for young people and a sense of obligation to the trade' (DEETYA 1997: 49; see also Smith E., 1998:134-135).

There is no evidence in the literature of a compression in apprentice/tradespersons wage relativity over the last decade that could account for the declining apprentice training rates. From an orthodox economic point of view these results are anomalous. From an orthodox perspective 'the way in which recruitment decisions are made for apprentices and trainees remains a mystery' (DEETYA 1997:100).

3.3 Inadequate Financial Incentives to Employ Apprentices

The current system of financial incentives is arguably biased against the employment of apprentices, as opposed to trainees, and inadequate in its response to identified skills shortages.

Commonwealth financial incentives are paid to employers of apprentices and trainees upon commencement of the person in employment and upon completion of their training. The same level of payment for the commencement and completion of New Apprentices applies to both apprentices and trainees undertaking AQF III and IV courses ($1375 for a commencement and $2750 for a completion). These payments do not recognise the fact that some AQF III or IV traineeships can be completed in much less time, such as in one year, compared to the four year term of a metal, electrical or construction apprenticeship. As such, the payments do not recognise the much greater investment of time and effort on the part of the apprentice employer. In theory, an employer could get four cycles of commencement and completion payments for trainees in the same time it takes an employer of an apprentice to get one cycle.

Secondly, the incentive programme fails to strategically target scarce training funds on key skill shortages. The bulk of incentive funding is supporting traineeships in lower skilled occupations, Labourer and Elementary Clerical occupations (Toner 2002b).

The New Apprentice employer incentive programme that specifically targets skills shortages is inadequate. Under the Rural and Regional New Apprenticeships Incentive scheme an additional payment of $1,100 is made to employers engaging a person in 'an occupation identified as being in skill shortage', including many traditional trade occupations (DEST 2002: 1). Unfortunately, these payments are only available to employers in non-metropolitan areas. In NSW for example, around 75 percent of all apprentices are located in metropolitan areas (BVET 2001: 37).[12]

A new programme to promote training for innovation industries, the Innovation Incentive will operate from 2003. It covers a wide range of occupations across a number of industries such as telecommunications and electrical generation, transmission, electrical/electronic installation and maintenance and process manufacturing occupations. The incentive is targeted towards higher level AQF III-IV training. The new incentive is certainly a positive development but fails to include a broad range of manufacturing industries, such as metals and engineering, which are not only highly innovation intensive but also have low training rates. Secondly, 'innovation' intensive is a touchstone for payment even if there is currently an adequate supply of trained persons.

It is possible that an increase in the level of current financial incentives could have a marginally beneficial effect in redressing the declining training rate. Relatively minor adjustments of the programme guidelines could significantly improve the effectiveness of these important schemes.

3.4 Declining Quality of Apprentice Applicants

A number of surveys of employers, such as those by Marshman (1996: 24), ACIRRT (2002: 35) and DETYA (2002: 18), reported that employers suggested that the quality of applicants for apprenticeships is declining. At the same time many trade fields, such as metals and engineering, have an 'image problem' and the size and quality of the apprentice applicant pool for these sectors remains an issue (Hall and Buchanan 2000).

Despite improved levels of school retention in the early 1990s and the PISA assessment of the scientific and mathematical literacy of Australian students, Smith (1998:ix) cites a number of studies indicating that apprentices and trainees have 'inadequate language, literacy and general reasoning skills'. These inadequacies create significant learning problems, especially with the move away from face-to-face teaching, and increased use of computer based and distance learning. Whether this is a recent development reflecting declining intake quality or a long term problem with apprentice intake is not clear.

On the other hand, research by the Federal Department responsible for the administration of the apprenticeship system found that although there may be shortages of quality applicants in particular regions or particular trades, overall, employers reported seven suitable applicants for each vacancy. Group training companies reported three suitable applicants for each vacancy. Smaller firms have more of a problem than larger firms in attracting suitable applicants (DEETYA 1998:5).

Some reduction in the quality of applicants over the last decade or so may be due to alternative employment opportunities open to more academically able students as a result of the expansion of tertiary education. There would also appear to be an 'image problem' for some traditional trades. However, on the balance of evidence this appears to be only a minor factor in explaining the decline in aggregate training rates.

3.5 Corporatisation and Privatisation of Government Activities

A major contributor to the reduction in apprentice numbers over the 1990s has been the large-scale withdrawal of all levels of government from apprentice training (Toner 1998). The reason for this withdrawal is largely due to the corporatisation or privatisation of state and Commonwealth government activities, confirmed by later studies (Worland and Doughney 2001; ACIRRT 2002). A singular focus on improving the direct rate of return on the private or public funds invested has seen these entities reduce their responsibility to train for 'their' industry. In the mid-1980s NSW Government Business Enterprises (GBEs) alone employed 21 per cent of all electrical apprentices; 10 per cent of building apprentices and 9 per cent of metal apprentices. By the late 1990s the GBEs share had been reduced by 80 percent. It was estimated that the withdrawal of the public sector accounted for around one-third of the decline in apprentice intake over the last ten years (Toner 1998). Similar large falls in public sector apprentice intake occurred throughout Australia (NCVER 2001:75). Crucially, there was no compensating increase in private sector apprentice employment in the metal, electrical and construction occupations.

3.6 Increased Competition and Altered Production Systems

Marshman (1996) and (ANTA 1997:12; ACIRRT 2002; AEGIS 2002) have argued that factors such as tariff reductions, globalisation, National Competition Policy and the growing dominance of the major retailers over suppliers have increased the intensity of competition, especially in trade-exposed areas of the economy such as manufacturing. Manufacturing is the principal employer of metal trades and to a lesser extent of electrical trades. One measure of this intensification of competition is that in 1989-90 the manufacturing trade deficit was 12.3 percent of total manufacturing turnover; by 1999-2000 by it had increased to 19.4 percent (AEGIS 2002: 33). A study into the effects of globalisation on training recently concluded that 'increasing competitive pressure [was] exacerbating employers' traditional failure to make an adequate commitment to training and skills development' (Hall et al 2000: viii).[13]

Firms have responded to this increasingly competitive environment in a number of ways, some of which have further heightened competitive pressures. These responses are the intensification of work; introduction of 'lean production' systems, growth of labour-hire and increased out-sourcing of functions.

Downsizing and 'delayering' (removal of management layers) over the 1990s has led to an intensification of work, as measured by increased working hours and increased responsibilities of the remaining workforce. The recent ACIRRT (2002: 33-38) study of Victorian manufacturers found that as a result of reduced employment the intensity of

work in the remaining workforce had increased to the point where there was simply no surplus labour capacity to disengage experienced tradespersons from production to train and mentor apprentices. This lack of surplus labour capacity not only adversely affected the quality of training for existing apprentices but also made firms reluctant to engage apprentices. Employers also reported that intensified competition and tighter margins had reduced their financial capacity to invest in the level of training that they would like.

