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**‘The Decline in Apprenticeship  
Training in the Electrical Industries in  
Victoria’**

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# **The Decline in Apprenticeship Training in the Electrical Industries in Victoria**

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## **Abstract**

A nation that pursues a knowledge-based approach to economic growth might be expected to view its skill base as an important component of this strategy and the rate of accumulation of trade skills as an important part of the skill formation story. Australia, in common with many other countries, has experienced an uneven rate of trade skills formation over time. This paper identifies the emergence of a skills shortage in the electrical and associated occupations in Victoria over the last decade. The first part of the paper presents a literature review and a discussion of the issues surrounding this shortage. A downturn in the number of apprentices in training provides a possible explanation of the shortage and contemporary data for electrical apprenticeships in Victoria are presented, analysed and discussed. Three key issues emerge. The first is the downward trend in the number of apprentices being trained in Victoria. The evidence shows that the accumulation of electrical trade skills in Victoria is occurring at a much slower rate than in other states. State specific factors provide at least part of the explanation for this. On the question of whether apprenticeship training is becoming more equitable by being more accessible to minority groups, the evidence shows that women and other disadvantaged groups are not becoming better represented within the apprentice population. Finally, the paper presents arguments about the nature of the skills shortage and provides an estimate of the size of this shortage.

## **Introduction**

A number of researchers from different countries have identified a shortage of electricians in those countries (Bennett, 2000; Finlayson, 2001; Steele, 2000). Finlayson (2001), in discussing the Canadian position, argues that demographics, an increase in the skill intensity of employment and an increase in the competition for talent are important factors. Steele (2000), in an evaluation of the United States experience, asserts that an increase in demand for electrical services in buildings has contributed to the shortage, and Miller (2001) talks about the rapidly increasing demand for telecom installers as a factor. Bennett (2000) suggests that the ageing workforce in the United States and the resulting exit of electricians from the workforce contribute to the shortage. There is a body of evidence showing the decline in apprenticeship numbers as a possible explanation for shortages in Australia and the United Kingdom (Gospel, 1995; Marshman, 1996; Naataajan and Mission, 1998; Wilks, 2000). Naataajan and Mission and Marshman argue also that changes in the employment relationship in specific industries, especially the shift to labour hire firms, outsourcing and apprenticeship training retention rates, are important. Wilks shows the decline to be attributed, at least in part, to the growing level of competition for suitable trainees by other sectors of the economy, for example universities.

The first part of this paper presents a literature review and a discussion of the issues. Contemporary data for electrical apprenticeships in Victoria are then presented, analysed and discussed. Three key issues emerge. The first question relates to the number of electrical apprentices in training within Victoria. Are fewer apprentices being trained? The second is to

discover reasons for this and to explore issues of equity, especially those regarding women apprentices. Thirdly, it attempts to analyse the skills shortages question.

### **The shortage of electricians**

Industry representatives have attempted to quantify the electrician shortage. For the US the National Electrical Contractors Association (USNECA) and the International Brotherhood of Electrical Workers (IBEW) estimate that over the next decade more than 100,000 additional electricians and IT system installers will be needed to meet the wiring and cabling needs of business and industry (CEE News, 2001).

### **Electricians and the IT industry**

Prior to discussing the issue of shortage, it is important to consider a definitional issue, namely the occupational boundaries for the 'electrician'. Does this occupational group include the 'IT worker', or are there two quite separate occupational groups? This is an important question in so far as there are potential differences in the way each group behaves in the labour market. For example there is evidence of a blow out in demand for electricians being caused by an increase in the kind of work generated by the demand for IT services, and this has occurred in tandem with a decline in the demand for the work performed traditional electricians.

This proposition is advanced in a report on the future outlook for electricians prepared by the Vancouver Island Advanced Technology Centre (Viatec, 2001). They argue that technological advances as well as an increase in the incidence of do-it-yourself installations within the home are contributing to a decline in the demand for electricians. It is also asserted that there is a change in the skill requirements for electricians because of the sharper increase in demand for IT personnel, and this will ultimately impact on the range of skills sought within an apprenticeship. However, this position is not agreed within the literature. Indeed this kind of labour market segmentation is not generally accepted, but it helps to explain the range of views about the labour market conditions for electricians presented in the literature and whether there is an endemic shortage of them.

The definition adopted in this paper is the more traditional one, namely, that an electrician is a tradesperson who has completed the trade training required to legitimately work as an electrician.

