

Australian Government

Department of Transport and Regional Services Bureau of Transport and Regional Economics

information paper 51

FOCUS ON REGIONS NO. 2: EDUCATION, SKILLS AND QUALIFICATIONS

Bureau of Transport and Regional Economics

INFORMATION PAPER 51

FOCUS ON REGIONS NO. 2: EDUCATION, SKILLS AND QUALIFICATIONS

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ISSN 1440-9585 ISBN 1-877081-53-1

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Printed by the Department of Transport and Regional Services

FOREWORD

Skills and education are increasingly accepted as being central to employment opportunities, regional productivity and the resilience of communities. At the regional level, issues of salience include relative educational attainment levels, availability of skilled workers, and the retention and attraction of a range of skilled professionals.

This report analyses trends in educational attainment, occupational status and presence of selected professionals and skilled tradespeople, and also investigates the spatial distribution of skills and qualifications across Australia's regions in the period 1991 to 2001.

The report is the second release in the Bureau of Transport and Regional Economics (BTRE) *Focus on Regions* series. The series presents empirically based analysis of the spatial dimensions of regional development issues. A complementary *Education, Skills and Qualifications Database* with detailed supporting data is available at www.btre.gov.au

Kerry Laughton prepared this report under the guidance of Leanne Johnson. Dr Judith Winternitz provided executive supervision.

> Phil Potterton A/g Executive Director

Bureau of Transport and Regional Economics (BTRE) Canberra February 2004

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EXECUTIVE SUMMARY

This report presents and analyses a range of statistical information about skills, education and employment trends in Australia's regions over the period 1991 to 2001. The report identifies that Australia's qualification levels have risen in line with comparable OECD nations. In 1991, 31% of census respondents had skilled vocational or higher qualifications, while in 2001 the share was 43%. An upward trend in education levels was not mirrored in occupation shares. Although there was considerable change in occupational structures within industry sectors, at an aggregated national level relative occupation shares remained similar between 1991 and 2001.

Education levels grew strongly across all regions over the decade, whether they were experiencing income decline or high growth, and particularly strongly in non-agricultural regions and high growth agricultural regions. Some equalisation of results occurred for Major Cities and Inner Regional areas over the decade. This suggests that for more populated regions, skill and qualification outcomes are converging. However, skill and qualification outcomes diminish with remoteness and are significantly lower in Outer Regional, Remote and Very Remote areas of Australia.

As the Australian economy evolves and different sectors take on increasing prominence, the nature of the work involved affects requisite skill levels. In particular, the structures and trends of high–employing industries can play an important role in the aggregate demand for qualification levels at the regional level. Over the 1991 to 2001 decade, all industry sectors experienced growth in shares of university educated workers, and many individual sectors showed variation in their occupational structures. Industry sectors shifting towards more highly skilled occupations and offering fewer relatively unskilled jobs include Mining, Finance and Insurance, and Manufacturing. Meanwhile, Retail Trade and Accommodation, Cafes and Restaurants are two expanding sectors with increasing shares of relatively unskilled employment. However, the net effect of industry changes did not change the relative aggregate occupation shares in Australia, which were similarly distributed between 1991 and 2001.

The report indicates that teaching, health and computing professionals are increasing at or above national employment and population growth rates. However, the representation of each professional category differs across remoteness classes — teaching professionals are evenly distributed, while computer professionals are concentrated in Major Cities and Inner Regional areas. Between 1991 and 2001, only skilled tradespeople shares showed decline

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relative to the working age population across most States, Territories and remoteness classes.

Much regional science literature argues higher skill and qualification levels to be a central contributor to maintaining economic competitiveness, and a key to building an equitable and inclusive society. In such analyses, shortages of skills may result in sub–optimal growth in the business sector filtering through to the national economy. Unemployment and under-employment are the problematic outcomes of a population under–developed in the skills and knowledge necessary for effective participation in the labour market.

In practice, the links between education, labour quality and productivity are more complex. While many commentators link increasing knowledge levels in society in general with economic growth, other analyses suggest that economic and productivity rates of return on education expenditure begin to diminish beyond upper–secondary school. However, the *private* and *social* returns from higher education are unambiguous — individuals investing in university qualifications tend to be employed in higher paid, non–hazardous and secure occupations. Better–educated populations are associated with healthier people, heightened civic participation and volunteering, and lower crime rates.

This information paper provides further support to the proposition that there is a complex relationship between increasing levels of education, skills, qualifications and economic productivity and growth levels. Our analysis of income growth and education, skills and qualification levels for labour market regions found mixed results. Overall, regions with higher 1991 shares of university educated residents tended to experience higher income growth over the 1991 to 2001 decade. This pattern was especially clear for non-agricultural regions. However, the relationship between higher education and income growth does not persist indefinitely. Non-agricultural regions with the highest 1991 university-educated shares did not grow income as fast as other regions with lower 1991 shares. The analysis also revealed that regions with high 1991 shares of managers, administrators and professionals — highly skilled workers — showed no clear link with income growth, except in agricultural regions, where high 1991 shares of these workers were associated with income decline.

In conjunction with this information paper, BTRE has released an *Education*, *Skills and Qualifications Database* (http:\\www.btre.gov.au). The database contains a wealth of regional data on the distribution of education, skills and qualifications across regions and industries.

CHAPTER 1 INTRODUCTION

This report analyses the following aspects of education, skills and qualifications:

- growth and decline of educational attainment and occupation status at the national and regional level over the last ten years;
- the educational and occupational composition of industry sectors;
- distribution and growth of selected professionals and skilled tradepersons;
- links between skill and qualification levels and regional growth.

Background — The significance of education, skills and qualifications

Education is now seen to fulfil two instrumental functions in societies (White, 1987). First, it serves an integrative function — particularly in primary and secondary school — by transmitting cultural norms and values, including language and customs. Second, it serves an economic function by equipping the population with the necessary skills for the workforce. Education, skills and qualifications are increasingly considered to be central to regional productivity, employment opportunities, personal development and the resilience of communities. More specifically, the acquisition, production, distribution and use of knowledge are valued as a contributor to individual and social well–being and economic prosperity.

Changing labour market and social conditions in many western societies over the past century have contributed to higher educational attainment levels. Increasing affluence has fostered the possibility of prolonged schooling, while globalisation and economic transitions (in particular, the transition from goods–producing to service and information–based economies) have raised the requirement for labour quality and business innovation. The long–run growth and competitiveness of economies — be they regional or national — is argued to be increasingly dependent on the skills and knowledge utilised by its workforce.

As a general rule, the literature finds that higher skill levels and qualifications have broad private benefits including higher employability, increased earnings and higher quality jobs. Though economic and productivity returns to educational investment beyond upper–secondary level are somewhat contested, many argue that higher skill levels and qualifications are important in the context of increasing economic performance through improved labour quality. The so–called 'new learning economy', for example, is argued to rely on a workforce of lifelong learners who can respond positively to emerging economic conditions, and adapt to process and product innovations to improve productivity and performance (OECD, 2001b). Knowledge networks are also a growing theme in development literature — both broader than, but dependent on, individual skill and competency levels. The links between education, productivity and economic development are discussed more fully in Chapter 5 — suffice to say that while the actual evidence is complex, much of the regional science literature asserts developmental benefits for more highly qualified populations.

It is worth noting that all occupations are essential in the economy. Bank workers, child-care workers, train drivers, and garbage collectors are as necessary to a rounded and productive economy as neuro-surgeons, high level managers, teachers, IT specialists or dentists. Also, there is no necessary correlation between skill upgrading and the incidence of high skill employment. In both 1991 and 2001, the majority of jobs in the economy did not require high level skills. At the national level, the aggregate structure of labour demand remained proportionately similar over the decade of 1991 to 2001, though — as will be shown in section 3.3 — considerable change in occupational structure was evident within individual industry sectors.

Two economic models are of particular relevance in discussing the theoretical impacts of skills and qualifications. They are the screening model and the human capital model — a summary of these models is provided below.

Screening Model

The screening model of education assumes that the education system is a forum for sorting the most able individuals into the most difficult and betterrenumerated jobs. The output of the education system is a ranking of the innate abilities of individuals, and an education qualification provides a signal to future employers of individual capability. The model assumes that there is no necessary inherent social value in education, and thus does not predict income growth associated with increased average number of years in schooling.

Empirical literature on the screening model is limited and inconclusive. Critics of the screening model argue that a limitation of the theory is that students actually learn something in the process of education, and that education assessment tests the knowledge learnt rather than the student's innate ability (Quiggin, 1999).

Human Capital Model

Education, skills and qualifications form part of the broader economic concept of 'human capital', which refers to the value to the economy of increased educational investment in individuals. The Organisation for Economic Co–operation and Development (OECD) adopts a broader definition of human capital that incorporates the "knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (2001a). This definition can include a range of competencies and attributes including communication, numeracy, tacit knowledge¹, intra-personal attributes such as health, self-discipline and motivation, and inter-personal skills such as team-building and leadership. Not surprisingly, the multi-faceted nature of human capital complicates its measurement.

The human capital model of education contends that the function of schools is to provide students with information and skills that will enable them to be valuable to society in later life. Knowledge and skills are valued instrumentally, insofar as they contribute to increased productivity and (other things being equal) higher earnings. Social rates of return on investment in education take account of both private and social costs and benefits, including the costs of publicly funded education and the increased tax payments of more highly educated individuals.

Empirical studies have affirmed that incomes increase with the level of education and that the implied private and social rates of return to education are high. Nevertheless, studies have found that the return to tertiary education, relative to the base level of compulsory education, has fallen as average education levels have risen (Quiggin, 1999).

This report narrows the scope of investigation to education, skills and qualifications and their relationship to private, social and economic wellbeing.

Data categories

The primary categories used in this report are **educational attainment** and **occupational status**.

Educational attainment shows the number or percentage of people who have successfully completed various levels of formal education. Four educational attainment categories are used in this report as follows:

Educational category	Educational qualification
Ed–1	Bachelor degree or higher
Ed–2	Diploma or advanced diploma
Ed–3	Skilled vocational
Ed–4	Basic vocational and/or compulsory secondary education

 TABLE 1
 EDUCATIONAL ATTAINMENT CATEGORIES

Note The specific ABS Census categories for 1991 and 2001 are detailed in Appendix I.

Similarly, occupational status shows the number or percentage of people in certain skill-level occupation categories. Occupational status provides some

¹ Tacit knowledge refers to the embodied knowledge of the expert, who acts, makes judgements, and so forth without explicitly reflecting on the principles or rules involved. It is the knowledge gained other than through explicit instruction or declarative education.

measure of the labour market value of an individual's skills, with higher skilled individuals generally employed in higher income occupations. The occupational status categories used in this report are as follows:

Occupational category	Occupation
Occ–1	Managers, administrators and professionals
Occ-2	Associate professionals
Occ-3	Tradespersons, advanced clerical and service workers
Occ-4	Intermediate and elementary workers

TABLE 2 OCCUPATIONAL STATUS CATEGORIES

Note The specific ABS Census categories for 1991 and 2001 are detailed in Appendix I.

The report also explores the regional presence of certain skilled worker and professional categories, including teaching and health professionals. Such professions provide services to a broad population, and there are equity of access elements related to their local presence in regions.

BTRE is aware that specialists in education and occupation analysis may use finer levels of analysis than the four aggregated levels used here. For the purposes of this assignment, the four levels of aggregation used are considered to be suitably discriminating while also allowing analysis from the desired small–area regional perspective. Undertaking small–area analysis of education and occupation data at a more disaggregated level would be unmanageable in practice and could be misleading due to confidentialisation process effects. For more important methodology and data sources details, see Appendix I.

Convergence and Differentiation of education, skills and qualifications

According to neoclassical theory, there is a tendency for different units of analysis (ie. incomes, educational attainment levels, etc) to equalise across economies in the long run. The driving force behind convergence is the assumed diminishing returns to capital. Evidence of convergence would exist if, for example, education levels in non-metropolitan regions grew at a rate faster than the higher levels existing in metropolitan regions.