Secondly increased competition has resulted in unpredictable and shorter contract cycles. This has introduced uncertainty about the future, which makes employers reluctant to enter into the 3-4 year contract involved in the employment of apprentices. The move to shorter contract cycles reflects the introduction of 'lean production' production techniques aimed at reducing a firm's cost and risk (Harrison 1997). Just in Time (JIT) production methods, where JIT sub-contractors enter into 'open ended contracts' with principals with no guarantee of a fixed quantity of work over a given period, offers considerable cost savings, especially reduced inventory holdings. But they also make it difficult to provide the continuity of work required for employers to invest in an apprenticeship (Smith, Oczkowski, Noble and Macklin 2002: 8).

Nearly 50 per cent of employers identified meeting peak production demands as the main reason for the use of labour hire (ANTA 1998[b]: 26). It appears that labour hire arrangements are accelerating: in 1990, 14 percent of firms surveyed in the Australian Workplace Industrial Relations Surveys reported using labour hire employees; by 1995 this proportion had increased to 23 percent (ACIRRT 2002: 44). In the U.S. the largest single private sector employer is the labour-hire firm Manpower Inc, with over 500,000 people on its books (Crouch, Finegold and Sako 1999:16).

Many of the industries that were traditionally the principal employers of apprentices, such as manufacturing, construction, and electricity gas and water, are also disproportionately outsourcing production, maintenance and other services to labour hire companies (Hall and Bretherton 2000). The significance of this outsourcing of trade-based work to labour hire companies is that 'labour hire firms primarily rely upon the pool of skilled people in the labour market, and are not large providers of formalised training of the type involved in the traditional apprenticeship' (ANTA 1998[b]: 1).

Increasingly many labour hire firms recognise that their long run existence relies on the availability of a pool of trained workers, and therefore are prepared to assist the training effort. However, the clients of these firms are 'often reluctant, if not downright hostile about having contract apprentices on their site' (ACIRRT 2002: 51). This hostility derives from the fact that the labour hire contractee only wants fully qualified and experienced persons working for them and do not see it as their role to 'train' labour hire workers.

The growth of the labour hire industry, contracting-out and downsizing in the private and public sectors are, at least in the medium term, mutually self-reinforcing in that reducing firms' full-time core employment increases the demand for contract staff. On the supply-side downsizing, outsourcing and 'just in time' labour practices have been accompanied

by the growing use of casual labour to achieve the desired 'numerical' flexibility between the stock of labour and the volume of production. Controlling for a wide range of personal, educational, demographic, occupational and industry variables, casual employees are much less likely to have undertaken employer-provided training compared to full time employees (VandenHeuvel and Wooden 1999:27, 43-45). In 1982 13.3 per cent of the workforce were casual employees; by 1999 this had increased to 26.4 per cent (Campbell 2000).

3.7 Reduction in Firm Size

Both the propensity to train and the intensity of that training increases with firm size. With respect to training intensity, in the private sector in 1996, firms with more than 100 employees spent 3.4 times more on structured training than firms with less than 20 employees. The proportion of firms providing structured training is 6.6 times greater in larger firms than smaller firms (ABS 6353.0: Table 4.1). Other research confirms the link between firm size and in-house formal training, in particular (Wooden 1996). On the specific issue of the relation between firm size and apprentice training,

'It is well known that large firms are more likely to provide formal training, and this extends to apprenticeship training. There is also a positive correlation between firm size and the absolute number of apprentices employed' (Dockery, Koshy and Stromback 1996:14).

However in many of the industries, such as construction and electricity gas and water, that were traditionally large employers of metal and electrical apprentices, there has been a marked reduction in the average firm size. For instance over the seven years to 1996-97 the share of total employment in construction firms employing less than five persons increased from 42.6 to 68.6 per cent. All of the employment growth over the period occurred in businesses with less than five employees. Employment in larger firms actually declined, with the level of employment in firms with 20 or more employees falling by more than 50 per cent.

3.8 Transformation of the Industrial Relations System

Many of the changes outlined above, such as those related to the intensification of work, growth of labour-hire and increased out-sourcing of functions have been facilitated by reduced union influence in workplaces, the broader deregulation of the labour market and retreat from a centralised wage fixing and industrial relations system. In turn, these changes to the industrial relation system have also contributed to the decline in apprentice training rates.

The creation and maintenance of a VET system producing 'industry' specific skills, like traditional apprenticeships in Australia and Western Europe, depends to a significant extent on a set of inter-locking institutional arrangements. These institutional arrangements include 'collective wage bargaining systems' and their associated strong business and union organisations.[14] In Australia for most of the twentieth century almost

all aspects of these training provisions were prescribed in industrial awards: 'training and skills formation has been historically coupled to the industrial relations system in Australia through the award system' (Roan and Lafferty 2001: 7). In many cases these awards prescribed certain classes of work to be undertaken by apprentices.

In a prescient statement in 1993 Curtain argued that,

> 'existing forms of regulated training are likely to decline substantially within the next five years as a result of a shift in the centre of gravity of industrial relations away from highly centralised forms of determining wage and conditions to agreements that are negotiated closer to the workplace'.

Reduced union influence and a reduced share of the workforce covered by industry based awards has also facilitated management use of labour hire and casual and part-time employment. There is also some evidence that employers are shifting training more towards meeting firm-specific requirements. One large survey of manufacturing and construction companies found that 'all respondents had a strong desire to have [Training Package] standards arrangements that suit companies as the primary focus, not necessarily industries' (AiG 1999: 79). In some circumstances such a shift to more firm specific training can result in workers being trained only 'to acquire the minimum competencies to get the job done' (ACIRRT 2002:38). This is a shift away from the more comprehensive skills and knowledge such as that embodied in an apprenticeship.

This is reflected in a recent study of Australian Workplace Agreements, which promote bargaining at the individual enterprise rather then sector-wide level. Roan and Lafferty have found that 153 AWAs or 71.6 percent of the sample contained no reference to training, which the authors interpreted as indicating 'a lack of importance accorded to training in many agreements' (Roan and Lafferty 2001: 10). Secondly, 47 (30.71 percent of AWAs with training provisions) had very limited content related to training. Typically, this content consisted of just one or two sentences along the lines of 'undertaking training as directed' (Roan and Lafferty 2001: 8). Moreover, only eight of the 153 AWAs with training provisions specified that training should occur during working hours (Roan and Lafferty 2001: 8). It could be that in these firms training matters are dealt with though other instruments, such as personnel policies or that the AWA defers to the parent award on these matters (Hamberger 2002: 5). Nevertheless there is *prima facie* evidence that industrial relations changes have contributed to reduced training rates.

4. Possible Responses to Declining Apprentice Training Rates

There is no single solution to the decline in apprentice training rates; multiple responses directed at ameliorating identified causes are required[15]. These include training levies; an increase in public sector training; changes to the structure of financial incentives offered to employers of apprentices; improving the quality of Group Training services; re-introduction of government support for pre-apprenticeship programmes; improving VET in schools; enhancing multi-employer co-ordination of training; encouraging firms to invest in product and process in innovation and marketing of apprentices; and improving the marketing of apprenticeships. These measures are summarised in Table 6.