### **Factors contributing to the shortage**

Adopting a position that a shortage exists, two contributing factors appear likely: there are too few electricians being trained and too many electricians are leaving the trade. For Australia, according to data provided by DEETYA (1997, p. 3), the number of new apprentices in training during the first half of the 1990s declined. Both the numbers and ratio of apprentices and traineeships in the electrical field fell between 1985 and 1997 – from 14.2 per cent to 9.6 per cent (Robinson, 1999; Doughney et al., 2001). However, while evidence has been presented to suggest that this decline has been arrested in the last couple of years (NCVER, 2000), the figures contributing to this change in trend are somewhat misleading.

A large proportion of the recent growth has been in traineeships rather than apprenticeships. Further, this rather healthy aggregate picture is driven by very rapid expansion in the number

of trainees in the non-traditional trade areas such as the services sectors of hospitality, food and retailing. For example between 1995-96 and 1998-99 most of the growth (nearly 60 per cent) occurred in intermediate and elementary level clerical, sales and service occupations (Kemp, 2000; Dumbrell et al., 2001, p. 11). It is also clear that more traineeship places and positions have been created than apprenticeship places and positions (see NCVET 1999). Saunders (2001, p. 12) suggests a link between traineeship growth and 'the existence of saleable traineeships in growth sectors of the economy', and traineeship growth has been stimulated by policy and marketing initiatives taken during the second half of the 1990s.

However, growth is not occurring in the traditional trades areas such as electrical, electronic and communications fields. Further, the decline in the number of apprentices in these traditional areas is not being arrested. In short they show a marked decline from a high point in 1990 of 23,000 in training to a low in 1995 of 15,900. Since then, a modest increase to about 17,900 apprentices in training has occurred.

For Victoria the story is similar although the decline is more marked. A study sponsored by the National Electrical and Communications Association (NECA, 1998) showed a fall in the number of apprentices under training so serious as to be producing a shortage of skilled tradespersons. During the 10 years to 1995-96, apprenticeship commencements fell by 13 per cent, and the fall was greater in some of the traditional trades such as electrical and electronics. The NECA study also showed which industry sectors were responsible for the decline in the electrical mechanic trade group within Victoria. Commencements in government employment had all but evaporated and the number of group training commencements had also fallen by more than 50 per cent over the period 1994-97. The commencements within the private sector had also fallen, but by 18.9 per cent (NECA 1998).

A recent study of self employed workers in the Victorian building industry (Underhill et al., 1997, p. 94) concluded that growing reliance on self employment was likely to impede both apprenticeship and post-apprenticeship training. The self-employed seemed to be reluctant to be involved in the training loop. Given that the electrical and associated industries also rely on self-employment and other forms of alternative work arrangements, the question arises as to whether these industries might expect a similar training outcome.

The lower number of apprentices in Australia is attributed both to the smaller number of entrants to apprenticeship training and a higher wastage rate both during and after training. Saunders, in reporting DEETYA studies (1998), identifies wastage of apprentices and tradespersons, lower intakes in the early 1990s and inability of older tradespersons to meet the requirements of the new technologies as contributing to this situation. A study by KPMG (1998) revealed a fall in the ratio of apprentices to the total workforce during the period 1970-1996, although Saunders shows in her review of the literature that there is room for debate on the question of the incidence of apprenticeship. Naataajan and Mission, though, provide evidence of a fall in the ratio in Victoria over the first half of the 1990s (Saunders, 2001, p12), a period when considerable change away from public ownership occurred.

Research shows the downturn in the number of apprentices to be related to both supply and demand factors, although the supply side rather than growth in the demand for trade skills appear to be the more important. The decline in intake is at least partly due to a shortage of suitable candidates, and this is associated with a growing incidence of higher education as a preference for secondary students and more informal study options outside apprenticeships. Marshman (1996) refers to this as the image and status of the trades. Young people are less

keen to undertake apprenticeships if the prospects for further training and career progression are limited (Gospel, 1994, p. 53). The shortage of suitable applicants is also addressed in a DEWRSB study (DEWRSB, 1998). The experiences of employers and group training companies in recruiting apprentices in 1997 revealed differences in the ratios of suitable applicants between regions, specific occupation groups and size of organisation. For example, in Victoria, employers had lower ratios of suitable applicants compared to most other states. Large firms had higher ratios of suitable applicants and the group training companies had a higher rate of suitable applicants compared to traditional employers.