The extent of convergence (or divergence) is important because it gives us an indication of how groups of people, or regions are growing relative to each other, and what may be influencing the relative growth rates.

Education, skills and qualifications may not be evenly distributed across populations for a number of reasons. These may relate to the socio-economic background of individuals, opportunities, or location, as well as innate learning capacity.

Lower education levels and unemployment

The private benefits of education are well documented and include access to quality jobs, higher incomes and better health outcomes (OECD, 1998). Societies

with better–educated populations enjoy benefits such as heightened civic participation and volunteering, and lower crime rates. Conversely, labour force participants with minimal qualifications are more susceptible to social and labour market risks, such as unemployment and social exclusion (OECD, 2001b).

Table 3 presents an analysis of the educational composition of unemployed persons across Australia. It shows that only the basic vocational and compulsory secondary education category recorded a higher share of unemployed persons (69%) than the total national share of qualification holders at that level (for Ed–4: 57%). That is, people with minimal qualifications are over–represented in unemployment numbers.

TABLE 3	EDUCATIONAL COMPOSITION OF UNEMPLOYED PERSONS
	— AUSTRALIA, 1991 AND 2001

Year	ar Share of unemployed persons with qualification level				Share of with quali	population fication lev	n² rel	
	Ed–1	Ed–2	Ed–3	Ed–4	Ed–1	Ed–4	Ed–3	Ed–4
1991	5%	3%	13%	78%	10%	7%	14%	69%
2001	10%	6%	15%	69%	17%	8%	18%	57%

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

Table 3 also highlights some redistribution of unemployment across qualification categories between 1991 and 2001. Complementary correlation analysis reveals a link between region size and the unemployment of university educated people. This is discussed further in section 4.2 — suffice to say that unemployment occurs less frequently for highly qualified residents in less populated regions.

Indigenous Australians

One important example of a demographic group whose education, skills and qualification attainments are still diverging significantly from the rest of the Australian population are Indigenous Australians (SGRGSP, 2003). Although education outcomes are gradually improving for Indigenous Australians (DIMIA, 2002; Table 4 below), it is well–documented that the non-Indigenous norm of entry into primary school, progression through secondary school and workforce entry, either with or without tertiary education, is not the standard for many Indigenous Australians (DEST, 2002).

Barriers to educational attainment include disadvantage in other aspects of life (including health and socio-economic status), and unfamiliarity with an education system "that often shows little acknowledgement of Indigenous issues and knowledge and a course structure and pedagogy that may ignore Indigenous ways of learning" (DEST, 2002). Poor levels of attendance in early schooling have contributed to low levels of literacy and numeracy. On the OECD PISA 2000 literacy survey, Indigenous students scored an average of 448 on the literacy scale while non-Indigenous students scored 531. On the

² 'Population' refers to all census topic respondents.

mathematical scale, Indigenous students scored 449, compared with non-Indigenous scores of 529 (ABS, 2002).

Table 4 confirms that Indigenous Australians experience poor education and occupation outcomes relative to the total Australian working age population. The table also shows that education outcomes have improved markedly between 1991 and 2001.

TABLE 4INDIGENOUS AND TOTAL AUSTRALIAN EDUCATIONAL ATTAINMENT AND
OCCUPATION STATUS SHARES, 1991 AND 2001

Year	Share of Indigenous population with qualification/occupation level			Share of with o	^F Australian qualification	population a	aged 15+ Ievel	
	Ed–1	Ed–4	Occ–1	Occ–4	Ed–1	Ed–4	Occ–1	Occ–4
1991	1%	91%	13%	59%	10%	69%	26%	44%
2001	5%	78%	15%	63%	17%	57%	28%	44%

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

Note Total Australian population includes both Indigenous and non-Indigenous Australians.

It is worth reiterating that educational attainment and occupation status may not adequately recognise the 'unpaid' activities that certain demographic groups contribute, such as Indigenous people and women. For example, performance of social and cultural obligations within communities, household duties, and volunteer work are unrecognised in these definitions (ABS, 2000). Nevertheless, analysis of systemic under–attainment in mainstream skill and qualification measures is important to document both levels of exclusion and improvements in outcomes where they occur.

CHAPTER 2 INTERNATIONAL CONTEXT

Changing labour market and social conditions in comparable nations have led to a clear demand for more education. Upper–secondary and tertiary level qualifications, which were originally designed for a privileged minority, are increasingly considered necessary for a higher proportion of jobs. Lifelong learning is also argued to be a key determinant of long–run growth, particularly within service and information based economies (OECD, 1998).

Across OECD nations, there is a clear trend towards higher qualification levels. Younger adults today are more highly educated than predecessors. Figure 1 demonstrates that Australia's educational outcomes roughly align with comparable nations.





Source OECD 1998 Human Capital Investment: An International Comparison, OECD, France.

Figure 2 shows that Australia has slightly more tertiary educated people than the OECD average, but fewer upper secondary completions. Australia's educational expansion has occurred less evenly than in most OECD nations. That is, expansion has been concentrated at the university-level rather than more evenly across qualification levels. The OECD also notes that Australia has high levels of educational participation, and comparatively low levels of completion (Draca, Foster and Green, 2003).

There is also an international trend to increased rates of investment in education and skills–upgrading. While all OECD nations make initial education investments of broadly the same magnitude (around 6.3% of Gross Domestic Product), there are marked differences in spending on, and participation in post-compulsory education and training across the lifespan. In all countries, such education investment is concentrated among younger, economically active, better-educated people (OECD, 1998). Many groups who have greater need for training are in practice less likely to participate, increasing their vulnerability in the labour market. In particular, those who do not complete upper secondary education potentially face severe social and labour market risks, including under–employment and unemployment.

The OECD finds that social rates of return to education investment are highest for the upper secondary level, and begin to diminish at tertiary level as higher costs weigh against the effect of higher earnings. Private rates of return are higher at tertiary level and Australia, Canada and France enjoy the highest private returns (OECD, 1998). In these countries, the privately borne costs of education (including foregone earnings) are estimated to reap private gains (including higher post-tax earnings) between 15 and 25% higher than initial outlays.

CHAPTER 3 EDUCATION, SKILLS AND QUALIFICATIONS IN AUSTRALIA

3.1 HISTORIC TRENDS

Historically, upper secondary and tertiary education were reserved for elites. It was only in 1881 that Australian women — and not until the 1950s that Indigenous Australians — were admitted to university examinations (Kirner & Rayner, 1999). Over the 20th century, the network of schools and post–secondary education institutions expanded as greater affluence fostered the possibility of prolonged education.

The lack of reliable historic data makes it difficult to chart long–term growth trends in educational attainment. However, an examination of attainment levels at different age cohorts serves to illustrate change over time. Table 5 demonstrates the national trend for younger adults to be more highly educated than older adults, though nationally there is marginal difference between the 25–39 and 40–55 age cohorts.

Age cohort	Ed–1	Ed–2	Ed–3	Ed–4	Total	Proportion of workforce
56 – 81 years	13.0%	9.0%	21.5%	56.5%	100.0%	9.9%
40 – 55 years	20.3%	9.4%	18.8%	51.5%	100.0%	36.1%
25 – 39 years	21.7%	8.3%	18.1%	51.9%	100.0%	35.4%

TABLE 5PROPORTION OF AGE COHORT WITH EDUCATIONAL ATTAINMENT LEVEL3— AUSTRALIA, 2001

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

Several labour market conditions have contributed to increased demand for education since the 1970s (Gregory, 1995). These include a fall in the effective cost of an additional year of education, and the increase in part-time employment opportunities that has allowed students to earn income while studying and therefore reduced the opportunity cost of further education. Increases in government education subsidies have also provided incentives for education participation.

³ See Appendix I for methodology details and definitions.

3.2 EDUCATION, SKILLS AND QUALIFICATIONS IN AUSTRALIA, 1991 TO 2001

Nationally, education levels have been rising between 1991 and 2001, with the fastest growing categories being at the university and skilled vocational levels. Growth trends in occupation status in large part reflect national growth in employment — though with some decline in trades and advanced clerical and service workers. Each of the classes of selected professionals (except Building Engineers) grew more rapidly between 1991 and 2001 than the working age population, while there was a relative decline for skilled trade workers.

While a clear upward trend in educational attainment is apparent, the same aggregate pattern is not evident in the proportional distribution of employment across occupations. While some internal change is evident — notably an increase in Associate Professionals and decline in Tradespersons, Advanced Clerical and Service Workers — aggregate proportions were relatively similar between 1991 and 2001. This aligns with findings that, overall, educational expansion has not altered individuals' position on the occupational ladder (Draca, Forster & Green, 2003).

	Numboro	Proportions ⁴	Crowth Potos
	2001	2001	1991–2001
Educational Attainment			
Ed–1: Bachelor or Higher Degree	1 818 407	17.4%	94.7%
Ed–2: Diploma or Advanced Diploma	846 676	8.1%	31.6%
Ed-3: Certificate III or IV	1 836 297	17.5%	44.3%
Ed-4: Certificate I or II, and/or completed year 10 or above	5 968 780	57.0%	-4.7%
Occupational Status			
Occ-1: Managers, Administrators and Professionals	2 204 838	27.8%	25.1%
Occ-2: Associate Professionals	949 540	12.0%	74.4%
Occ–3: Tradespersons, Advanced Clerical and Service	1 297 838	16.4%	-12.2%
Workers			
Occ–4: Intermediate and Elementary Workers	3 483 306	43.9%	16.6%
Skilled Workers and Professionals			
Skilled Tradespeople⁵	661 837	4.7%	-0.7%
Teaching Professionals ⁶	305 010	2.2%	16.9%
Health Professionals ⁷	277 873	2.0%	26.5%
Computing Professionals	120 905	0.9%	111.3%
Building Engineering Professionals	84 458	0.6%	10.4%
Total employed	7 935 522	-	17.2%

TABLE 6EDUCATIONAL ATTAINMENT AND OCCUPATION STATUS, NUMBERS,
PROPORTIONS AND GROWTH RATES — AUSTRALIA

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

14 119 314

14.2%

Population aged 15+

⁴ Education proportions relative to total Census topic respondents. Occupation proportions relative to total employed persons. Professional proportions relative to working age population.

⁵ The skilled tradesperson category includes tradespersons of Mechanical Engineering, Fabrication Engineering, Automotive, Electrical and Electronics, Structural Construction, and Food and Plumbers.

⁶ Teaching Professionals incorporates School Teachers and University and Vocational Education Teachers.

⁷ Health Professionals incorporates Medical Practitioners, and Nursing and Miscellaneous Health Professionals.

Educational attainment

Table 6 shows that, in 2001, 43% of Census respondents⁸ held skilled vocational or higher qualifications. This compares with 31% in 1991 and 35% in 1996, and demonstrates an increase in the educational attainment of the working age population. Between 1991 and 2001, educational expansion has been concentrated at the Ed–1 level. However, some deceleration of growth between census periods was evident. The category grew by 47% between 1991 and 1996, and slowed a little to 33% between 1996 and 2001. In contrast, the skilled vocational category (Ed–3) demonstrated accelerated growth, from 10% between 1991 and 1996 to 31% in the 1996 to 2001 period.

For the majority of respondents, the highest qualification level remained compulsory schooling or basic vocational (Ed–4). However, this was the only category to record a negative growth rate, further affirming that qualification levels are increasing.

Occupation Status and Professionals

Most occupational categories showed positive growth between 1991 and 2001, generally reflecting national employment growth of 17%. Between 1991 and 2001, minimal change occurred in the proportions of workers at the highest and lowest occupation status levels. The Occ–1 category marginally grew its share of employment from 26% in 1991 to 28% in 2001. The Occ–4 category maintained its share of 44% of employed persons across the three census periods. The Occ–4 category employs more workers than any other occupation category.