Table 6
Summary of the Causes and Policy Responses to Declining Training Rates

Cause of Declining Training Rate	Remedial Measure
Inadequate financial incentives to employ apprentices	• Changes to the structure of Commonwealth financial incentives offered to employers of apprentices • Training levies
Declining quality of applicants	• Improve VET in schools; • Re-introduce large-scale government support for pre-apprenticeship programmes • Improved marketing of apprenticeships
Corporatisation and privatisation of government activities	• Examine the scale and effectiveness of current policies to use government capital works programmes and Public Private Partnerships to lift training rates
Increased competition and altered production systems	• Training levy on labour hire companies • Encouraging firms to invest in product and process in innovation • Improve the quality of Group Training services
Transformation of the industrial relations system	• Enhancing multi-employer co-ordination of training

4.1 Incentive arrangements

Training Levies

One recent study argued for the re-introduction of a training levy, though one which learns from the errors in the original Training Guarantee Levy (TGL), that operated during the 1990s (Hall, Buchanan and Considine 2002). Given the necessity for Australia to significantly lift its training rates and improve the quality of training to compete in the international knowledge economy, the study argued for some form of compulsory training levy. There are many current examples of training levies in Australia. A levy on turnover in the construction industry has operated with industry support for many years in

several Australian states. These levies are used to support activities such as pre-apprenticeship schemes and skill centres. Other forms of compulsory post-graduation training are a requisite for registration with professional associations including, engineers, lawyers and medical practitioners. As noted earlier, labour hire firms are increasingly significant in the supply of skilled labour to manufacturing and other industries, but in general, they rely on the existing stock of skills without contributing to the reproduction of these skills. A levy could be imposed on the turnover of labour hire firms and this could be used to expand training for VET skills in shortage, provided the design of a levy and its purpose involved the parties being taxed (ACIRRT 2002).

Changes to Employer Incentives

There is evidence to support the contention that financial incentives to employ apprentices can affect, at the margin, numbers in training. Further reforms are required. One possibility would be for higher payments for longer terms of training, in recognition of the much greater employer investment in the training of apprentices compared to trainees undertaking the same AQF level of training. However, this could run into the problem that such incentives could drive an increase in the duration of non-apprentice training. It is commonly believed, that differences in incentives structures across New Apprenticeships are driving patterns of training without this necessarily reflecting industry demand for these skills. For example, from the latter 1990s to the present there has been a marked increase in the proportion of New Apprentices undertaking AQF III level courses. This has been driven, in part, by higher payments for AQF III training than for AQFII level training. The National Centre for Vocational Education Research doubts whether this increase…

> accurately reflects the demand for, and provision of training at this level rather than uptake of incentives…A …qualitative analysis is needed to determine the legitimacy or otherwise of AQF to training provided to apprentices and trainees (NCVER 2001: 72-73).

A preferred solution is for the existing incentive programme designed to address skill shortages to be expanded to include metropolitan areas and the scope of occupations covered by the Innovation Incentive to be reviewed to include a much broader range of occupations, such as apprentice level training in manufacturing.

4.2 Quality of applicants

Re-invigorate Pre-Apprenticeship Programmes

Pre-apprenticeship schemes could address a number of issues such as declining quality of applicants and the ‘wastage’ of apprentices who do not complete their training. Participants would have had sufficient experience during their pre-apprenticeships to know if they were suited to the trade.

A recent evaluation of Australia's experience with the pre-apprenticeship schemes of the 1980s concluded that a similar scheme would assist in overcoming the current reduction in apprentice training and skill shortages (Dumbrell Consulting and RCVET 2003, forthcoming). The key to the success of the best practice models of pre-apprenticeship was the combination of theoretical and practical skills that made the students commercially attractive to employers at the end of their initial training. Providing a sufficient quantity and range of practical work experience is a challenge that could be overcome by accessing public works contracts. The cost to government could be addressed to some extent by a re-allocation of the incentives for vocational training towards higher level skills in shortage, such as the provision of pre-apprenticeship training for metal and electrical trades.

In addition a significant DEST, employer and union marketing program focused on trade apprenticeships is required. Steps to improve the quality of VET in schools and to create direct links to trade apprenticeships (rather than the concentration on shorter-term traineeships) are also important.

4.3 Enhanced role for government

Increase Public Sector Training

Some State governments, such as NSW, are responding to the problems arising from large-scale public sector withdrawal from direct employment of apprentices by requiring private sector contractors on substantial public works projects to commit to a regime of structured training.[16]

There are two difficulties with the current policy. Firstly, these provisions are not mandatory for corporatised state government entities, such as the State Rail Authority, Pacific Power, coal loading and port authorities and Sydney Water, but only apply on a best endeavour basis. This is a potential flaw in the design of this provision as these corporatised entities account for the bulk of NSW government capital expenditure. The mandatory imposition of such requirements would contravene the 'competitive neutrality' condition in National Competition Policy. This condition requires governments to create a 'level playing field' with corporatised entities that are in competition with the private sector. Secondly, there is no centralised monitoring unit or compliance co-ordination agency for this policy; the individual agencies contracting construction work are responsible for maintaining records.

The scheme is not due for review till 2005 but an initial study is now warranted to examine the scale and effectiveness of the scheme. Other states and the Commonwealth also need to consider how their purchasing and contracting arrangements can be used to strengthen trade apprenticeships.

4.3 Impact of new production systems

The Innovation-Intensity of Industry

Section 2.1 identified the mechanisms whereby higher level vocational skills facilitate innovation, or changes in product design and production processes that improve quality and productivity. It was also argued that the shortages of these trade skills could act as a constraint on investment in innovation in Australia. Conversely, other studies have also shown a very positive association between innovation intensity of firms and an increased propensity to invest in training. One recent study of vocational training in innovation-intensive industries in Australia found that the same factors that

'most of the factors that were identified…as stimulating innovation were also identified as stimulating training…[These] factors were large firm size, investment in new capital equipment, introduction of new products and production processes and work organisation changes such as quality assurance and consultative mechanisms and regulatory requirements…Upon reflection, this is not a surprising result. The fundamental purpose of vocational training is, after all, the transmission of economically useful knowledge. Industries which experience comparatively rapid changes in the knowledge base of their processes and products require more intensive training to transmit this knowledge' (AEGIS/ACIRRT 2002: 10).

In other words, measures that promote innovation will also positively affect investment in vocational training. Measures to promote product and process innovation include for example, technology diffusion, promotion of clustering and more favourable taxation policies for accelerated equipment depreciation and R&D investment allowances. Targeted development policies, which have stringent performance criteria relating to levels of R&D, investment and exports, have been shown to be highly effective in stimulating output and exports of innovation-intensive industries. Recent examples include the steel, automotive, pharmaceuticals shipbuilding and aerospace sectoral plans of the 1980s and the later Partnerships for Development (Sheehan, Pappas, Cheng 1994; Sheehan, Pappas, Tikhomirova, and Sinclair 1995).