The increasing relative costs of apprentice labour compared to other sources of skilled labour has also had an impact (Marshman, 1996). Changes in the demand for apprentices have been associated with the privatisation of government instrumentalities (Marshman, 1996) and the (unintentional) effects of the training reform agenda of the 1980s (Gospel, 1994, p. 54). The figures also show large fluctuations in the number of apprentices in training over time. For example the aggregate numbers of apprenticeships and traineeships have shown both a decline and a recovery from this position over the last decade. Individual trades, however, have deviated from this pattern. Gospel's (1994) analysis of Australian data for the period 1970-1992 questions whether there is a long-term decline in the apprentice population.

Other possible barriers to apprenticeships in the building, electrical and engineering industries identified by Marshman and Associates (1996) included the size of the applicant pool, the impact of restructuring and outsourcing and changes in contractual cycles and the growth of group training. There has also been a reduction in the ability of employers to employ apprentices in an economic environment characterised by shorter and less predictable contract cycles as a result of restructuring (Marshman, 1996, p. 24).

Lehmann (2000) reports that apprenticeship numbers have also declined in the US, and Bosch and Zuhlke-Robinet (2001, p. 19) present a similar story on the position in Germany, where there was a decline in the ratio of apprenticeships to total employment from 10.2 per cent in 1950 to 1.8 per cent in 1970. Accepting that there is a shortage of apprentices in the electrical field, a number of issues follow. One question broached in the literature is how to encourage the take-up of more apprenticeships. Various strategies are considered including the imposition of financial levies (Bosch and Zuhlke-Robinet, 2001; Anonymous, 2000), the possibility of subsidies for employers (Bledsoe, 2000), the requirement that government contracts specify apprentices be employed on such contracts (Daniels, 2000), the establishment of joint union and management training trusts to foster apprenticeships (Winston, 1999) and other types of government intervention. Such policy initiatives directly intervene in the market and raise questions about efficiency aspects of the apprenticeship system. Ebaum and Singh (1995, p. 620) question the economic rationale of apprenticeships, indicating that subsidy issues have entered the UK debate in the following way:

Ever since Adam Smith the economics literature has forcefully voiced the suspicion that apprenticeship arrangements primarily serve to restrict job entry and provide monopolistic benefits. Smith himself considered lengthy apprenticeships 'altogether unnecessary', suggesting by implication that apprenticeship would wither away in Britain were it not for its legislative backing.

Notwithstanding this, Ebaum and Singh argue that the growth in apprenticeship in Britain during periods when there was no regulation by government or unions suggests that there are efficiency advantages arising from apprenticeship training both for youth and employers (1995, p. 620). Lately, policy makers have also been considering reform of Britain's traditional job training arrangements, prompted in part by efficiency concerns and by a recent

severe decline in the numbers receiving apprenticeship training. The historical record suggests they may in each case have good reason.

### **Skill requirements and training needs**

A paper by The Victorian Office of Training and Further Education (OTFE), titled 'Planning guide for providers of training and further education in Victoria 2000-2002' (OTFE 1999), provides an industry perspective of training needs and their regional distribution. This study identifies key variables expected to influence the market for electrical workers during the period 2000-02. Significant demand for electrical workers was expected from big projects in progress in Victoria and the work in NSW linked to the Olympic games. The main area of growth beyond this time is likely to be in the boom industries of telecommunications and information technology (OTFE 1999, p. 51). A recent report by the Electrotechnology Working Group of the National Skills Forum (Catelotti 2000) highlights the skills shortages in these fields.

The locational issues discussed in Dumbrell et al. (2001) left no doubt that there are major differences in the incidence of apprenticeships between and within states. The causes of these differences are less clear, but it is important to take them into account when devising policy designed to alter the flow of apprentices into specific trades or occupations. Variables such as age, industry, occupation, duration of trade, full time and part time, level of unemployment and the location of an apprenticeship within a metropolitan or rural area would appear to be important in determining the incidence of apprenticeship within a specific setting.

Other factors that affect the industry and, therefore, its training requirements have been identified by OTFE (1999) as the rate of technological change, the convergence of technology, competition and deregulation, quality issues, skills shortages and support for small business. The increasing competition has led to greater pressure on workers for 'multi-skilling' and 'up-skilling' in a technical sense and for them to broaden their skills base to encompass marketing and customer service skills as well as technical skills. With increased flexibility there will be some merging of industries in areas such as cabling. OTFE has suggested that these changes will impact upon apprenticeship training both qualitatively and quantitatively (1999, p. 119). Moreover, social changes, such as the expectation of greater equality of opportunity in the workplace, mean women will be given the same opportunity to enter a trade as their male counterparts. As well, there will be a change in the ethnic mix within the electrical trades in line with the population as a whole.