The most significant change in occupational status shares was growth in Occ2: Associate Professionals, although Associate Professionals make up only a small share of employed persons. There was a decrease in the Occ–3: Tradespersons, Advanced Clerical and Service Workers category from 22% of employment in 1991 to 16% in 2001. The Occ–3 employment decline is known to coincide with both cyclic decline and skills shortages in some trades occupations (DEWR, 1999). This point is reinforced by the decrease of Skilled Tradespeople from 5.4% of the working age population in 1991, to 4.7% in 2001. Trades are discussed further in Section 4.3.

All Professional categories recorded some growth between 1991 and 2001, generally matching or exceeding growth in the working age population (the exception was Building Engineers). In 2001, there were more health and computing professionals relative to working age population than in 1991. Computing professionals experienced the greatest growth, nearly doubling its employment share over the period.

⁸ For each Census, around 75% of Census respondents provided complete answers to the education questions. The remainder were either 'non-respondents' or the question was not applicable to them. This includes people who left school at age 14 or younger, did not go to school, are still at school, or did not state age left school.

3.3 INDUSTRY EFFECTS ON EDUCATION AND SKILL LEVELS

As the Australian economy evolves and different sectors take on increasing prominence, the nature of the work involved affects requisite skill levels. In particular, the structures and trends of high–employing industries can play an important role in the aggregate demand for qualification levels at the regional level.

Between 1991 and 2001 all industries experienced growth in the proportion of workers with a bachelor degree or higher educational qualification. There are signs that the educational compositions of industries are equalising. In 2001, all industries with a below average proportion of highly educated workers were closer to the national average than they were in 1991. Six industries were above the 1991 national average of 10% (Education, Health and Community Services, Property and Business Services, Government Administration and Defence, Finance and Insurance, and Cultural and Recreational Services), compared with nine industries above the 2001 national average of 13% — the sectoral additions being Electricity, Gas and Water Supply, Mining and Communication Services. The industries demonstrating the fastest growth in Ed–1 were Mining (1991: 9%, 2001: 17%), Communication Services (1991: 7%, 2001: 16%) and Transport and Storage (1991: 4%, 2001: 8%).

Nationally, occupational shares at the Occ–1 and Occ–4 levels were relatively stable between 1991 and 2001. Growth rates for the upper and lower occupations tended to mirror national employment growth. The main variance occurred at the Occ–2 associate professional and Occ–3 skilled vocational levels, largely due to cyclic fluctuations in the trades industry. Thus, overall, increased education has not manifested in a fundamental change to the structure of labour demand — in large part due to the greater numbers of people at higher occupation levels relative to numbers of university qualified people (see Table 6). Nevertheless, between 1991 and 2001, particular industries did demonstrate changing occupational structures.

Tables 7 and 8, and Figures 2 and 3 demonstrate the education and occupation structures of Australia's industries, as well as sectoral changes between 1991 and 2001 (see pages 14 and 15). The tables and figures show that, while all industry sectors increased their employment shares of university educated workers, more variation appeared in occupation level growth rates.

Analysis of the education and occupation composition of industry sectors reveals that:

- The majority of jobs in the economy are at middle to lower occupation levels. Only 4 of the 17 industry sectors employ over 40% of their workforce as managers, administrators and professionals.
- Industry sectors consistently recording high proportions of workers in Occ-4 occupations are Transport and Storage (70% in 2001), Retail Trade (64%), and Accommodation, Cafes and Restaurants (62%). The latter two sectors both increased their share of national employment between 1991 and 2001, and in 2001 Retail Trade was Australia's largest industry sector (in terms of employment).
- Industry sectors shifting towards higher occupation levels and offering fewer relatively unskilled jobs include Mining, Finance and Insurance, Manufacturing, and Government Administration and Defence. All these sectors decreased their national employment shares, primarily at the expense of Occ–3 and Occ–4 workers.
- The industry sector with the highest proportion of highly qualified workers, not surprisingly, is Education. Health and Community Services (Health), Property and Business Services (Property), and Government Administration and Defence also employ high shares of university qualified workers. Over the 1991 to 2001 period, the Education, Health and Property sectors all expanded their share of national employment. The Health and Property sectors grew their base of highly qualified staff well above the national average of 95%, at 128% and 136% respectively.
- The major employing industries for skilled vocational workers are Construction (57% of its 2001 workforce), Manufacturing, Electricity, Gas and Water Supply, and Mining (all between 22–28% of their workforce). Over the decade, only Construction increased its share of national employment and registered a positive growth rate in both Occ–3 and Ed–3 categories. The remaining industries decreased their shares of national employment over the 1991 to 2001 period. The occupation levels in decline in these industries are primarily Occ–3 and Occ–4 workers.
- Wholesale Trade and Agriculture, Forestry and Fishing were the only industry sectors recording both slower than average Ed–1 growth and lower than average Ed–1 proportions.
- Major employers of workers with minimal qualifications (Ed–4) are Accommodation, Cafes and Restaurants (58% of its 2001 workforce), Retail Trade (57%), Finance and Insurance (57%) and Wholesale Trade (54%). Both Finance and Insurance and Wholesale Trade registered negative growth in the Ed–4 category between 1991 and 2001.

The Educational Composition of Industry Sectors

Figure 2 demonstrates the education levels held by workers in industries in 2001, while Table 7 shows national sectoral growth rates in educational levels between 1991 and 2001.



FIGURE 2 EDUCATION LEVELS WITHIN INDUSTRY SECTORS — AUSTRALIA, 2001

Note The Australian average includes unemployed people and people outside the labour force whose work status precludes them from inclusion in industry employment figures.

TABLE 7	NATIONAL GROWTH RATES OF EDUCATION LEVELS WITHIN INDUSTRY
	SECTORS — AUSTRALIA, 1991 TO 2001

Industry	1991 to 2001 Growth Rate (%)					v share of ployment
	Ed 1	Ed 2	Ed 3	Ed 4	1001	<i>70)</i> 2001
Agriculture Ecreatry and Eiching	20-1	15 5	Eu-3	10 /	1991	2001
Agriculture, Forestry and Fishing	00.0 40 E	15.5	04.Z	-10.4	4.0	4.0
Mining	40.5	4.5	-15.1	-39.5	1.3	0.8
Manufacturing	94.2	73.3	28.0	-14.9	14.4	12.7
Electricity, Gas and Water Supply	41.4	-19.6	-32.7	-54.6	1.5	0.7
Construction	102.4	94.8	41.8	3.7	6.3	6.9
Wholesale Trade	57.8	46.3	14.5	-16.0	6.4	5.4
Retail Trade	120.1	111.0	35.3	13.9	14.2	15.1
Accommodation, Cafes and Restaurants	112.6	132.1	97.3	18.1	4.2	5.0
Transport and Storage	135.6	87.7	29.7	-13.4	4.9	4.4
Communication Services	170.2	97.5	12.6	5.0	1.8	1.8
Finance and Insurance	100.2	92.6	58.6	-28.9	4.8	3.9
Property and Business Services	136.5	132.1	94.7	30.6	7.8	11.3
Government Administration and Defence	47.3	18.7	-9.0	-33.2	6.4	4.5
Education	53.9	-19.1	77.1	0.3	7.0	7.4
Health and Community Services	128.2	-27.6	216.2	3.4	8.8	9.9
Cultural and Recreational Services	155.8	107.5	111.5	24.0	1.9	2.5
Personal and Other Services	101.6	133.8	46.0	-5.6	3.5	3.7
All industries	94.7	31.6	44.3	-4.7	100.0	100.0

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

The Occupational Composition of Industry Sectors

Figure 3 demonstrates the occupational structure of industries nationally for 2001. Table 8 shows national sectoral growth rates of occupations between 1991 and 2001.



FIGURE 3 OCCUPATION LEVELS WITHIN INDUSTRY SECTORS — AUSTRALIA, 2001

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

TABLE 8	NATIONAL GROWTH RATES OF OCCUPATIONAL LEVELS BY INDUSTRY
	SECTOR — AUSTRALIA, 1991 TO 2001

Industry	Industry total em	v share of ployment				
					()	%)
	Occ–1	Occ–2	Occ–3	Occ–4	1991	2001
Agriculture, Forestry and Fishing	-12.0	134.6	5.0	17.8	4.8	4.0
Mining	4.4	25.7	-41.0	-29.5	1.3	0.8
Manufacturing	21.4	74.5	-10.8	0.3	14.4	12.7
Electricity, Gas and Water Supply	-3.1	-20.2	-51.5	-51.6	1.5	0.7
Construction	19.1	119.2	18.9	32.9	6.3	6.9
Wholesale Trade	11.2	78.2	-42.9	3.9	6.4	5.4
Retail Trade	4.3	119.0	-12.6	27.2	14.2	15.1
Accommodation, Cafes and Restaurants	-2.7	164.8	-39.0	38.9	4.2	5.0
Transport and Storage	3.9	205.4	-33.6	6.3	4.9	4.4
Communication Services	95.6	-9.3	-32.9	33.5	1.8	1.8
Finance and Insurance	11.2	48.4	-30.9	-17.6	4.8	3.9
Property and Business Services	93.9	128.3	5.6	63.0	7.8	11.3
Government Administration and Defence	-2.3	15.2	-46.4	-24.4	6.4	4.5
Education	23.9	85.6	-11.4	19.9	7.0	7.4
Health and Community Services	40.0	19.6	-33.8	40.1	8.8	9.9
Cultural and Recreational Services	37.2	120.8	21.0	61.5	1.9	2.5
Personal and Other Services	13.0	21.6	12.4	41.5	3.5	3.7
All industries	25.1	74.4	-12.2	16.6	100.0	100.0

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

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Across all industry sectors, high correlation exists between corresponding education and occupation levels.⁹ A negative correlation also exists between high education levels and lower occupation levels, and visa versa. That is, highly educated workers are unlikely to hold lower level occupations, and workers with minimum qualifications are unlikely to hold higher level occupations. This relationship seems intuitive and supports the human capital theory that incomes and responsibilities rise with the level of education.

The only anomaly to these correlations is the Agriculture, Forestry and Fishing sector. For this industry, this is some positive correlation between high occupation status and lower educational attainment. Sixty percent of workers in the industry are in the highest occupational category, but only 6% hold a bachelor or higher degree. This finding suggests that, in this industry sector, the education entry level to higher level occupations is much lower than in other industry sectors, and thus that higher occupation levels have not been professionalised.

⁹ The only exception is the Ed–2: Diploma and Advanced Diploma category. For this category, there is positive correlation between Ed–2 attainment and Occ–1 status.

CHAPTER 4 EDUCATION, SKILLS AND QUALIFICATIONS IN THE REGIONS

4.1 STATES AND TERRITORIES

The Australian Capital Territory, Victoria and New South Wales have above average proportions of residents with the highest qualification and occupation levels. Tasmania and Queensland record the lowest proportions of highly qualified residents. Queensland, the Northern Territory and Tasmania had the lowest levels of workers in high status occupations. South Australia has a similar education structure to Queensland, but an occupation structure balanced slightly more towards higher professions. Western Australia and the Northern Territory register the highest proportions of skilled vocational workers.

State	Educational attainment Proportion of Census Topic Respondents (%)					Occupati ortion of En (%	on Status 1ployed Per %)	sons
	Ed–1	Ed–2	Ed–3	Ed–4	Occ–1	Occ–2	Occ-3	Occ–4
NSW	18.4	8.5	17.9	55.1	29.0	11.8	16.4	42.7
VIC	19.6	8.5	17.0	55.0	29.2	11.5	16.2	43.1
QLD	14.2	7.2	17.9	60.7	24.7	12.2	16.6	46.6
SA	14.3	7.2	17.8	60.7	26.7	11.7	15.8	45.7
WA	15.4	8.1	17.6	58.9	26.1	12.6	17.3	44.0
TAS	13.7	7.0	18.0	61.2	25.9	11.8	15.6	46.7
NT	16.2	7.9	19.0	56.9	25.1	14.2	16.7	43.9
ACT	30.6	8.8	11.8	48.8	37.9	14.5	11.5	36.0
Australia	17.4	8.1	17.5	57.0	27.8	12.0	16.4	43.9

 TABLE 9
 EDUCATION AND OCCUPATION LEVELS — STATES AND TERRITORIES, 2001

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

Queensland, Western Australia and New South Wales recorded education growth rates above the national average, while South Australia, Victoria, the Australian Capital Territory and Queensland recorded above average growth in the Occ–1 category. Analysis of Ed–1 shares over the decade reveals that Queensland, Tasmania and the Northern Territory were closer to the national average in 2001 than they were in 1991. However, for South Australia and Western Australia, despite growth in the category, shares of Ed–1 showed greater divergence from the national average in 2001 than 1991.