Improve the Quality of GTC Operations

Group Training Companies (GTCs) redress a number of those structural impediments to the employment of apprentices that have been identified in this report.[17] GTCs currently employ over 20 percent of all apprentices compared to the early 1980s when they accounted for around 2 percent. It is highly likely that the decline in the number of apprentices would have been greater had GTCs not increased their activity. Given the increased importance of GTCs in the system, the issue of quality of service to apprentices and employers is becoming more urgent.

New quality benchmarks for the registration of GTCs that provide GTCs with access to financial support focus largely on *outputs* such as GTCs employing New Apprentices in occupations that meet skills in demand and targets for certain equity groups rather than the *inputs* or quality of training offered by GTCs (ACIRRT 1997, 2002).

It is essential that GTCs be encouraged to adopt 'best practice' models of skill formation. Agreement should be reached between GTCs and the government to identify and define best practice models and encouraging the spread of these best practise models, such as linking their adoption to additional government financial assistance, should be investigated.

Good Practice Group Training.

One leading GTC, Gippsland Group Training, has developed 'quality' practices including:

- providing three months pre-apprenticeship training in its own skill centres to 'ensure the apprentice is productive from the first day with the employer'
- planned rotation of apprentices between employers to ensure acquisition of the necessary range of skills
- excluding or strictly limiting 'downtime' of the apprentice. When downtime occurs Gippsland GTC engages the apprentice in its own skill centres or workshops
- regular visits by GTC field staff to employers monitor skill acquisition and resolve any problems (ACIRRT 2002: 63,78).

In the NSW Hunter Valley, the GTC HunterNet provides three month full-time training for first year apprentices at TAFE. During this period the GTC pays participants the equivalent of a first year apprentice wage. The apprentices are more attractive as those who finish demonstrate a commitment to the trade; learn production skills and acquire OH&S knowledge. Local employers use their participation in GT to identify prospective employees; HunterNet actively assists these employers to retain GT apprentices once they become qualified tradespersons. The ability of hosts to retain GT apprentices a strong part of the commitment of these employers to HunterNet. The partnership between HunterNet, formed by around fifty Hunter Valley manufacturing firms, and the TAFE colleges in the Hunter. HunterNet has been very active in promoting metal and electrical apprenticeships in the Hunter, encouraged by the responsiveness of the local TAFE colleges in meeting their training needs.

4.4 Changing industrial relations landscape

Improving Multi-Employer Co-ordination

The shift to decentralised industrial relations and more firm-specific training has influenced reduced training rates. One means of encouraging the retention and growth of 'industry specific' skills such as apprenticeships are initiatives designed to improve the flow of information on a regional level between and firms, employees and training organisations. There are number of successful examples of regional TAFE Institutes and individual colleges forming close partnerships or networks with local manufacturing firms. TAFE officers actively promote apprenticeship and other training to these local

firms and industry communicates its training needs to TAFE. The key point, however, is that whilst there are many positive examples of collective or individual action to promote apprenticeship and other forms of training at a local level there is no requirement for these models to be promoted across all colleges.

5. Conclusion

This brief study suggests four major conclusions for consideration by government, industry, unions and VET institutions.

The study concludes firstly, there was a large and statistically significant decline of 16 percent in the long-run aggregate apprentice training rate over the last decade from 1993 onwards compared to the period 1974-1992. At an occupational level between 1987-1992 and 1993-2001 the Metal training rate declined by nearly 19 percent. Electrical and Electronic trades declined by close to a quarter after 1993. The training rate for Construction fell by close to 15 percent, even though the industry recorded a significant increase in trades employment over the 1990s. Some trades such as food experienced a large increase the number of apprentices in-training and a modest rise in the training rate.

Secondly, the decline is contributing to the deficit in the supply of skilled trades and the resulting shortages can have severe economic impacts such as reducing the innovation capacity of the economy. Declining training rates have also reduced a source of full time job opportunities offering good career paths for young people. Had the training rate not declined nearly 19,000 additional job opportunities for young people aged 15-24 would be available.

Thirdly, the wide variation in training rates across the major trade occupations suggests that the decline in the overall training rate does not reflect a systemic problem with the apprenticeship institution, instead it suggests a range of industry and/or occupationally specific factors inhibiting employer investment in training. For example, the training rate for Food increased by 5 percent over the period and Vehicle declined by just one-third of the average decline over the period. A variety of structural changes over the last ten to fifteen years, disproportionately affecting those industries that employ metal, electrical and to a lesser extent construction apprentices, largely account for declining training rates. These changes include, the corporatisation and privatisation of public utilities, growth of ‘lean production’ systems and the associated reduction in firm size and expansion of JIT, outsourcing and labour hire.

It is most unlikely that the decline in training rates can be accounted for by a decline in the demand for trade skills. Some trades, such as construction and electrical and electronics had modest growth in employment over the last decade, though the training rate for apprentices declined by 9 percent and 25 percent respectively. For other trades such as Metal the decline in the training rate was three times the percentage decline in employed metal tradespersons.

Fourthly, given the diverse range of factors identified as contributing to the decline an equally broad range of solutions are required to redress the problem. In addition, given the multiplicity of causes only a combination of measures will result in a lift in training rates.

Finally, this study of declining apprentice training rates should be regarded as largely preliminary. A quantification of the factors identified in this report would assist in establishing a ranking of the principal causes of declining training rates and priorities for remedial action. In addition the marked decline in training rates in the Other category requires further investigation.

The focus of policy makers' interest, and to some extent of VET research, over the last decade has been on the rapid growth of the New Apprenticeship system. This growth, however, has masked divergent trends within the VET system. There is a compelling case to re-direct attention and resources to redressing the decline in a key element of Australia's skill formation system.

Appendix A
A Note on Apprenticeship Data

As observed in the Note to Table 1 the data on which the analysis in this report is derived from administrative data compiled by Federal government agencies, and from 1994 to 2001 data supplied by the NCVER. After 1998 the New Apprenticeship system was introduced and the NCVER ceased to make any distinction between apprentices and trainees in its data collection. The data after 1998 is based on in-training data for the ASCO Major group 4 Trade and Related Workers, as all apprentices are classified to this occupational group. However, it is also known that a number of trainees are classified to ASCO Major Group 4, even though they are not undertaking traditional apprenticeships. The data after 1998 therefore contains a certain percentage of trainees. The implication of this is that the training rates for the last three years calculated in this report are almost certainly inflated in comparison with data been based solely on apprentices in-training. In other words, the data used in this report is the most inclusive and therefore, the evident sustained decline in training rates is a conservative estimate of this trend.

There are two bases for claiming Major Group 4 contains an unspecified percentage of trainees. Firstly, data on new Apprentices in-training for 2002 supplied by the Queensland and Victorian Departments of Training indicate that 1469 trainees in Queensland and 500 trainees in Victoria were classified to Major Group 4. The occupational classification of New Apprentices published by the NCVER is based on data supplied by the states, and is not subject to revision or modification by the NCVER.