In the electrical field the ratio of apprentices to tradespersons has nearly halved over the last decade. One spin put on this scenario is that the change is simply an expression of a successful labour market adjustment. However, this makes sense only if the adjustment process does not leave individual sectors with skill shortages or surpluses.

### **Numbers of apprentices in Victoria**

The study now turns to the question of how many apprentices are trained in Victoria and an examination of the relevant data. Four sets of data obtained from one or more of four sources are used for this task.<sup>ii</sup>The changing apprentice population can also be viewed in terms of a ratio of apprentices to tradespersons, since this is a useful measure of the rate of apprenticeship training. Chart 1 shows the ratio of apprentices to tradespeople for both Australia and Victoria. The trend, and the times at which the most noticeable changes

occurred, are evident in this chart. The ratio has declined more rapidly in Victoria. From approximate equivalence at 13 per cent in 1990 a cleavage began to open in 1991-92. This has been maintained or widened since then.

The relationship between the Victorian and Australian data is apparent from table 1. Particular attention should be given to the last two rows. These examine change from 30 June 1985 to 31 December 1998. Significantly, 78 per cent of the change in the national electrical apprentice total was caused by the drop in the number of Victoria's electrical apprentices. All other states combined contributed only 22 per cent of the fall. An important question is why does the ratio of apprentices to tradespeople in Victoria decline more steeply than the Australian average ratio of apprentices to tradespeople? The NECA study (1998) and other anecdotal evidence suggests that one explanation might be the extensive corporatisation and privatisation of Victorian public enterprises in recent years. The power industry, which was a major employer of electrical apprentices in Victoria, is one case in point. The rail industry is another.

NCVER data on employer type breaks down the Australian totals for apprentices and trainees by state and employer type. While the figures are aggregated and include trainees, some useful comments can be made about the 'in training' numbers at 31 December 1998. The most striking comparison is the proportionately miniscule role played by the Victorian public sector in the employment of apprentices and trainees (less than 1 per cent of the total). In NSW the proportion is about 9.5 per cent, while nationally the figure is about 6.6 per cent (see table 2). This reflects the aggressive privatisation of public enterprises in Victoria and the correspondingly higher percentage for private sector employment. However, although this does not account for the relatively poor showing by state and local government sectors, it does provide evidence that the lower apprenticeship rates in Victoria is due in significant part to the decline in the role of the public sector in providing apprenticeship opportunities.

There are other possible explanations as well. One of these might be that the steeper decline in the ratio is related to the relative decline in manufacturing employment. Given Victoria's historically larger manufacturing base, this decline may thus have a disproportionate effect here and cause apprentice intakes to be cut by a greater amount in Victoria. Although a plausible explanation, this turns out not to be convincing in light of the evidence. One way to show this is to consider the ratio of Victorian electrical apprentices to Australian electrical tradespeople ( $A_V/T_A$ ) as being a good indicator of Victorian trends and influences against a national benchmark (see column two of table 3). This ratio is itself the product the two key ratios. These are the ratio of Victorian electrical apprentices to Victorian electrical tradespeople ( $A_V/T_V$ ) and the ratio of Victorian electrical tradespeople to Australian electrical tradespeople ( $T_V/T_A$ ). That is:

$$(A_V/T_A) = (A_V/T_V) \cdot (T_V/T_A)$$

Now the latter ratio ( $T_V/T_A$ ) is important because it is a good proxy for structural shifts in the Australian labour market. If manufacturing decline in Victoria had resulted in a reduced call for electricians compared with other States it would show up in this ratio. Moreover, it is possible to compare the trends for each ratio in terms of their average percentage changes per annum and to estimate the relative contribution of each to the change in ratio of Victorian electrical apprentices to Australian electrical tradespeople ( $A_V/T_A$ ). The results are given in table 3. This table illustrates that the trend decline in the Victorian electrical apprentices to Victorian electrical tradespeople ( $A_V/T_V$ ) ratio was by far the stronger influence. More than

86 per cent of the decline in Victorian electrical apprentice numbers against the national electrical tradesperson benchmark was attributable to the decline in the numbers of apprentices as against tradespeople in this state. Only approximately 13.20 per cent of the shift can be said to be a result of national trends in the labour market for electrical tradespeople, as captured by the ratio of the number of Victorian electricians to the national total. Note also that the effect of corporatisation and privatisation of public enterprises will also be working to reduce the tradesperson ratio, too (see, e.g. Watson 2000). This means that the relative decline in apprentice numbers has been even more severe. It lends support to the view that declining public sector employment of electrical apprentices is the cause of the divergence from national trends.