State		t		Occupati Growth	on Status Rate (%)			
	Ed–1	Ed–2	Ed–3	Ed–4	Occ–1	Occ–2	Occ–3	Occ–4
NSW	95.0	34.7	38.8	-12.1	21.0	90.6	-20.8	7.0
VIC	89.0	31.9	41.0	-8.7	26.5	73.0	-15.8	12.7
QLD	125.5	39.2	59.2	12.9	26.1	52.1	-4.7	25.7
SA	79.1	10.0	40.6	-5.8	33.7	96.2	-0.6	28.7
WA	97.7	32.1	49.3	6.7	7.7	52.5	-19.8	7.4
TAS	70.9	4.4	40.4	-16.1	4.5	58.7	-23.8	5.0
NT	86.9	25.0	45.9	-10.6	22.6	66.0	-14.0	15.6
ACT	63.0	39.1	49.2	-7.3	26.1	81.9	-0.9	25.6
Australia	94.7	31.6	44.3	-4.7	25.1	74.4	-12.2	16.6

TABLE 10	EDUCATION AND OCCUPATION LEVEL GROWTH RATES
	- STATES AND TERRITORIES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

An examination of the distribution of skilled workers and professionals across States and Territories again reveals the decline of skilled trade workers across most States. Only Western Australia, Queensland and the Northern Territory demonstrated growth in skilled tradespeople.

State	Skilled Tradespeople	Teaching Professionals	Health Professionals	Computing Professionals	Building Engineering Professionals
NSW	-6.2%	17.6%	21.1%	114.2%	4.7%
VIC	-1.8%	8.3%	28.4%	109.9%	8.3%
QLD	11.1%	34.6%	43.9%	174.9%	30.4%
SA	-9.4%	4.2%	16.2%	83.7%	-5.5%
WA	12.9%	27.1%	28.5%	104.9%	31.2%
TAS	-14.5%	7.2%	6.8%	77.4%	-21.1%
NT	2.7%	10.3%	27.0%	55.5%	6.4%
ACT	-9.1%	8.2%	22.4%	68.8%	-9.5%
Australia	-0.7%	16.9%	26.5%	111.3%	10.4%

TABLE 11 PROFESSIONALS GROWTH RATES — STATES AND TERRITORIES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

All States and Territories increased their numbers of teaching, health and computing professionals, with the standout performers being Queensland and Western Australia. The results for Building Engineers are mixed, though Queensland and Western Australia also perform strongly on this measure.

4.2 ABS REMOTENESS CLASSES

The ABS Remoteness Structure divides Australia into five broad spatial groupings sharing common characteristics in terms of physical distance from services and opportunities for social interaction. The groupings are Major Cities

of Australia; Inner Regional Australia; Outer Regional Australia; Remote Australia; and Very Remote Australia.¹⁰

Table 12 demonstrates that the proportion of people with higher qualifications and skill levels tended to decline with increasing remoteness, although there has been a rise in qualification levels across all groups between 1991 and 2001.

Remoteness Class	Educational attainment Proportion of Census Topic Respondents (%)				Educational attainment Growth Rate (%)			
	Ed–1	Ed–2	Ed–3	Ed–4	Ed–1	Ed–2	Ed–3	Ed–4
Major Cities	19.9	8.6	16.3	55.3	95.3	40.3	39.7	-4.2
Inner Regional	12.2	7.4	20.7	59.7	98.1	18.7	58.4	-1.6
Outer Regional	10.6	6.6	20.1	62.7	84.8	4.4	49.4	-9.6
Remote	10.3	6.1	19.6	63.9	78.1	-6.6	33.9	-15.7
Very Remote	9.9	5.8	17.6	66.8	53.5	-14.9	20.6	-28.5
Australia	17.4	8.1	17.5	57.0	94.7	31.6	44.3	-4.7

TABLE 12 EDUCATIONAL ATTAINMENT — ABS REMOTENESS CLASSES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Major Cities recorded the highest shares of university educated residents. Inner Regional recorded the fastest Ed–1 growth rates and was the only class to record a faster Ed–1 growth rate than Major Cities. This indicates that the Inner Regional and Major Cities groupings have been converging in education attainment over the period of 1991 to 2001. Set against this convergence, the educational attainment patterns of the other remaining remoteness classes grew more slowly and started from a relatively lower point in 1991 in terms of Ed–1 attainment shares. One contributing factor may be the importance of the Agriculture, Forestry and Fishing industry sector in remoter areas (BTRE, 2004). The educational composition of this sector tends towards lower education levels.

Over the decade, Ed–1 shares tended to equalise for regions *within* remoteness classes. For example, Inner Regional areas with a lower proportion of highly qualified residents in 1991 experienced faster growth than Inner Regional areas with a higher 1991 base. Educational attainment patterns within some remoteness classes showed expansion of an already above average base, while in others there was a decline compounding a lower than average 1991 base. Table 13 depicts the range of outcomes for Bachelor or Higher degree holders within State/Territory remoteness classes.

¹⁰ For further information on the ABS Remoteness Structure see Australian Standard Geographical Classification (Cat. No.1210) 2001.

Remoteness Class	Expanding Ed–1 (ie. high shares, fast growth)	Converging Ed–1 (ie. low shares, fast growth or high shares, slow growth)	Declining Ed–1 (ie. low shares, slow growth)
Major Cities		NSW, VIC, QLD, WA, ACT	SA
Inner Regional		NSW, VIC, QLD, SA, WA, TAS, ACT	
Outer Regional	QLD, WA, NT	VIC	NSW, SA, TAS
Remote	WA, NT	VIC, SA	NSW, QLD, TAS
Very Remote		NSW, QLD, SA, WA, NT, TAS	

TABLE 13GROWTH RATES OF ED-1: BACHELOR OR HIGHER DEGREE HOLDERS— WITHIN ABS STATE/TERRITORY REMOTENESS CLASSES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Table 14 demonstrates the range of outcomes for shares and growth of occupation levels. The table highlights that professional opportunities have expanded in Major Cities and Inner Regional areas.

Remoteness Class	Occupation Status Proportion of Total Employed Persons (%)				Occupation Status Growth Rate (%)			
	Occ–1	Occ-2	Occ-3	Occ-4	Occ–1	Occ–2	Occ-3	Occ–4
Major Cities	28.6	12.2	16.0	43.2	31.9	76.4	-14.6	16.1
Inner Regional	24.8	11.8	17.8	45.6	15.8	73.9	-3.3	23.6
Outer Regional	28.2	11.0	16.1	44.6	1.8	67.3	-6.7	13.3
Remote	31.1	10.7	16.0	42.3	-0.5	53.3	-13.9	1.4
Very Remote	24.9	10.3	13.3	51.4	-4.9	11.0	-29.0	10.4
Australia	27.8	12.0	16.4	43.9	25.1	74.4	-12.2	16.6

TABLE 14 OCCUPATION LEVELS — ABS REMOTENESS CLASSES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Again, there is some evidence of equalisation of Occ–1 outcomes *within* most remoteness classes. South Australian Major Cities and Tasmanian Outer Regional and Remote are the only classes recording lower than average Occ–1 shares in 1991, and slower than average Occ–1 growth between 1991 and 2001. The classes demonstrating expansion (high 1991 shares, faster than average growth) are New South Wales and Victorian Major Cities, Western Australian Outer Regional and Remote, and Northern Territory Very Remote.

While Occ–1 growth declined with remoteness, it is worth noting that the Remote class contains the highest proportions of managers, administrators and professionals (Occ–1) in both 1991 and 2001. These rates are likely to reflect the high rates of farm managers in Outer Regional and Remote areas (BTRE, 2004). Table 15 demonstrates that shares and growth of the 'Selected Professionals' (which does not include farm managers) were overall generally lower in the three more remote classes.

Remoteness Class	Selected Professionals Proportion of Working Age Population (%)					Selected Growtl	Professionals h Rate (%)	
-	Health	Teaching	Computing	Building Engineers	Health	Teaching	Computing	Buildina Engineers
Major Cities	2.1	2.1	1.2	0.7	26.5	17.4	111.7	12.0
Inner Regional	1.9	2.3	0.3	0.4	28.9	19.2	122.8	8.6
Outer Regional	1.6	2.1	0.1	0.3	23.0	11.4	82.1	0.8
Remote	1.3	2.3	0.1	0.4	17.6	9.8	20.1	-17.5
Very Remote	0.9	2.0	0.1	0.3	6.3	0.9	25.9	-8.9
Australia	2.0	2.2	0.9	0.6	26.5	16.9	111.3	10.4

TABLE 15	SELECTED PROFESSIONALS SHARES AND GROWTH RATES
	— ABS REMOTENESS CLASSES, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

The proportions of teaching professionals were roughly equivalent across all remoteness classes. Only Inner Regional recorded a higher than average share of teaching professionals in both 1991 and 2001, while Remote areas also recorded an above average proportion of teaching professionals in 2001, despite an apparently low growth rate. Shares of health professionals tended to decline by degree of remoteness. Computing professionals were highly concentrated in Major Cities. Of the other remoteness classes, only Inner Regional registered an increase in computing professional shares relative to working age population, from 0.1% in 1991 to 0.3% in 2001. Table 15 also demonstrates that Inner Regional recorded the highest growth rate across all Selected Professionals, with the only exception being Building Engineers.

Educational composition of the unemployed by ABS Remoteness Classes

Earlier, in Chapter 1, it was established that people with minimal qualifications were over-represented in unemployment numbers in both 1991 and 2001. Table 16 below analyses the educational composition of the unemployed by remoteness class, and confirms this link across all remoteness classes.

Remoteness Class	Proport	ion of unemployed pe	rsons with qualificatio	on level	
	Ed–1	Ed–2	Ed–3	Ed–4	
Major Cities	12.6%	6.7%	13.9%	66.8%	
Inner Regional	5.2%	4.5%	17.8%	72.5%	
Outer Regional	4.1%	3.6%	17.5%	74.7%	
Remote	3.3%	3.4%	16.8%	76.5%	
Verv Remote	2.9%	3.2%	15.0%	78.9%	

TABLE 16EDUCATIONAL COMPOSITION OF UNEMPLOYED PERSONS
— ABS REMOTENESS CLASSES, 2001

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

The table also shows that unemployment occurs less frequently for highly qualified residents, and more frequently for minimally qualified residents in less populated regions. This suggests that demand for skills is strong in less populated regions, while an over-supply of skills is occuring in highly populated regions. Figure 4 confirms a correlation between region size and unemployment rates for highly qualified residents.



FIGURE 4 UNEMPLOYMENT RATES FOR BACHELOR OR HIGHER DEGREE HOLDERS — ABS STATE/TERRITORY REMOTENESS CLASSES, 2001

Indigenous Australian education outcomes by ABS Remoteness Class

Educational outcomes decline with increasing remoteness for both Indigenous and non–Indigenous Australians. However, Table 17 shows a more extreme decline for Indigenous Australians.

TABLE 17	INDIGENOUS AND TOTAL AUSTRALIAN EDUCATIONAL ATTAINMENT AND
	OCCUPATION STATUS SHARES — ABS REMOTENESS CLASSES, 2001

Remoteness Class	Indigenc	ous (%)			Populatio	on Aged 15-	+ (%)	
	Ed–1	Ed–4	Occ–1	Occ-4	Ed–1	Ed–4	Occ–1	Occ–4
Major Cities	8.1	71.8	18.6	55.5	19.9	55.3	28.6	43.2
Inner Regional	5.0	75.2	15.4	60.7	12.2	59.7	24.8	45.6
Outer Regional	3.3	80.9	15.2	63.8	10.6	62.7	28.2	44.6
Remote	3.1	83.3	14.1	65.3	10.3	63.9	31.1	42.3
Very Remote	1.6	89.8	10.0	78.8	9.9	66.8	24.9	51.4

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

Indigenous students tend to leave school once they reach the age when attendance is no longer compulsory, and the table confirms that minimal qualifications are particularly prevalent in remoter areas. The table also demonstrates that Indigenous Australians are under–represented in higher occupational categories across all remoteness classes, and particularly in more remote areas.