Secondly, the NCVER recently began publishing data on 'traditional apprenticeships' in-training. Data on apprentices is no longer collected or published by NCVER, so traditional apprenticeships is a derived variable constructed on the following basis. It is defined as New Apprentices in-training, undertaking AQF III or above qualifications and with an expected duration of training exceeding two years for full-time contracts and more than eight years duration for part-time or school based contracts of training (NCVER 2003: 12). In the December quarter 2002 there were an estimated 119,300 'traditional apprentices', though the total number of persons in-training in the Trades and Related occupational group was estimated to be 133,700. In other words, some 14,400 persons classified to the trades occupational group did not fit the definition of an apprentice. On this basis the December 2002 Major Group 4 data over-estimates the number of apprentices in-training by 10.7 percent.

Another interesting feature of the NCVER data is that the number of traditional trades in-training shows an increase of 17 percent between December quarter 1997 and December quarter 2002 (derived from NCVER 2003: Table 3). The number of ASCO 4 New Apprentices in-training increased by only 9 percent.

It is possible the large rate of increase of traditional trades recorded by the NCVER reflects, at least in part, the rapid growth in the number and proportion of AQF III and higher qualifications in total New Apprenticeships. There has been a very significant increase in the proportion and absolute number of trainees undertaking these higher

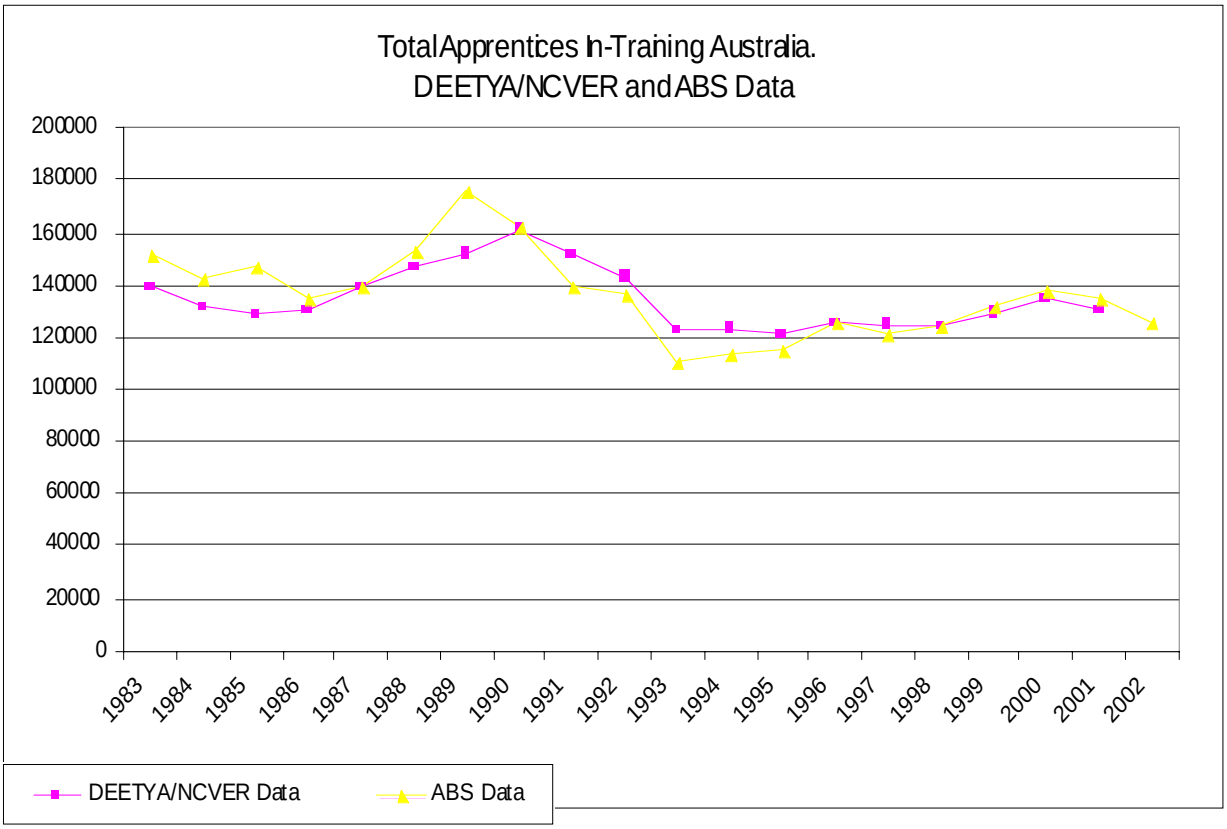
qualifications. Over the period December quarter 1997 to December quarter 2002 the proportion of AQF III or higher level qualifications undertaken by all New Apprentices increased from 71.7 percent to 82 percent. The number of persons in-training undertaking AQF III or higher qualifications increased from 133,000 to 307,400. This is an increase of 131 percent. (Offsetting this somewhat is that over this period the proportion of New Apprentices in–training with an expected duration of training undertaking exceeding two years decline 3.8 percent from 61.9 percent to 58.1 percent). Given this growth in the proportion and number of AQF III and higher amongst New Apprentices in-training this could account for the large differences between the rate of increase of so-called 'traditional trades' and total ASCO Major Group 4 New Apprentices in-training. In other words, the possibility that the growth in traditional trades in the NCVER data is due, in part, to growth of traineeships undertaking AQF III and higher and with an expected duration of training exceeding two years in ASCO Major Group 4 cannot be rejected.

Comparison With Other Data Series

Since 1983 the ABS has published annual data on apprentices in-training (ABS *Transition From Education to Work*, Cat. No. 6227.0). A comparison of the DEETYA/NCVER data and ABS data from 1983 to the present is provided in Figure A1 and Table A2. At both the aggregate level and for the individual trade occupations there is a reasonably close correspondence in the level and trends in the two data series. (At the aggregate level the population correlation coefficient for the two data sets is .83, which indicates the movements in the data are highly correlated).

However, because the ABS data is survey based there is greater variation from one year to the next compared to the DEET/NCVER data. Whereas the DEET/NCVER is derived from administrative data collected by the state Departments of Training, the ABS data is derived from a national survey of households. The fact that there is a reasonably close correspondence between the two data sets, even though they are derived from different sources, lends credibility to the data used in this report. Regardless of whether DEET/NCVER or ABS data is used a similar trend in apprenticeship training rates as that recorded in Table 1 would result.