### **Commencements, completions, attrition and equity**

The commencements, completions and attrition figures illustrated in chart 2 also help to explain why electrical apprentice numbers in Victoria have declined. The coincidence of falling commencements in the early 1990s, together with relatively higher completions and a high level of attrition, have set a trend from which it has been difficult to recover. A drop in commencements in 1996 (see chart 2) and a rise in attrition in the later 1990s (see chart 3) have exacerbated the problem. Both commencements and completions are on average lower in the 1990s than they were in the 1980s, but the level of attrition is on average higher.

Although a community awareness has arisen as to the gender imbalance of apprentice numbers in this sector, the increasing number of women entering the electrical trades appears to have been a temporary phenomenon. Numbers originally rose but in recent times have begun to decline and, indeed, have withered. Apart from the equity concerns revealed by this data, the reduction in the incidence of women apprentices has contributed to the overall decline in the ratio of electrical apprentices to tradespeople in Victoria.

### **Inferences about skills shortages**

Is there a skills shortage? According to the Federal Labour Market Policy Group of the Department of Employment Workplace Relations and Small Business (DEWRSB) skill shortages 'exist when employers have difficulty filling, or unable to fill, vacancies in recognised occupations or specialisations (at reasonable levels of pay, conditions and location)'. However, they add that these 'are typically for specialised and experienced workers, and can coexist with relatively high unemployment... The labour market can change... [partly due to] training lead times'. Moreover, shortages 'may be numerically small, or in specific locations' (DEWRSB 1999, p. 6). Nonetheless, some measure of skills shortage is possible. One index produced is the Skilled Vacancy Survey (SVS). It

...is based on a count of skilled vacancies in the main newspaper of each State and Darwin. Around 130 occupations are grouped into 19 occupational groups and three broad groupings: Professionals, Associate Professionals and Trades. The figures are expressed as an Index (November 1997 = 100). (DEWRSB, 1999b, p.8)

The index allows easy calculation of percentage increases in vacancies. Thus, according to an earlier index base, the 'SVS Index for the Trades rose by 43 per cent over the five years to February 1999', but 'the strongest rises were for Hairdressers and Electrical and Electronic Trades. Construction Trades also recorded a strong rise over the five years.' (DEWRSB, 1999b, p. 8) In fact, the rise for electrical and electronic trades was about 118 per cent over the five years from February 1995, meaning that, taking February 1994 = 100, the index rose



to 218. This is a significant national increase in vacancies indicating some level of skills shortage.

Based on the current SVS index, vacancies in the electrical and electronic trades rose by 20.6 per cent (to 120.6) between November 1997 and May 2000 (DEWRSB, 2000). Splicing the two indices gives a percentage increase of about 122.5 per cent in vacancies in the electrical and electronic trades in the past six-and-a-quarter years. This clearly suggests, from the labour demand or employer side of the labour market, that a skills shortage as defined exists at the aggregate Australian level. What do the figures presented elsewhere in this paper say about the issue from the supply or apprentice-tradesperson side?

Here the most important figure is the ratio of apprentices in training to tradespeople, of which much has been made in the previous sections of this paper. If this ratio falls over time, as it has, then the number of new tradespeople entering the trade to offset retirements and departures (wastage and emigration) of tradespeople will decline, other things being equal. Note that the electrical trades have the equal highest rate of wastage among the trades as a whole (43 per cent do not work in their trade) but that net immigration of tradespeople to Australia, if not necessarily between the States, is likely to be positive in any given year (see, e.g. Beaton et al. 1999).

A simple calculation will illustrate how significant the declining electrical apprentices in training to tradespeople ratio can be. In the five years May 1987 to May 1991 the ratio averaged 12.35 per cent. In the most recent five years to February 2000 it averaged 7.36 per cent, a fall of more than 40 per cent. Assuming that in each year about one-quarter of the apprentices in training graduate, and using the May 1987 starting figure of 42,975 Victorian electrical tradespersons, the addition from graduating apprentices to tradesperson numbers after a number of years can be estimated. The estimate first uses the 12.35 per cent figure and compares the results with those using 7.36 per cent. The calculation demonstrates roughly that 7,500 fewer new tradespeople will have entered the trade after 10 years and about 10,000 fewer after 15 years.

It also means that the average age of electrical tradespeople will increase and retirement will become even more a problem. That is, the skills shortage on the supply side will be exacerbated at both ends of the age spectrum if remedial action is not taken to arrest the decline in the electrical apprentices to tradespeople ratio.