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

In summary

Overall, the remoteness structure analysis indicates rising levels of educational attainment across all classes, though to a lesser extent for more remote areas. The highest proportion of university educated residents are in the Major Cities groups, while Inner Regional areas recorded the highest Ed–1 growth rates. Over the decade, Inner Regional showed evidence of 'catching up' with the better–educated Major Cities populations. By contrast, Outer Regional, Remote and Very Remote areas, while still experiencing growth in their Ed–1 shares, grew at slower rates than Inner Regional and Major Cities.

The majority of remoteness classes showed some evidence of equalising results *within* their remoteness category for both education and occupation outcomes. In particular, regions within the Major Cities, Inner Regional and Very Remote classes demonstrated a tendency to equalise outcomes over 1991 to 2001.

All classes grew their shares in each of the Selected Professionals categories with the exception of Building Engineers, which declined in Remote and Very Remote classes. The incidence of health professionals declined with remoteness, whereas teaching professionals were fairly evenly distributed across categories. Building Engineers were most prevalent in Major Cities, and otherwise fairly evenly distributed across classes. The greatest divergence across classes occurred for computing professionals: shares of these professionals in Major Cities were at least four times higher than in other remoteness classes. Very Remote areas registered the lowest shares of all selected professionals.

Minimum qualified people were over-represented in unemployment numbers across all remoteness categories. For highly qualified workers, unemployment was more prevalent in more populated regions. Educational attainment outcomes for Indigenous Australians were significantly lower in more remote areas.

4.3 BTRE LABOUR MARKET REGIONS

Discussions of education, skills and qualifications are often concerned with the availability of skills and knowledge to regional economies. Education and occupation data by BTRE labour market region provides a reasonable guide to the labour quality readily available to be utilised within a region's economy. BTRE labour market regions are a geographical classification constructed for the *Focus on Regions* Information Paper series. BTRE has grouped the full ABS set of approximately 1350 Statistical Local Areas (SLAs) into 425 such regions, based on commuting patterns revealed by the 2001 census.¹¹ In concept, labour market regions reflect the area within which people are willing to commute from their place of residence to their place of employment. For each labour market region, the majority of employed residents work in the same region in which they live. Maps of BTRE labour market regions are included in Appendix II. The *Education, Skills and Qualifications Database* provides further details of the labour market region classification and methodology.

¹¹ Offshore and migratory SLAs, and SLAs with zero employed persons were excluded prior to defining the regions.

EDUCATIONAL ATTAINMENT

Figure 5 below shows those labour market regions with a denser population and higher numbers of employed persons are likely to have higher proportions of tertiary qualified residents. This is not an unexpected result, given that the Major Cities and Inner Regional remoteness classes recorded the greatest proportions of highly qualified residents.

Correspondingly, the figure also shows that it is generally inland and remote regions that have low proportions of highly educated residents. It terms of States, Queensland, South Australia and Tasmania demonstrate the lowest proportions of university educated residents. However, Figure 5 also demonstrates that it is not only the east-coast and capitals that register high proportions of tertiary qualified residents. The more remote areas demonstrating above average proportions of highly qualified residents tend to have relatively high employment of workers in the Education, Health and Community Services and Mining industry sectors. The educational composition of these sectors, which tends towards higher shares of university educated workers, raises the region's relative shares of highly qualified people.

FIGURE 5 PROPORTION OF RESIDENTS WITH BACHELOR OR HIGHER DEGREE — BTRE LABOUR MARKET REGIONS, 2001



SourceDerived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons
enumerated at home).NoteRelative to total Census topic respondents.

Education Levels within Industry Sectors — Non-Capital Labour Market Regions

Capital cities demonstrate significantly higher proportions of highly qualified and skilled workers, relative to non-capital regions. To better understand sectoral variation across *non-capital* labour market regions, Table 18 presents higher qualification ranges within industries for the non-capital labour market regions. Also presented are the top five non-capital regions recording the highest shares of Ed–1 workers within the associated industry.

Industry	Propo Ed–1 v	rtion of workers	Most highly qualified non-capital regions
	Тор	Bottom	
Agriculture, Forestry and Fishing	13.3%	4.0%	Tammin WA, Murrindindi – East VIC, Byron NSW, Holbrook NSW, Coffs Harbour & surrounds NSW
Mining	24.5%	0.0%	Bendigo & surrounds VIC, Townsville & surrounds QLD, North Grampians – Stawell VIC, Yilgarn WA
Manufacturing	19.4%	0.0%	Denmark WA, Nhulunbuy NT, Augusta-Margaret River WA, York WA, Byron NSW
Electricity, Gas and Water Supply	34.2%	2.3%	Cooma-Monaro NSW, Horsham VIC, Shepparton VIC, Warrnambool & surrounds VIC, Bathurst & surrounds NSW
Construction	13.9%	0.0%	Barcaldine QLD, Cloncurry QLD, Narrogin & surrounds WA, Emerald QLD, Benalla & surrounds VIC
Wholesale Trade	8.2%	0.0%	Augusta-Margaret River WA, Goondiwindi & surrounds QLD, Wollongong & surrounds NSW, Byron NSW, Armidale & surrounds NSW
Retail Trade	9.4%	0.0%	Colac-Otway – South VIC, Magnetic Island QLD, Denmark WA, Byron NSW, Augusta-Margaret River WA
Accommodation, Cafes and Restaurants	11.5%	0.0%	Denmark WA, Byron NSW, Colac-Otway – South VIC, Alpine – East VIC, South Gippsland – East VIC
Transport and Storage	12.0%	0.0%	Augusta-Margaret River WA, Alpine – East VIC, Byron NSW, Whitsunday QLD, Kangaroo Island SA
Communication Services	8.9%	0.0%	Wollongong & surrounds NSW, Armidale & surrounds NSW, Geelong & surrounds VIC, Ballarat & surrounds VIC, Bendigo & surrounds VIC
Finance and Insurance	17.8%	3.1%	Wingecarribee NSW, Wollongong & surrounds NSW, Geelong & surrounds VIC, Bendigo & surrounds VIC, Byron NSW
Property and Business Services	32.7%	0.0%	Armidale & surrounds NSW, Hamilton & surrounds VIC, Byron NSW, Ballarat & surrounds VIC, Alice Springs NT
Government Administration and Defence	33.4%	0.0%	Byron NSW, Nhulunbuy NT, Castlemaine & surrounds VIC, Baw Baw - Pt B West VIC, Bellingen NSW
Education	62.8%	29.2%	Hindmarsh VIC, Bass Coast – Phillip Island VIC, Castlemaine & surrounds VIC, Wakool NSW, Alpine – East VIC
Health and Community Services	42.0%	7.7%	Snowy River NSW, Byron NSW, Augusta-Margaret River WA, Alice Springs NT, Douglas QLD
Cultural and Recreational Services	28.6%	2.9%	Bellingen NSW, Armidale & surrounds NSW, Byron NSW, Castlemaine & surrounds NSW, Snowy River NSW
Personal and Other Services	17.2%	0.0%	Armidale & surrounds NSW, Alpine – East VIC, Snowy River NSW, Alice Springs NT, Narrabri NSW

TABLE 18	INDUSTRY PROPORTIONS OF WORKERS WITH BACHELOR OR HIGHER
	DEGREE — NON-CAPITAL BTRE LABOUR MARKET REGIONS ¹² , 2001

Source Derived by BTRE using unpublished data from ABS 2001 Census of Population and Housing (persons enumerated at home).

¹² Regions with industry-specific employment of less than 100 were not included in this table due to confidentialisation effects. The table and underlying analysis reveal that many regions lack workers with higher formal qualifications across a range of local industries. However, some non-capital regions are clearly demonstrating high levels of highly educated workers across a variety of local industries. Some of these regions have been described as 'seachange' towns and have attracted an increasing population of former city–dwellers drawn by the "affordability, simplicity and lifestyle advantages" of provincial coastal town living (Salt, 2001; Woolcott, 2003). Byron NSW, Augusta-Margaret River WA and Wollongong and surrounds NSW are examples of such regions demonstrating high levels of knowledge-based economic activity.

PROFESSIONALS

Attraction and retention of skilled people and professionals in Australia's rural and regional areas is often identified as a major issue (RBDA Panel, 2003). Skill shortages in certain professions can significantly affect standards of living — in particular, health and quality of life — and limit the capacity for regions to capitalise on their comparative advantages and socio-economic opportunities (OECD, 2001a).

Between 1991 and 2001, cities of over 100 000 residents registered the highest proportion of selected professionals¹³ as well as the highest growth rates. Table 19 provides information on shares of Selected Professionals relative to the working age population across all labour market regions. It shows a trend nation-wide to a higher proportion of selected professionals within the working age population.

Proportion of Selected Professionals ¹³	No. of Reg	ions	Examples (2001)
	1991	2001	
0 – 2%	29	25	Etheridge QLD, Unincorporated Pirie SA, Shark Bay WA, West Arnhem NT, Jervis Bay Territory
2-4%	269	237	Broken Hill & surrounds NSW, Strathbogie VIC, Burke QLD, Coober Pedy SA, Busselton WA, Dorset TAS
4 – 6%	118	153	Parkes NSW, Shepparton VIC, Mount Isa QLD, Flinders Ranges SA, Bunbury & surrounds WA, Tennant Creek NT
6% or more	7	10	Armidale & surrounds NSW, Canberra & surrounds ACT, Alice Springs, Coomalie NT, Nhulunbuy NT

TABLE 19FREQUENCY OF SELECTED PROFESSIONALS IN BTRE LABOUR MARKET
REGIONS, 1991 AND 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Note Proportions are relative to working age population. Two regions were not calculable in 1991 due to zero populations.

¹³ Select professionals = Building and Engineering Professionals, Computing Professionals, Medical Practitioners, Nursing Professionals, Miscellaneous Health Professionals, School Teachers, University and Vocational Education Teachers. The distribution of teaching professionals in particular is worthy of closer consideration, as it provides some measure of the level of teaching resources available to regions and their capacity to build labour quality locally. This analysis does not take into account electronic delivery of education services, but notes increasing provision of distance education and online learning facilities.

The proportion of teachers to the working age population increased marginally between 1991 and 2001 from 2.1% to 2.2%. Over this period the headcount of teaching professionals grew by 17%, or 44 085 persons. This growth is above national population growth of 14%. Figure 6 demonstrates the spatial distribution of this growth.

FIGURE 6 TEACHING PROFESSIONALS GROWTH RATE — BTRE LABOUR MARKET REGIONS, 1991 TO 2001



Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

High growth in numbers of teaching professionals is evident around the coastline, major cities and inner regional town centres. Many sparsely populated and remoter areas are also represented amongst higher growth regions. However, some regions in South Australia and Tasmania demonstrate negative growth in teaching professionals.

Trade occupations are noted for being subject to cyclic employment swings. The cyclical nature of much of trade employment contributes to fluctuations in apprenticeship intakes and to people leaving trades work. This in turn flows through to skill shortages when the labour market strengthens (DEWR, 1999). There are also occupational disadvantages that contribute to early departure

from trade employment, including the physical demand of work, exposure to chemicals, and uncongenial working hours (DEWR, 1999).

The distribution of skilled tradespeople is noteworthy. Despite decline in trades employment over the past decade, shortages of some trades occupations have persisted for many years (DEWR, 1999). Table 20 shows the regional implications of decline of skilled tradespeople over the period 1991 to 2001. It shows a significant general decline and that fewer regions were able to maintain shares of skilled tradespeople above 6% of the working age population.