Figure A1



Source: DEETYA *Annual Apprenticeship Statistics*, various issues, NCVER data, and ABS *Transition From Education to Work*, (Cat. No. 6227.0), various issues

Table A2. DEET/NCVER and ABS Apprenticeship Data

DEET/NCVER	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Metal	46681	46824	48469	44692	46326	48203	52394	56669	59064	53900	48819	44494	42125	25700	26762	27712	29576	27478	25941
Electrical/Electronic	18865	18696	18990	16796	17059	17014	17871	19218	20545	19943	19523	18316	18035	19416	20917	21859	23342	22382	20921
Building	29733	29431	29777	25277	25175	24205	24845	24990	26061	23936	22747	21869	22801	24603	27742	30312	32727	30618	28769
Printing	4567	4531	4299	3585	3314	3481	3809	3126	2906	2702	3085	3389	3827	4261	4692	3362	4509	3978	3618
Vehicle	7401	7345	7585	7342	7904	8157	7135	6616	6471	5972	5605	5952	6454	20991	23829	25301	27080	25276	23423
Food	7064	7492	7729	7919	8532	8831	9265	9511	9865	10228	10066	10966	11987	13005	13937	13815	14282	13945	13917
Other	17060	17580	17836	17589	18613	20017	21345	20656	22258	22162	22070	23594	25172	30938	29231	29375	29473	27312	26350
Total	131372	131899	134675	123200	126923	129908	136664	140786	147170	138843	131915	128580	130401	138914	147110	151736	160989	150989	142939
ABS										**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**
Metal										35300	31100	30300	21400	25100	28200	37900	25000	19500	26100
Electrical/Electronic										23200	18200	22000	15100	19700	22800	25600	22700	21000	20000
Building										28200	25900	26200	29100	24100	26500	30600	31300	25500	25300
Vehicle										19600	20200	21100	20700	19300	26800	29900	29300	24900	19400
Food										12800	10100	10800	13600	10900	12700	13300	13200	11300	14500
Other										31900	36500	37400	34600	40600	36000	38200	41100	36900	31700
Total										151000	142000	147800	134500	139700	153000	175500	162600	139100	137000

DEET/NCVER	1993	1994	1995	1996	1997	1998	1999	2000	2001	
Metal	22203	20700	19700	21200	21400	20830	19960	18000	16490	
Electrical/Electronic	17821	16500	15900	16700	16800	16040	16570	16920	15610	
Building	23799	25500	26400	25900	24300	24340	26650	30760	30000	
Printing	1984	2000	3100	3300	3200	2310	2190	2330	2210	
Vehicle	19560	18900	19800	21100	21200	23960	24080	24200	23310	
Food	13503	15200	15100	16300	17100	17000	19510	19230	19400	
Other	23803	24300	21200	21100	20500	19260	20570	22840	23250	
Total	122673	123100	121200	125600	124500	123740	129530	134280	130270	
ABS	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Metal	15400	21100	17200	18500	19100	15400	23700	20200	17000	17100
Electrical/Electronic	12100	14200	13500	18500	17300	16700	12500	21100	16500	14500
Building	25800	22800	21100	23800	18400	24800	28300	30400	31100	26300
Vehicle	18200	15200	17700	21900	18900	17700	18000	22200	22000	23900
Food	15200	13700	12700	14000	9800	9000	10600	12800	14000	13000
Other	24500	26900	32400	29700	37600	40900	39100	31500	34800	31600
Total	111200	113900	114600	126400	121100	124500	132200	138200	135400	126400

References

ACIL Consulting 1991, *Skill Development & Training in the Building & Construction Industry: A Review of the Issues*, A report for the National Building and Construction Committee. Department of Industry, Science & Resources

ACIRRT (1997) *The Development of Quality Arrangements in Group Training, NSW Department of Education and Training*, Sydney

ACIRRT (2002) *Renewing the Capacity for Skill Formation: The Challenge for Victorian Manufacturing*, A Report for the Manufacturing Industry Consultative Council

Anderton B. and Schultz S. (1999) *Explaining export success in the UK and German medical equipment industry*, Deutsches Institut fur Wirtschaftforschung, Discussion Paper, No. 185

Australian Bureau of Statistics (1987) *Labour Force Australia Historical Summary 1966-1984* (Cat. No. 6204.0)

Australian Bureau of Statistics (1988) *Australian Standard Classification of Occupations/Classification and Classified List of Occupations: Link*, Information Paper, (Cat. No. 2182.0)

Australian Bureau of Statistics (1996) *Australian Standard Classification of Occupations* (Second Edition)

Australian Bureau of Statistics (1998) Education and Training Experience. Australia. Cat. No. 6278.0

Australian Bureau of Statistics (1999) *Employer Training Practices Australia, 1997* (Cat. No. 6356.0)

Australian Bureau of Statistics (2000) Education - Education and Work. Developments in contracted training: apprentices and trainees, *Australian Social Trends* 2000 (Cat. No. 4102.0)

Australian Bureau of Statistics, *Transition From Education to Work*, (Cat. No. 6227.0), various issues

Australian Industry Group (1999) *Training to Compete*. *The Training Needs of Industry*

Australian National Training Authority (1997) *Taking Care of Business: Growth Through Group Training. Issues Paper*, Brisbane

Australian National Training Authority (1998) *Impact of the Growth of Labour Hire on the Apprenticeship System*, Brisbane

Australian National Training Authority (1998) *National Evaluation of User Choice – Phase 1: Evaluation Framework*. KPMG Consulting/ANTA.

Australian National Training Authority (1999) *National Evaluation of User Choice – Phase 2: Overview Report*. KPMG Consulting/ANTA.

Becker G. S. *Human Capital*, (New York: NBER)

Ball M. (1988) *Rebuilding construction. Economic Change and the British Construction Industry*, Routledge, London

Buchanan J. and Callus R. (1992) Economic Inefficiencies, Enterprise Bargaining and the Need for Multi-employer Co-ordination in the Labour Market, in *Issue in Enterprise Bargaining,* EPAC Background Paper No. 22

Campbell I. (2000) The Spreading Net: Age and Gender in the Process of Casualisation in Australia, *Journal of Australian Political Economy*, No. 45, 68-98

Construction Training Australia (1999), *Building and Construction Workforce 2005-Strategic Initiatives*, Melbourne

Commonwealth/State Training Advisory Committee, *Annual Apprenticeship Statistics*, Canberra

Currie W. and McCollow J. (2002) *Vocational Education and Training in Public Schools: Enhancing Student Career Options*, Australian Education Union

Curtain R. (1987) Skill Formation and the Enterprise, *Labour & Industry*, Vol. 1, No. 1, 8-38

Curtain R. (1993) *Has the Apprenticeship System a Future? The impact of labour market reform on structured entry-level training*, Department of Employment, Education and Training

Cully M. and Curtain R. (2001) New Apprenticeships: An Unheralded Labour Market Program, *Australian Bulletin of Labour*, Vol 27, No.3, 204-215

Dandie S. (1996) *Economic Analysis of Employment Based Entry Level Training. An Analysis of Trends in Apprenticeship Training*, Centre for Labour Market Research, Curtin University of Technology

Department of Employment, Education, Training, *Annual Apprenticeship Statistics*, Canberra (various issues)

Department of Employment, Education, Training and Youth Affairs (1997) *Evaluation of the Impact of Financial Incentives on the Recruitment of Entry Level Trainees*, Centre for Labour Market Research

Department of Employment, Education, Training and Youth Affairs (1998) *Labour Market for Apprentices*, Analysis and Evaluation Division, Analytical Series No. 98/1