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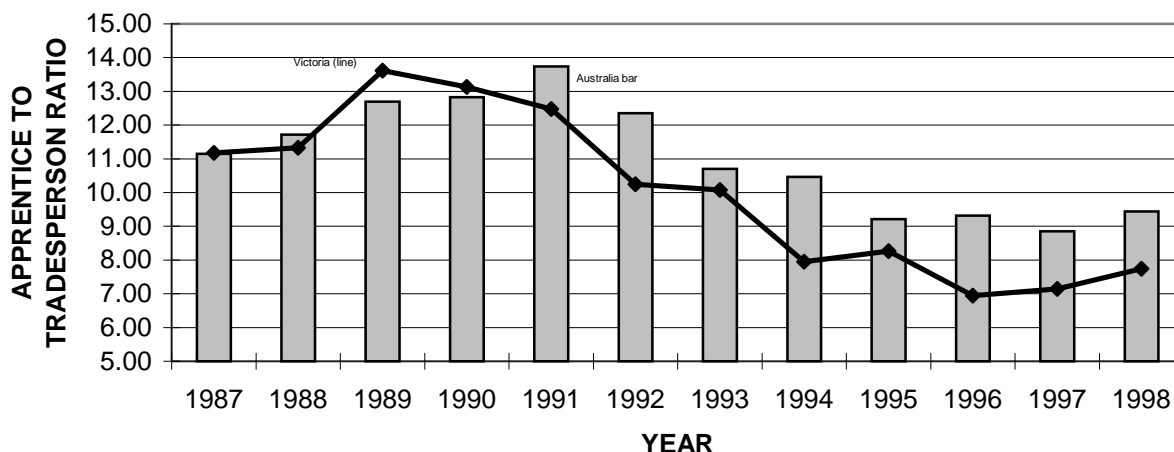
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## Appendix – Charts and tables

**Chart 1 Apprentices to tradespersons ratio, Victoria vs. Australia 30 June 1987 to 31 December 1998**



**Table 1 Changes in electrical apprentice numbers in Victoria, other states, and Australia, 30 June 1985 to 31 December 1998**

At 30 June of the year shown	Apprentices in training, Australia	Apprentices in training, Victoria	Apprentices in training, other States	Change in Victorian electrical apprentices in training	Change in other States' electrical apprentices in training
1984-85	18,300	4329	13,971	n.a.	n.a.
1985-86	18,000	4253	13,747	-76.00	-224.00
1986-87	17,900	4803	13,097	550.00	-650.00
1987-88	20,900	4966	15,934	163.00	2837.00
1988-89	21,900	5546	16,354	580.00	420.00
1989-90	23,300	5794	17,506	248.00	1152.00
1990-91	22,400	5163	17,237	-631.00	-269.00
1991-92	20,900	4293	16,607	-870.00	-630.00
1992-93	17,800	3540	14,260	-753.00	-2347.00
1993-94	16,500	3085	13,415	-455.00	-845.00
1994-95	15,900	3209	12,691	124.00	-724.00
1995-96	16,700	3013	13,687	-196.00	996.00
1996-97	16,800	3028	13,772	15.00	85.00
31 Dec 1998	17,030	3335	13,695	307.00	-77.00
<i>Change 1985-98</i>	<i>-1270</i>	<i>-994</i>	<i>-276</i>	<i>-994</i>	<i>-276</i>
<i>% contribution to change 1985-98</i>	<i>100.00</i>	<i>78.27</i>	<i>21.73</i>	<i>78.27</i>	<i>21.73</i>

**Table 2 Apprentices & trainees by employer type, Victoria, NSW & Australia 31 December 1998**

	NSW	Victoria	Australia	NSW % to total	Victoria % to total	Australia % to total
Private sector	40,810	50,850	175,720	78.88	86.64	80.22
Group training scheme (GTS)	5,910	7,430	28,760	11.42	12.66	13.13
<i>Total private &amp; GTS</i>	<i>46,720</i>	<i>58,280</i>	<i>204,480</i>	<i>90.30</i>	<i>99.30</i>	<i>93.35</i>
Government business enterprise	2,650	0	3,290	5.12	0.00	1.50
Local government	690	220	2,780	1.33	0.37	1.27
State government	910	50	6,790	1.76	0.09	3.10
Commonwealth government	660	140	1,580	1.28	0.24	0.72
<i>Total public sector</i>	<i>4,910</i>	<i>410</i>	<i>14,440</i>	<i>9.49</i>	<i>0.70</i>	<i>6.59</i>
n.e.c.	110	0	120	0.21	0.00	0.05
<b>TOTAL APPRENTICES &amp; TRAINEES</b>	<b>51,740</b>	<b>58,690</b>	<b>219,040</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