Proportion of Skilled Tradespeople	No. of Reg	ions	Examples (2001)
	1991	2001	_
0-2%	24	28	Central Darling NSW, Aurukun QLD, Ngaanyatjarraku WA, Tanami NT, West Arnhem NT
2-4%	128	159	Barraba NSW, West Wimmera VIC, Inglewood QLD, Kangaroo Island SA, Northampton WA, Elsey Balance NT
4 – 6%	192	186	Berrigan/Jerilderie NSW, Benalla & surrounds VIC, Winton QLD, Adelaide & surrounds SA, Broome WA, Flinders TAS
6 – 8%	45	27	Cobar NSW, Emerald QLD, Mount Gambier & surrounds SA, Augusta-Margaret River WA, King Island TAS
8% or more	34	25	Bulloo QLD, East Pilbara SA, Mount Magnet WA, Katherine NT

TABLE 20FREQUENCY OF SKILLED TRADESPEOPLE IN BTRE LABOUR MARKET
REGIONS, 1991 AND 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

Figure 7 demonstrates the distribution of growth (and decline) in skilled tradespeople across labour market regions. Sparsely populated (less than 2 000 working age population) and inland regions recorded the lowest levels of growth in skilled tradespersons. Northern Territory and Western Australian regions also experienced notable decline, despite overall State–Territory growth in the trades professions.



FIGURE 7 SKILLED TRADESPERSONS GROWTH RATE — BTRE LABOUR MARKET REGIONS, 1991 TO 2001

Source Derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home).

In summary

Labour market regions with higher numbers of employed persons were likely to have higher shares of tertiary qualified residents. However, some sparsely populated regions also have high shares of tertiary qualified residents. These regions tend to have relatively high employment in the Education, Health and Community Services or Mining industries. 'Seachange' towns with lifestyle advantages can also tend to register high shares of university educated residents. Otherwise, remote and inland regions tend to have relatively low shares of highly educated residents.

Growth in professionals and skilled workers differed considerably across States and Territories. While teaching professionals were evenly distributed across remoteness classes, some variation in growth patterns across States and labour market regions was evident. In particular, the east and west coastline, major cities and inner regional town centres tended to experience high growth, while South Australia and Tasmania tended to demonstrate decline in teaching professionals.

Other general trends across regions included a slight drift towards selected professionals making up a higher proportion of the working age population, and a contraction of skilled tradespeople. Many remoter regions have experienced trade decline, while higher growth rates in trades were dispersed towards inner regional and coastal areas.

CHAPTER 5 EDUCATION, SKILLS AND QUALIFICATIONS AND REGIONAL ECONOMIC PERFORMANCE

The role of education, skills and qualifications in regional economic performance is complex though recent research suggests a favourable impact (OECD, 2001a, b and c). Much of the complexity stems from data constraints and the difficulties of adequately measuring the wider social and economic benefits of education, skills and qualifications, and real rates of return to individuals, organisations and societies.

On the positive side, Quiggin's (1999) analysis of international economic performance found education to be a significant contributor to economic growth, particularly in explaining the strong long-term growth in East Asian nations. His review also reinforced the non-monetary benefits of education, which have included better health knowledge and health status, transmission of cultural values and reduced criminal behaviour.

The OECD conducted a study on the growth effects of education, skills and qualifications across 21 OECD nations between 1971 and 1998 (2001c). The study found positive and significant effects of skills accumulation on output per capita growth. The estimated long-run effect on output of one additional average year of schooling was found to be around 6%. Another OECD review of the education and skills investment literature found slightly higher social rates of return to upper secondary compared to tertiary education, and higher private rates of return to tertiary education (2001a). A third OECD study found correlation between three levels of educational attainment (primary, secondary and tertiary) and the number of patent applications in regions (2001b). The study found only a few deviations from the general rule that higher education levels were linked to higher numbers of patent applications. The study concluded that tertiary education provided a basis for organisational learning and innovation, which could increase regional prosperity.

Closer to home, a recent Reserve Bank of Australia study found conflicting evidence for the correlation between regional education and skills and employment growth (Lawson and Dwyer, 2002). Results from a binomial logit model found no correlation, although a complementary regression suggested that higher proportions of skilled people in the local population were associated with higher employment growth rates. The study also found that regions with low education and skills had stronger rates of out-migration, and posited that this was a reflection of skilled workers being more likely to leave less–educated regions because of diminished employment opportunities. No correlation was found between in-migration and education and skill levels. A recent Queensland Office of Economic and Statistical Research (2003) study used a cross-sectional approach to analyse the relationship between education, skills and qualifications and economic performance for five Australian States (New South Wales, Victoria, Queensland, South Australia and Western Australia). The study found that differences in education, skills and qualifications could explain between 10 and 20% of the variation in gross state product per capita for Victoria, Queensland and South Australia. The report points out that high skill qualifications and jobs are important but do not need to dominate the labour force to achieve economic performance.

This Information Paper provides some data to test the relationship in terms of correlation between education and occupation levels and growth in total taxable income.

Relationship between growth of total taxable income and education, skills and qualifications

The following analysis examines the relationship between education and occupation levels and economic growth in regions. Total real taxable income between 1990–1991 and 1999–2000 is used as a proxy for Gross Regional Product growth.¹⁴ The taxable income data period and the census data periods do not perfectly coincide, but nevertheless provide a useful approximation.

Table 21 provides data for *all* BTRE labour market regions, which are classified into quintiles according to growth in income. These quintiles are labelled: declining, minimal change, modest growth, solid growth and high growth. The table also presents quintile findings for 'agricultural' and 'non-agricultural' labour market regions. The majority of the BTRE labour market regions have a strong agricultural component. This analysis separately examines regions with more than 10% of employed persons in the Agriculture, Forestry and Fishing industry.¹⁵ Thus, the following analysis is based on taxable income data for 419 labour market regions¹⁶, as well as 329 regions with a strong agricultural component, and the remaining 90 regions considered 'non-agricultural'.

¹⁴ It is noted that taxable income is not an output–based proxy. Further discussion of this data source including its limitations is included in *Focus on Regions No.3: Taxable Income* (forthcoming).

¹⁵ The national average for Agriculture, Forestry and Fishing is 4.8% of total employment.

¹⁶ Taxable income data was not available for all 425 BTRE labour market regions.

	AII BTRF La	our Market	Regions			Agricultural F	TRF Labour	Market Redi	suo		lon-agricult	ural BTRF La	abour Marke	t Regions	
QUINTILE Description of change in total regional income, 1900-01 м. 1000-2000	1 Declining	Ainimal	3 Modest	t Solid growth H	ligh growth	Declining N	inimal Mc	dest Sol	5 id growth Hi	1 gh growth D	eclining A	Vinimal N	4 1odest S	5 olid growth Hi	gh growth
Summary measure for each quintile		2				0	0				,	2			
Change in total income, 1990-91 to 1999-2000	-15%	3%	16%	27%	43%	-15%	2%	13%	24%	44%	-20%	14%	26%	39%	52%
Change in employed persons, 1991 to 2001	-14%	-2%	%9	16%	24%	-10%	-3%	3%	11%	23%	-20%	5%	16%	19%	36%
Total number of employed persons, 1991	181 141	220 870	987 044	2 013 895	3 367 420	74 752	144 254	199 920	268 863	260 047	62 636	696 713	1 853 370	2 347 164	862 651
Average real taxable income per taxpayer, 1990-91	\$34 033	\$28 815	\$31 008	\$32 529	\$33 446	\$31 074	\$28 812	\$27 756	\$27 398	\$27 878	\$35 444	\$31 583	\$33 348	\$34 795	\$30 904
Average shares in 1991															
Bachelor or Higher degree	4.0%	3.9%	6.1%	7.7%	8.3%	3.7%	3.8%	4.4%	4.1%	4.1%	4.0%	6.6%	8.2%	9.2%	6.7%
Diploma or Advanced Diploma	4.4%	4.8%	5.3%	5.1%	5.3%	4.6%	4.8%	4.9%	4.7%	4.8%	3.9%	5.3%	5.2%	5.4%	5.2%
Skilled Vocational	11.7%	9.6%	10.5%	9.9%	10.5%	9.2%	9.6%	8.8%	9.4%	9.7%	12.4%	10.5%	10.2%	10.4%	10.9%
Basic Vocational and Compulsory Secondary Education	52.4%	52.3%	52.0%	49.1%	51.0%	54.5%	52.0%	52.2%	51.7%	51.0%	52.6%	51.5%	49.0%	51.0%	51.1%
Managers, Administrators and Professionals	14.1%	17.0%	13.8%	14.1%	14.3%	20.2%	18.4%	18.0%	16.6%	15.0%	10.3%	13.1%	13.6%	14.7%	12.6%
Associate Professionals	4.1%	3.8%	4.3%	4.3%	4.6%	3.8%	3.7%	3.9%	3.7%	3.9%	4.0%	4.5%	4.3%	4.6%	4.7%
Tradespersons, Advanced Clerical and Service Workers	12.1%	10.0%	11.4%	11.9%	12.3%	9.9%	10.0%	9.6%	10.2%	10.3%	12.7%	11.8%	12.2%	12.5%	12.2%
Intermediate and Elementary Workers	26.1%	22.5%	24.0%	24.0%	24.3%	24.5%	22.2%	22.1%	23.2%	23.7%	27.5%	24.7%	24.1%	24.1%	25.1%
Teaching Professionals	2.1%	2.2%	2.1%	2.2%	2.0%	2.1%	2.1%	2.3%	2.2%	2.0%	2.0%	2.1%	2.2%	2.0%	2.0%
Health Professionals	1.2%	1.4%	1.9%	1.8%	1.8%	1.0%	1.4%	1.4%	1.4%	1.4%	1.4%	2.1%	1.8%	1.9%	1.8%
Computing Professionals	0.1%	0.0%	0.3%	0.5%	0.5%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.3%	0.5%	0.7%	0.3%
Building Engineering Professionals	0.6%	0.3%	0.5%	0.6%	0.7%	0.4%	0.3%	0.2%	0.2%	0.2%	0.7%	0.6%	0.7%	0.7%	0.6%
Skilled Tradespeople	6.8%	5.1%	5.4%	5.4%	5.3%	5.0%	5.0%	4.7%	5.0%	5.1%	7.4%	5.5%	5.6%	5.3%	5.4%
Growth rates between 1991 and 2001															
Bachelor or Higher degree	43%	59%	78%	91%	103%	20%	57%	63%	%06	118%	28%	76%	91%	94%	130%
Basic Vocational and Compulsory Secondary Education	-26%	-21%	-11%	-8%	1%	-25%	-21%	-18%	-10%	3%	-29%	-9%	-9%	-5%	17%
Managers, Administrators and Professionals	-10%	%9-	10%	25%	34%	-10%	-8%	-4%	3%	13%	-17%	11%	28%	33%	45%
Intermediate and Elementary Workers	-13%	1%	8%	16%	22%	-9%	%0	8%	16%	28%	-20%	6%	14%	17%	35%

BTRE Taxable Income Database (as at August 2003). Education and occupation estimates derived by BTRE using unpublished data from ABS 1991 and 2001 Census of Population and Housing (persons enumerated at home). Source

Note All shares are relative to working age population.

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The main findings from the quintile analysis of *all* BTRE labour market regions include a demonstrated link between higher shares of tertiary qualified residents and high income growth in regions. Of the same vein, income decline and minimal change were associated with relatively low 1991 shares of bachelor or higher degree holders for all regions, whether agricultural or non-agricultural. High 1991 shares of intermediate and elementary workers were associated with income decline in both agricultural and non-agricultural regions.

Overall, no clear pattern was apparent for managers, administrators and professionals, though high shares of these employees were associated with minimal income change. However, in agricultural regions, the managers, administrators and professionals category accounted for a relatively high share of 1991 employment in declining regions, and a considerably lower share of 1991 employment in high growth regions, suggesting a negative relationship between higher proportions of highly skilled occupations and income growth. Occ–1 results were not so linear for non–agricultural regions, and little association was evident between Occ–1 levels and income growth.