Department of Employment, Education, Training and Youth Affairs (1999a) *Skill Shortages in the Trades - An Employment Perspective*, Labour Market Policy Group

Department of Employment, Education, Training and Youth Affairs (1999b) *Status of Skill Shortages in the Trades*, Labour Market Policy Group

Department of Education, Training and Youth Affairs (2000) *Electrotechnology*

Department of Education, Training and Youth Affairs (2000) *Skills Shortages in the Retail Motor Industry;*

Department of Education, Training and Youth Affairs (2002) *Engineering Skills Shortages*

Dockery A. M., Koshy P., and Stromback T. (1996) *The Cost to Employers of Apprenticeship Training in Australia*, Centre for Labour Market Research, Curtin University of Technology

Dumbrell Consulting and RCVET (2003) *Pre-Apprenticeships. Pathways or Sidetracks?*, NCVER (forthcoming)

Estevez-Abe M., Iversen T., and Soskice D. 'Social protection and the Formation of Skills: A Reinterpretation of the Welfare State' in Hall P. A. and Soskice D. (eds) (2001), 145-183

Gospel H. (1993) *Whatever Happened to Apprenticeship Training*, ACIRRT Working Paper No. 28, July.

Gospel H. (1994) The Survival of Apprenticeship Training in Australia, *The Journal of Industrial Relations*, March, 37-56

Hall P. A. and Soskice D. (eds) (2001) *Varieties of Capitalism. The Institutional Foundations of Comparative Advantage*, Oxford University Press, UK

Hall, R., Buchanan, J., Bretherton, T., van Barneveld, K. and Pickersgill, R. (2000). *Making the Grade?: Globalisation and the Training Market in Australia*. Volumes 1 and 2. Adelaide: NCVER.

Hall, R. and Bretherton, T. (2000). '*It's Not My Problem': The Growth of Non-Standard Work and Its Impact on Vocational Education and Training in Australia*. Seminar Presentation to School of Work and Organisational Studies, University of Sydney, May.

Hall R. and Buchanan J. (2000) *The Characteristics of Applicants for Metal and Engineering Apprenticeships and Traineeships*, Report for the MERS ITAB, Australian Centre for Industrial Relations Research and Training

Hall R., Buchanan J and Considine G. (2002) *"you value what you pay for". Enhancing Employers' Contributions to Skill Formation and Use*, Dusseldorp Skills Forum,

Harrison B. (1997) *Lean and Mean: the changing landscape of corporate power in the age of flexibility*, The Guildford Press, New York

Littler C. (2003) *Understanding the HR Strategies of the 1990s*, Paper for the University of Queensland, Graduate Business School, Seminar Series 14th March 2003

Marshman and Associates (1996) *The Employment of Apprentices. The Barriers*, Australian National Training Authority, Brisbane

Marshman and Associates (1998) *On the Brink of Crisis?* Report to Engineering Skills Training Board (Vic) Inc.

Merrilees W. J. (1983) Factors Affecting the Hiring of Apprentices, Conference Paper No. 37, *Bureau of Labour Market Research*, Canberra

National Centre for Vocational Education and Research (1998) *Apprentices and Trainees in Australia 1985 to 1997*

National Centre for Vocational Education and Research (1999) *Apprenticeship in Australia An Historical Snapshot*

National Centre for Vocational Education and Research (2001) *Australian Apprenticeships Facts, fiction and future*

National Centre for Vocational Education and Research (2003) *Australian apprentice and trainee statistics 2002. December Quarter*

NSW Government (2000) *Training Management Guidelines*, Construction Policy Steering Committee, Department of Public Works and Services, Sydney

New South Wales Board of Vocational Education and Training (2001) *Current Trends in Apprenticeship and Traineeship Training in NSW*, Sydney

Office of Training and Further Education (1998) *Apprenticeships and Traineeships-Victorian Trends*, State Training Board of Victoria

Prais, S. (1995) *Productivity, Education and Training. An International Perspective*, The National Institute of Economic and Social Research, Occasional Papers XLVII, Cambridge University Press

Roan A. and Lafferty G. (2001) Skills, Training and Workforce Bargaining – the Implications of Australian Workplace Agreements, paper presented at *The AWA Experience: Evaluating the Evidence*, University of Sydney 7th September

Saunders S. and Saunders J. (2002) *Getting adults in to the trades*, NCVER, Adelaide

Smith A., Oczkowski E., Noble C. and Mackling R. (2002) *New Management Practices and Enterprise Training*, National Centre for Vocational Education and Research

Smith E. (1998) How Apprentices Learn to Work, *Australian Bulletin of Labour*, Vol. 24, No. 2, June, 127 140

Smith E. and Wilson L. (2002) *Learning and training in school-based new apprenticeships*, NCVER

Smith L. (1998) *Apprenticeships and Traineeships- Queensland Trends*, Department of Employment, Training and Industrial Relations

Smith L. (1999) *Apprenticeships and Traineeships- Queensland Trends*, Department of Employment, Training and Industrial Relations

Snower D. J. and Booth A. L. (1996) Conclusions: government policies to promote the acquisition of skills, in Booth A. L. and Snower D. J. (1996) *Acquiring skills. Market failures, their symptoms and policy responses*, Cambridge University Press, UK, 335-349

Stevens J. and Mackay R.(eds) (1991) *Training and Competitiveness*, Kogan Page Ltd., London

Sweet R. (1990) Initial Vocational Preparation Facts and Issues: Costs and Benefits, *Training Costs of Award Restructuring. Report of the Training Costs Review Committee Vol. 2 Supplementary papers*: 223-251

Sweet R. (1995) The Naked Emperor: Training Reform, Initial Vocational Preparation and Youth Wages, *Australian Economic Review*, Vol. 110, April/June

Toner P. (1998) Trends in NSW Government Apprenticeship Intake: Causes and Implications, *Australian Bulletin of Labour*, Vol. 24, No. 2, June, 141-157.

Toner P. (1999) *Main Currents in Cumulative Causation: The Dynamics of Growth and Development.* Macmillan Press Ltd, U.K.

Toner P. (2000a) Trade Apprenticeships in the Australian Construction Industry, *Labour and Industry*, Vol. 11, No. 2, December, 39-58

Toner P. (2000b) Changes in Industrial Structure in the Australian Construction Industry: Causes and Implications, *The Economic and Labour Relations Review*, Vol. 11, No.2 December, 291-307

Toner P., Green R., Croce N. and Mills B. (2001) No Case to Answer: Productivity Performance of the Australian Construction Industry, *The Economic and Labour Relations Review*, Vol. 12, No.1, June, 104-125

Toner P. (2002a) The Impact of Skilled Migration on Skill Formation and the Labour Market, *NSW Board of Vocational Education and Training*, Sydney

Toner P. (2002b) The Occupational And Skill Structure Of New Apprenticeships: A Commentary, *Labour and Industry*, Vol. 13, No. 1, August, 39-58

VandenHeuval A. and Wooden, M. (1999) *Casualisation and Outsourcing: Trends and Implications for Work Related Training*, NCVER, Adelaide.