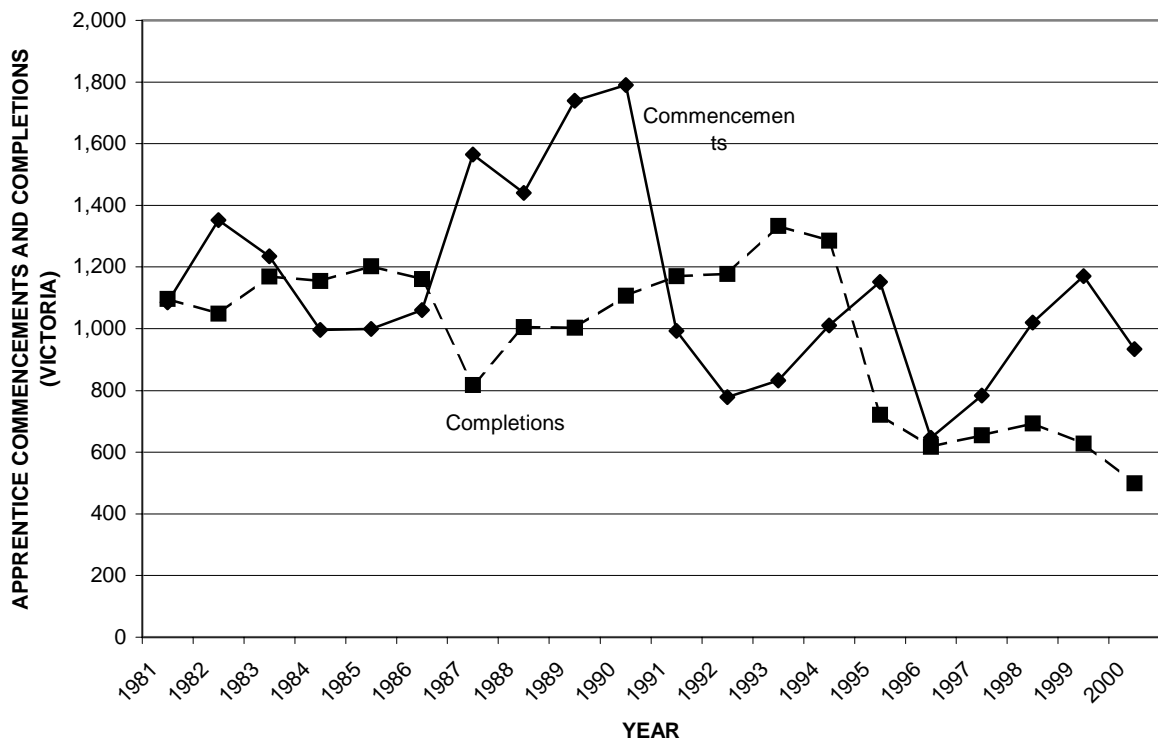
**Table 3 Key influences on Victorian electrical apprentice ratios and numbers, 1986-87 to 31 December 1998**

At 30 June of the year shown for apprentice data; May for tradesperson data	Victorian electrical apprentices to Australian electrical tradespeople (A <sub>v</sub> /T <sub>A</sub> ) %	Victorian electrical apprentices to Victorian electrical tradespeople (A <sub>v</sub> /T <sub>v</sub> ) %	Victorian electrical tradespeople to Australian electrical tradespeople (T <sub>v</sub> /T <sub>A</sub> ) %
1986-87	2.99	11.18	26.76
1987-88	2.78	11.33	24.56
1988-89	3.22	13.61	23.62
1989-90	3.19	13.13	24.30
1990-91	3.17	12.48	25.38
1991-92	2.54	10.25	24.76
1992-93	2.13	10.08	21.11
1993-94	1.96	7.95	24.61
1994-95	1.86	8.26	22.51
1995-96	1.68	6.94	24.22
1996-97	1.60	7.15	22.32
31 Dec 1998	1.85	7.74	23.88
<i>Average annual % change 1987-98*</i>	-6.48	-5.64	-0.89
<i>Approximate % contribution to change 1987-98**</i>	100.00	86.20	13.80