Analysis of selected professionals, over all regions, showed no clear connection between the presence of the selected professionals and income growth. However, two general patterns emerge: regions with higher 1991 shares of tradespeople were associated with income decline, while regions with lower 1991 shares of computing professionals were associated with income decline or minimal change.

Multivariate regression analysis was also undertaken to analyse income growth against educational attainment, occupation status and the presence of professionals. The regression controlled for the size of the regional economy, average income and ANZSIC division employment shares in 1991. The finding of most significance was the positive income growth relationship with the presence of Building Engineers. This is clearly a leading indicator in that the presence of Building Engineers is likely to be a consequence of development initiatives in a region. The only other regression analysis finding, of lesser significance, was a positive relationship between income growth and growth in Occ–1 employment. This is reflected in Table 21, particularly for non-agricultural regions, and is also verified by a complementary correlation analysis.

The correlation analysis tested relationships between real income and skill and qualification levels for the 425 labour market regions. It confirmed a positive income growth relationship with high growth rates of Occ–1, Ed–2 and Ed–1 categories (in order of significance). Growth rates of Occ–4 and Ed–4 were also positively correlated with income growth. However, regions with relatively high 1991 shares of bachelor/diploma holders and/or professionals and skilled trade workers tended to experience slower income growth.

Summary

The quintile, multivariate regression and correlation analyses reveal complex links between education, skills and qualifications and income growth. The main finding is that, overall, regions with higher 1991 shares of university-educated residents tended to experience higher income growth. However, the most highly educated quintiles were non–agricultural, modest and solid growth quintiles. Though the growth in university educated residents in these quintiles was high, it was slower than skills growth in the high growth quintile. This suggests that the relationship between higher education levels and income growth does not persist indefinitely. While highly skilled workers and occupations are important, they do not need to dominate the labour force for income growth to occur.

CHAPTER 6 EDUCATION, SKILLS AND QUALIFICATIONS DATABASE

The database is available in Microsoft Excel 1997 format from the BTRE website (www.btre.gov.au). It contains the regional statistics underlying this information paper, and has been developed by BTRE from ABS *Census of Population and Housing* data for 1991, 1996 and 2001. Two separate datasets are included: one based on the BTRE labour market region classification and another for SLAs (as defined in 2001). The following information is included in the database for each labour market region/SLA:

- Total persons aged 15+ (1991, 1996, 2001);
- Educational attainment numbers over four categories plus the 'Other' category (1991, 1996, 2001);
- Occupation status shares over four categories (1991, 1996, 2001);
- Teaching, Health, Computing, and Building Engineering Professionals and Skilled Trades shares (1991, 2001);
- Change in education numbers (1991 to 1996, 1996 to 2001, 1991 to 2001);
- Change in occupation numbers (1991 to 1996, 1996 to 2001, 1991 to 2001);
- Change in professionals and skilled trades numbers (1991 to 2001)
- Education structure of industries (numbers) (1991, 1996, 2001)
- Occupation structure of industries (shares) (1991, 1996, 2001)
- Change in education numbers by industry (1991, 1996, 2001)
- Change in occupation numbers by industry (1991, 1996, 2001); and
- Metadata (descriptions of data items and methods, including details of the BTRE labour market region classification).

The SLA-level information in the database can be used to analyse the education, skills and qualifications in user-defined regions. The following case study of the Esperance labour market region illustrates how the database can be used to profile a region's education, skills and qualifications. Through linkage with other regional information sources (including the BTRE's *Industry Structure* and forthcoming *Taxable Income* databases), a richer understanding can be gained of relationships between education and skills and regional wellbeing.

CASE STUDY: ESPERANCE, WESTERN AUSTRALIA

With an estimated resident population of 13 319 (ABS, 2001) and a distance of 725 kilometres from the nearest major city of Perth, Esperance is classified as

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Remote Australia under the ABS Remoteness Structure. Esperance's colonial development began in the 1840s as a sailor's settlement. The region's expansion as a port town servicing the nearby goldfields was effectively extinguished with the arrival of the Perth to Kalgoorlie railway in 1896. It was not until 1949 that the agricultural potential of the region was discovered and a new economic era of wheat, sheep and cattle production began. Over recent decades, Esperance's economy has diversified to include tourism and education, while maintaining a strong agricultural industry and re-established port facility for commodity imports and exports. In 2001, the top three industries in Esperance were Agriculture, Education, and Personal and Household Good Retailing (BTRE Industry Structure Database, 2004).

Between 1991 and 2001, the working age population in Esperance grew by 25% or 1 736 people. Over the same period, total employment grew by 26% or 1 053 people. In comparison to national and Western Australian averages, Esperance demonstrates lower shares of education, skills and qualifications. In 2001, 9.4% of Esperance residents stated they held a bachelor or higher qualification, compared with 15.4% for WA and 17.4% nationally. However, the 9.4% share compares favourably with a 5.2% share in 1991. Esperance was only a couple of percentage points below State and national averages for skilled vocational attainment, and 10 percentage points higher for minimal qualifications. Despite lower shares, Esperance recorded higher growth rates of higher qualified and skilled vocational attainment, as demonstrated in Tables 22 and 23.

TABLE 22EDUCATION AND OCCUPATION GROWTH RATES
— ESPERANCE AND COMPARATIVE AREAS, 1991 AND 2001

	Higl	hest Educat Growth	tional attain Rate (%)	ment	Occupation Status Growth Rate (%)			
	Ed–1	Ed–2	Ed–3	Ed–4	Occ–1	Occ–2	Occ–3	Occ–4
Esperance	121	20	64	9	13	91	3	37
Total WA	98	32	49	7	26	82	-1	26
Australia	95	32	44	-5	25	74	-12	17

Source BTRE Education, Skills and Qualifications Database, 2004.

			- ANEAO, 1991 P	0 2001	
	Skilled Tradespeople	Teaching Professionals	Health Professionals	Computing Professionals	Building Engineering Professionals
Esperance	31%	42%	67%	—	43%
Total WA	13%	27%	29%	105%	31%
Australia	-1%	17%	26%	111%	10%

TABLE 23PROFESSIONALS GROWTH RATES— ESPERANCE AND COMPARATIVE AREAS, 1991 TO 2001

Source BTRE Education, Skills and Qualifications Database, 2004.

Esperance has outperformed Western Australian and national averages on skilled tradespeople and professional growth rates, with the exception of computing professionals (of which there were none in 1991 and 4 in 2001).

Nevertheless, the share of managers, administrators and professionals declined from 33% in 1991 to 30% in 2001. Table 24 demonstrates education and industry structure changes in the region that have contributed to growing skills and qualification levels in the region.

Industry	Total industry growth 1991–2001	1991 Ed–1 Numbers	2001 Ed–1 Numbers	1991 Ed–1 Proportions	2001 Ed–1 Proportions
Agriculture, Forestry and Fishing	-11%	25	59	2%	5%
Property and Business Services	79%	31	52	18%	16%
Government Administration and Defence	29%	23	40	15%	24%
Education	39%	81	181	29%	46%
Health and Community Services	94%	29	89	14%	22%

TABLE 24GROWTH RATES OF DEGREE HOLDERS FOR SELECTED INDUSTRIES— ESPERANCE, 1991 TO 2001

Source BTRE Education, Skills and Qualifications Database, 2004.

The findings show the varied nature of links between education, skills and qualifications and industry growth. While the Agriculture industry declined, the proportion and number of Ed–1 respondents rose. Employment in the Property and Business sector grew in Esperance by 79%, which saw an increase in Ed–1 numbers, but a decrease in the proportion of industry workers holding such qualifications. The most significant Ed–1 growth factors in Esperance are connected to an expansion of teaching and health services in the region over the decade.

CHAPTER 7 CONCLUSION

Australia's educational attainment outcomes align with comparable OECD nations. We have slightly more tertiary education completions, and slightly fewer upper secondary completions than other comparable OECD members. Education levels rose across all Australian remoteness classes between 1991 and 2001, though educational attainment tends to decline with remoteness. A trend exists across Australia and OECD nations for younger adults to be more highly educated than older adults, though the current margin between the 25–39 and 40–55 year old cohorts is minimal. This is a pronounced trend raising the average level of attainment: in 1991, 31% of census respondents had skilled vocational or higher qualifications, while in 2001 the share was 43%. Nevertheless, the majority of 2001 census respondents still identified compulsory schooling or basic vocational education as their highest level of educational attainment.

Inner Regional areas appear to be 'catching up' with the high education and skill outcomes in Major Cities. However, skill and qualification levels and growth rates decline with remoteness and are significantly lower in Outer Regional, Remote and Very Remote areas of Australia. Results decline with remoteness most markedly for Indigenous Australians. In 2001, labour force participants with minimum qualifications were at greater risk of unemployment, and this risk increased with remoteness. Conversely for university educated residents, unemployment declined with remoteness. This indicates that demand for skills was strong in less populated regions, while an oversupply of skills appeared in more populated regions.

Nationally, educational expansion was not mirrored in occupational shares. The national distribution of occupations remained similar between 1991 and 2001, with growth rates for the upper and lower status occupations tending to mirror national employment growth. However, considerable internal change was evident in the occupation structures of industry sectors. The education and occupation structure of dominant industries in regions can affect levels of skills and qualifications required and evidenced. This is particularly true in agricultural regions, where higher occupation status is common, as are minimum qualifications. Higher occupation status shares peaked in Remote Australia — primarily due to the presence of farm managers — though shares of Selected Professionals peaked in Major Cities. Though all industries grew their shares of highly qualified workers between 1991 and 2001, the intermediate and elementary occupation category employed more workers than any other category. Fast growing industries with a high requirement for lower skilled workers include Accommodation, Cafes and Restaurants and Retail

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Trade. Conversely, industries moving towards higher occupation levels and fewer relatively unskilled jobs include Mining, Finance and Insurance, and Manufacturing.

Overall, shares of teaching, health and computing professionals increased at or above national employment and population growth rates. However, the representation of each professional category differs across States and remoteness classes — teaching professionals were evenly distributed, while computer professionals were highly concentrated in Major Cities and Inner Regional areas. Between 1991 and 2001, only skilled tradespeople shares showed decline relative to the working age population across most States, Territories and remoteness classes, though some inner regional and coastal areas have experienced growth in skilled tradespeople.

The link between education, skills and qualifications and regional economic performance is unclear in the regional science literature, largely due to data constraints and the difficulty of adequately measuring the wider social and economic benefits of education, skills and qualifications. However, many recent Australian and OECD studies suggest favourable impacts. Our analysis of income growth and education, skills and qualifications for labour market regions found mixed results. Overall, regions with higher 1991 shares of university educated residents tended to experience higher income growth over the 1991 to 2001 decade. This pattern was especially clear for non-agricultural regions. However, non-agricultural regions with the highest 1991 university-educated shares did not grow as fast as regions with lower 1991 shares. This suggests that the relationship between higher education and income growth does not persist indefinitely.

Regions with high 1991 shares of managers, administrators and professionals highly skilled workers — showed no clear link with income growth, except in agricultural regions, where high 1991 shares of these workers were associated with income decline. The only professional category to register a clear positive relationship with income growth was Building Engineers. Since the presence of Building Engineers is likely to be a consequence of development initiatives, this is a leading indicator only. While highly qualified workers and highly skilled occupations are important for a region's development, they do not need to dominate the labour force for income growth to occur.

APPENDIX I DATA SOURCES AND METHODOLOGICAL ISSUES

OECD STATISTICS PORTAL

Recent working papers and reports examining education, skills and qualifications have relied on summary proxy measures taken from OECD indicator collections. The OECD collects and analyses a range of education and training data, including survey results from the three-yearly PISA literacy survey. Some of this data is used in Section 2. A limitation of OECD data is that each country's information is drawn from different sources, and may be subject to different methods, classifications and definitions.