Wagner K. (1991) Training Efforts and Industrial Efficiency in West Germany, in Stevens J. and Mackay R. (eds), 132-149

Wooden M. (1996) Firm Size and the Provision of Employee Training: An Analysis of the 1994 Survey of Training and Education, *Australian and New Zealand Journal of Vocational Education Research*, Vol. 4, No. 2, 89-120

Worland D. and Doughney J. (2001) The Decline in Apprenticeship Training in the Electrical and Associated Industries, *Australian Bulletin of Labour,* Vol. 28, No.2, 88-103

[1] In 1986 a new occupational classification for the measurement of persons in the labour force, the Australian Standard Classification of Occupations (ASCO First Edition) was introduced. ASCO is largely incommensurable with the previous classification system, the Classification and Classified List of Occupations (CCLO). The CCLO had been used from the 1960s. Consequently, it was not possible to calculate aggregate or long-run training rates by broad occupational trade group, as comparable data on pre-1986 trade's employment were not readily available.

[2] The period from 1974 onwards was chosen due to the introduction of the first national employer subsidy scheme for apprentices in this year. This caused a break in the trend training rate. The subsidy 'had an immediate effect on the number of opportunities being offered by employers to apprentices…[as] apprentice numbers jumped by over 12 percent between 1973 and 1974' (NCVER 2001: 13).

[3] The data on apprentices in-training was derived from administrative sources and the National Centre for Vocational Education Research (NCVER). Data on employed tradespersons was derived from the ABS *Labour Force* survey. Aside from the total apprentice training rate, the trade occupations for which a consistent time series over this period could be constructed were Electrical/Electronics; Construction, Printing; Food; and Other (Table 1).

[4] The test involved an OLS regression over the full period 1974 to 2001 with dummy variables of 0 and 1 for the period 1974/1992 and 1993/2001 respectively. The change in the intercept is highly statistically significant at the 5 percent confidence level (t-statistic –9.28).The regression results are as follows:

	Coefficients	*Standard*	*t Stat*	*P-value*
Intercept	12.68421	0.124584	101.8123	0.000000
X Variable 1	-2.03977	0.219746	-9.28239	0.000000

[5] See also notes to Table 1.

[6] AEGIS/ACIRRT (2002) provides a comprehensive literature review of the links between VET skills and innovation.

[7] Saunders and Saunders (2002: 14, Table 1) note that the adult share of apprentices increased from 8 percent in 1995 to 14 percent in 2000.

[8] According to the NCVER (2001: 73) 83 percent of all New Apprentices were in full time employment. The proportion of apprentices in full time employment is higher than for trainees.

[9] The data reporting comparatively positive labour market outcomes for holders of AQF III and IV qualifications would not have been unduly affected by the large growth in the number of trainees gaining these level qualifications from the latter 1990s. The stock of holders of 'skilled vocational qualifications' in the latter 1990s exceeded one million persons, which greatly exceeded the number of trainees who completed training at the AQF III or IV level during this period (ABS 1998 *Education and Training Experience. Australia.* Cat. No. 6278.0)

[10] Toner (2002a: 49) found that between 1995-96 and 1999-2000 net migration contributed the equivalent of 17 percent of total apprenticeship completions in Australia. This is an upper estimate of the actual contribution of migrants to the qualified trades labour force, as not all migrants declaring their occupation as a trade upon arrival trade occupation would work in this occupation, once settled in Australia. Earlier studies found that there was considerable volatility over the longer term in the ratio of net trades migration to domestic apprenticeship completions (NCVER 1999:12).

[11] The finding that the level of output is the dominant variable in the explanation of apprentices would seem to contradict our argument that changes in the structure of the economy are largely responsible for the sustained decline in training rates from 1993 to the present. The econometric studies, which identified the dominance of the demand variable, were based on data from the mid-1960s to the early 1990s (for example DEETYA 1997: 94). This is a period in which the apprentice training rate was relatively constant (Table 1) and prior to those structural changes which, it is argued, occurred over the last decade. In addition, it is implausible to argue that changes in the level of output explain the decline in apprentice training rates over the last decade. Table 3 shows that between 1987-1992 and 1993-2001 average employment in Trades across Australia declined by just .7 percent, but employment of apprentices declined by 15.2 percent. Some trades such as building and electrical experienced increased employment of trades over the period, but large reductions in their respective training rates and number of apprentices in-training.

[12] Following a review of the New Apprenticeships financial incentives in 20002, a number of improvements were made to the system, which removed some of the bias in favour of trainees over apprentices.

[13] Another indicator of increased competition is that the profit margins and rate of return on manufacturing assets have not recovered over the decade from rates recorded in the deep recession of the early 1990s (ABS *Summary of Business Operations and Performance* Cat. No. 8140.0, various issues).

[14] Estevez-Abe, Iversen, and Soskice (2001) argue that this industry wide co-ordination is essential if workers are to be encouraged to invest in acquiring these industry specific skills. The existence of a recognised occupational labour market for these skills, established career paths and comparability of wages across firms reduces the risk to individuals in acquiring these skills. In countries such as the US which do not have these institutions individual workers invest much more heavily in 'general' skills, notably college and university education. Just as the acquisition of industry specific skills in countries such as Australia, is

facilitated by a large infrastructure of vocational education institutions, so too in the US the existence of a large world class university sector and a culture that encourages self-funding of post-compulsory education, facilitates the attainment of general skills. The portability of these skills across firms and industries is designed to insulate workers from the risk of unemployment and diminished wages. In countries such as Japan large internal labour markets and a policy of life-time employment (until recently) in the big corporations encouraged individuals to invest in firm specific skills. The low risk of unemployment and a clear internal career path reduced the risk to individuals in investing in firm specific skills.

[15] Some of these responses are taken from AEGIS (2002).

[16] In NSW 'building and engineering projects 20% of the trade work is to be undertaken by apprentices. This target is to be reached by 25% of the way through the contract awarded and maintained until the project is 90% complete. It is to be calculated on the basis of the total number of tradespersons employed in all trades by the contractor and subcontractors' (NSW Government 2000: 8). It is a important to note that the apprentices do not have to be employees of subcontractors, but can be from Group Training companies, or even conceivably students in pre-apprenticeship programmes. On civil construction projects similar requirements apply for the employment of trainees in civil construction (NSW Government 2000:9). Training provisions also apply to other persons employed on-site. In NSW this initiative is managed by the Department of Public Works and Services (DPWS). Similar schemes operate in other States. If these schemes are operating effectively, this programme could make a very substantial contribution to redressing skill shortages.

[17] These impediments include, increased specialisation of firms and their consequent inability to offer a sufficiently broad range of tasks and skills to apprentices, and reduced contract cycles and inability of firms to offer reasonable surety of employment to apprentices over their four year training period. They do this by engaging in a form of labour hire where the apprentice is employed by the GTC and hired out to employers over varying periods of time. Ideally the GTC ensures that the apprentice is hired out to a range of employers who can collectively offer the required breadth of training.