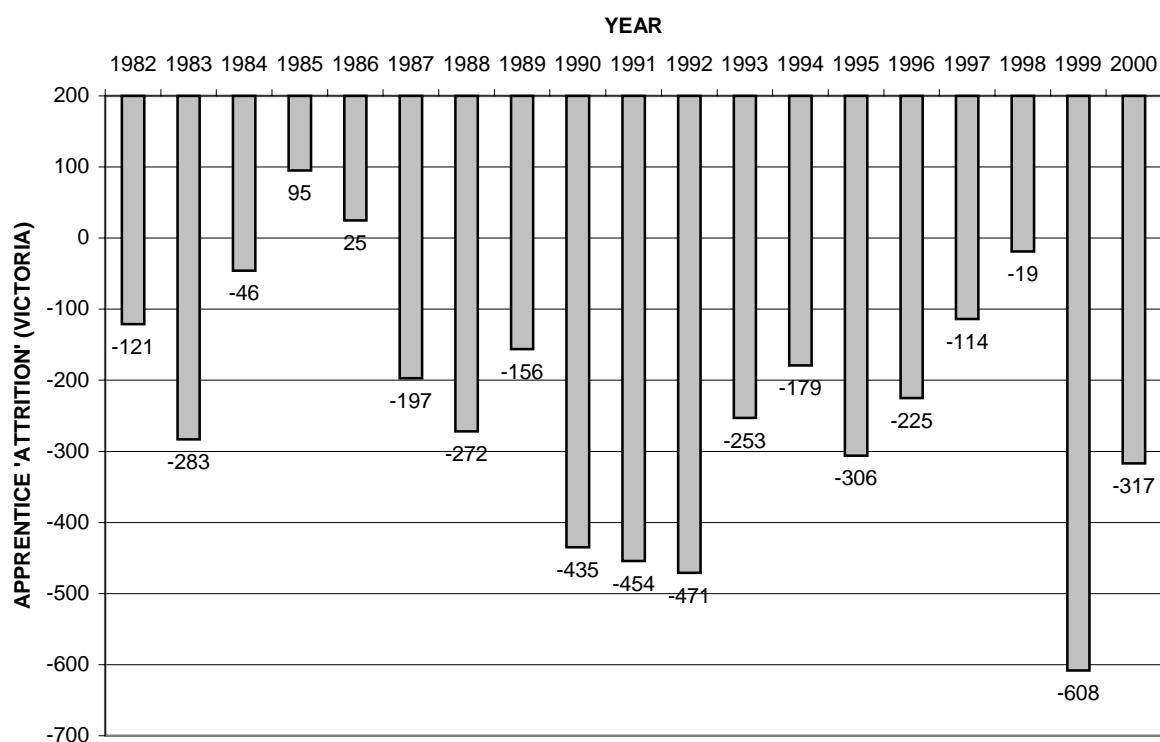
\* Exponential average annual percentage growth estimate across the years shown.

\*\* Presented as percentages of column 2, based on the approximately additive properties of exponential growth estimates.

**Chart 2 Electrical apprentice commencements & completions, Victoria 1980-81 to 28 February 2000**



**Chart 3 Electrical apprentice attrition, Victoria 1980-81 to 28 February 2000**



<sup>i</sup> School of Management and Workplace Studies Centre Victoria University of Technology, Melbourne Australia. The authors would like to thank Jenny Howes and Cheryl Wragg for their input and advice. They would also like to thank the Electrical Trades Union Victorian Branch and the National Electrical and Communications Association for their support.

<sup>ii</sup> (1) Australian Bureau of Statistics (ABS) for all aggregate occupational data for tradespeople, etc., according to the Australian Standard Classification of Occupations (ASCO) (Cat. no. 1220.0). (2) National Centre for Vocational Educational Research (NCVER) for all national apprenticeship data by ASCO code. (3) Victorian Office of Post Compulsory Education, Training and Employment (OPCETE) Apprenticeship Administration Branch for all Victorian apprenticeship data. (4) Department of Employment, Workplace Relations and Small Business (DEWRSB) Skills Analysis and Research Branch for additional data on skills shortages. It is difficult to patch together consistent state by state and national figures for apprentice and trainee numbers. Reasons include different definitions and collection categories used between states, changes in definitions and classifications of occupations (i.e. from the former Classification and Classified List of Occupations (CCLO) to ASCO in May 1986) and blurring between 'apprentice' and 'trainee' categories after 1997. Moreover not all of the published and other tables available are compatible. Note, too, that 'electrical' includes the broader trade grouping encompassing electricians, refrigeration and airconditioning mechanics, electrical distribution tradespersons (linespersons) and electronic instrument, electronic and office equipment, and communications tradespersons.