ABS AUSTRALIAN STANDARD OF OCCUPATION CLASSIFICATION

The main data for this analysis are categorised according to the ABS Australian Standard Classification of Occupations 2nd edition (ASCO) which uses education and occupation groupings that align with the Australian Qualifications Framework (AQF). ASCO criteria measure both formal education and previous experience required for entry into an occupation. The ASCO groupings provide a useful framework for analysing demographic and geographic correlations with educational attainment and occupational status. The ASCO Skill Levels groupings are as follows:

AQF Skill Level	Educational qualification	Occupation
1	Bachelor degree or higher, or 5 years relevant experience	Managers and Administrators, Professionals
2	AQF Diploma or Advanced Diploma or 3 years relevant experience	Associate Professionals
3	AQF Certificate III or IV or at least 3 years relevant experience	Tradespersons and related workers, Advanced Clerical and Service Workers
4	AQF Certificate II or at least 1 years experience	Intermediate clerical, sales and service workers, Intermediate production and transport workers
5	Compulsory secondary education or AQF Certificate I	Elementary clerical, sales and service workers, labourers and related workers
Source	ABS (1997) Australian Standard Classification of	Occupations, 2 nd edition, Cat No.1220.0.

While there is correlation between the AQF education levels and AQF occupation levels, workers will not necessarily be employed at occupation

levels equivalent to their education level. For instance, a sales clerk (AQF4 occupation) may have a bachelor degree (AQF1 education), while a business manager (AQF1 occupation) may have completed minimum schooling (AQF5 education). For the purposes of this analysis, the following ABS Census data categories were used:

Education		
AQF Skill Level	1991 ABS data	2001 ABS data
Ed–1	Bachelor Degree or higher	Bachelor Degree or higher
Ed–2	Diploma or Advanced Diploma	Diploma or Advanced Diploma
Ed–3	Skilled Vocational	Certificate III or IV
Ed–4	Basic Vocational and/or left school age 15 or higher	Certificate I or II, Certificate nfd and/or completed year 10 or above
Occupation		
AQF Skill Level	1991 ABS data	2001 ABS data
Occ-1	Managers, Administrators and Professionals	Managers, Administrators and Professionals
Occ-2	Associate Professionals	Associate Professionals
Occ-3	Tradespersons and related workers, Advanced Clerical and Service Workers	Tradespersons and related workers and Advanced Clerical and Service Workers
Occ-4	Intermediate and Elementary workers	Intermediate clerical, sales and service workers, Intermediate production and transport workers, Elementary clerical, sales and service workers, labourers and related workers

Note For the full listing of occupations see ABS, Australian Standard Classification of Occupations, 1st and 2nd editions, Cat No.1220.0, 1991 and 1997. Categories 4 and 5 have been combined.

ABS CENSUS OF POPULATION AND HOUSING (CENSUS)

This report's analysis of education and occupation levels is based on census data. The accompanying *Education, Skills and Qualifications Database* was developed by BTRE from data from the 1991, 1996 and 2001 censuses.

The primary concepts of this report are **educational attainment** and **occupational status**. Census data will not exactly reflect the qualification categories in the AQF. In particular, the Census data refers only to formal qualifications gained, and does not include the informal "previous years experience" criteria. Further, ABS defined categories for education and occupation changed between 1991 and 2001, requiring re-coding of 1991 and 1996 data. Re-codings were performed at the broadest 1 digit umbrella category, minimising coding discrepancies between periods.

The report also analyses trends in a select number of ASCO professional categories considered significant to regional development. Selection included the main professional (eg. health and education professionals) and skilled labour (eg. trades) categories. The professional and skilled worker categories requested were:

• Professionals: Building and Engineering Professionals, Computing Professionals, Medical Practitioners, Nursing Professionals, Miscellaneous

Health Professionals, School Teachers, University and Vocational Education Teachers.

• Skilled Workers: Mechanical Engineering Tradespersons, Fabrication Engineering Tradespersons, Automotive Tradespersons, Electrical and Electronics Tradespersons, Structural Construction Tradespersons, Plumbers, Food Tradespersons.

Again, 1991 categories were re-coded to 2001 categories. In some cases the sub–groups within the categories had changed so significantly that re-coding was unreliable. In these cases, the professions were excluded from analysis.¹⁷ This was the case for Accountants, Social Welfare Professionals, Finance Associate Professionals, Skilled Agriculture Workers, and Carers and Aides.

In determining proportions relative to population, the report refers to **working age population** as persons aged 15 and over.

Consistent small-area data for 1991, 1996 and 2001 could only be obtained on a place of enumeration basis. Unfortunately, **place of enumeration** data can be misleading for winter-touristed regions, such as the ski-fields and more remote Statistical Local Areas (SLAs) in Queensland, NT and northern WA. In 2001, there were 112 SLAs where domestic visitors represented more than 20% of employed persons on census night. Due to the number of regions significantly affected by this issue, it was decided to exclude visitors (domestic and overseas) from the analysis. Excluding domestic visitors has several limitations: including that some of the excluded visitors may be working in the region (temporary workers), and so their occupation would be relevant to analysis of the region's economy. While such temporary workers account for less than 1% of Australian employed persons, the issue is important for a number of remote, mining-based regions.

Census data is also subject to ABS **confidentialisation** processes. When a cell has a value of between 1 and 3, it is randomly confidentialised to either 0 or 3. This process can impact upon analysis of education and occupation for regions with a small employment base (particularly those with less than 300 employed persons).

These **limitations** should be kept in mind when using regional education and occupation data.

Proportional allocation of employed persons with unknown occupation or education status

For the purposes of the occupation analysis, employed persons whose occupation was non-classifiable or not stated were re-apportioned across the 1-digit industries for the relevant region. Both the non-classifiable and not stated categories for occupation were relatively small and therefore a reapportionment was considered non-distorting.

¹⁷ For 2001 data analysis on some of these professional groupings, see NATSEM 2003 Analysis of options for attracting skilled labour for regional business development, University of Canberra, Canberra.

In the education analysis, only employed persons whose qualification was non-classifiable were re-apportioned. The 'other' category was not re-apportioned as it was statistically significant. For each census, around 75% of respondents provided complete answers to the education questions. The remainder were either 'non-respondents' or the question was not applicable to them. This includes people who left school at age 14 or younger, did not go to school, are still at school, or did not state age left school.

Calculating Shares

Three sets of proportions are used throughout the report: shares of education qualifications, occupational status levels and skilled workers and selected professionals.

Education qualifications were calculated relative to total Census topic respondents. For each Census, around 75% of Census respondents provided complete answers to the education questions. The remainder were either 'non-respondents' or the question was not applicable to them. This includes people who left school at age 14 or younger, did not go to school, are still at school, or did not state age left school. The significant number of non-respondents made re-apportionment inappropriate. Therefore shares have been calculated relative to total Census respondents. Note that education shares include employed and unemployed persons as well as those not in the labour force.

Occupational status levels were calculated relative to total employed persons. Occupational status is not applicable to unemployed persons or people not in the labour market, so they have been precluded from this analysis.

Skilled workers, and selected professionals in particular, provide services to a broad population. To explore the equity of access element of the local presence of skilled workers and professionals, shares were calculated relative to the broadest level available in our data sets, which is working age population (i.e. the population aged 15 and over).

BTRE TAXABLE INCOME DATABASE, AS AT AUGUST 2003

BTRE has developed estimates of the number of taxpayers, total taxable income, and average income per taxpayer for SLAs for the 1990–1991 to 1999–2000 period. The estimates reflect real taxable incomes, deflated using the CPI and measured in 2001–02 prices. The estimates have been developed from taxable income by postcode data published by the Australian Tax Office. The methodology will be detailed in a forthcoming BTRE release, *Focus on Regions No. 3: Taxable Income*.

APPENDIX II BTRE LABOUR MARKET REGION MAPS

This appendix provides maps illustrating the 425 BTRE-defined labour market regions.¹⁸ These labour market regions form the basis of the regional analysis of education, skills and qualifications presented in Sections 4.3 and 5.

BTRE labour market regions are a geographical classification constructed for the *Focus on Regions* Information Paper series. BTRE has grouped the full ABS set of approximately 1350 Statistical Local Areas (SLAs) into 425 such regions, based on commuting patterns revealed by the 2001 census.¹⁹ In concept, labour market regions reflect the area within which people are willing to commute from their place of residence to their place of employment. For each labour market region, the majority of employed residents work in the same region in which they live.

For Queensland, South Australia and Western Australia, space constraints prevent all labour market region names from being detailed on the maps. The regions are identified by a number, and the full region name is provided on page 56.

Further detail on BTRE labour market regions, including details of the SLAs that contribute to each labour market region, is available from the *Education*, *Skills and Qualifications* database (http://www.btre.gov.au).

¹⁸ The labour market regions covering the Territories of Christmas Island and Cocos (Keeling) Islands have not been separately mapped.

¹⁹ Offshore and migratory SLAs, and SLAs with zero employed persons were excluded prior to defining the regions.



APPENDIX II













No.	Region name	No.	Region name	No.	Region name	
Queensland		West	Western Australia			
301	Kolan (S)	501	Irwin (S)	530	Bruce Rock (S)	
302	Perry (S)	502	Mingenew (S)	531	Narembeen (S)	
303	Eidsvold (S)	503	Morawa (S)	532	Brookton (S)	
304	Isis (S)	504	Three Springs (S)	533	Corrigin (S)	
305	Biggenden (S)	505	Perenjori (S)	534	Wandering (S)	
306	Gayndah (S)	506	Carnamah (S)	535	Pingelly (S)	
307	Mundubbera (S)	507	Coorow (S)	536	Waroona (S)	
308	Chinchilla (S)	508	Dalwallinu (S)	537	Boddington (S)	
309	Murilla (S)	509	Mount Marshall (S)	538	Williams (S)	
310	Bendemere (S)	510	Dandaragan (S)	539	Narrogin & surrounds	
311	Kingaroy (S)	511	Moora (S)	540	Wickepin (S)	
312	Dalby & surrounds	512	Wongan-Ballidu (S)	541	Kulin (S)	
313	Millmerran (S)	513	Koorda (S)	542	Collie (S)	
314	Warwick & surrounds	514	Gingin (S)	543	West Arthur (S)	
315	Inglewood (S)	515	Victoria Plains	544	Wagin (S)	
316	Stanthorpe (S)	516	Goomalling (S)	545	Dumbleyung (S)	
317	Nanango (S)	517	Dowerin (S)	546	Busselton (S)	
South Australia 5		518	Wyalkatchem (S)	547	Augusta-Margaret River (S)	
401	Wakefield (DC)	519	Trayning (S)	548	Nannup (S)	
402	Barunga West (DC)	520	Mukinbudin (S)	549	Bridgetown-Greenbushes (S)	
403	Copper Coast (DC)	521	Nungarin (S)	550	Boyup Brook (S)	
404	Port Pirie	522	Northam & surrounds	551	Kojonup (S)	
405	Mount Remarkable (DC)	523	Cunderdin (S)	552	Katanning & surrounds	
406	Clare & Gilbert Valleys (DC)	524	Tammin	553	Tambellup (S)	
407	Peterborough (DC)	525	Kellerberrin (S)	554	Gnowangerup (S)	
408	Orroroo/Carrieton (DC)	526	Merredin & surrounds	555	Cranbrook (S)	
409	Port Augusta (C)	527	York (S)	556	Plantaganet (S)	
410	Flinders Ranges (DC)	528	Beverley (S)			
411	Murray Bridge (RC)	529	Quairading (S)			

TABLE 25BTRE LABOUR MARKET REGION NAMES

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ABBREVIATIONS AND ACRONYMS

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ANZSIC	Australian and New Zealand Standard Industrial Classification
AQF	Australian Qualification Framework
ASCO	Australian Standard Classification of Occupation
BTRE	Bureau of Transport and Regional Economics
Cat.	Catalogue
DEST	Department of Education, Science and Training
DEWR	Department of Employment and Workplace Relations
DEWRSB	Department of Employment, Workplace Relations and Small
	Business
DIMIA	Department of Immigration and Indigenous Affairs
No.	Number
NATSEM	National Centre for Social and Economic Modelling
NSW	New South Wales
NT	Northern Territory
OECD	Organisation of Economic Co-operation and Development
PISA	Programme for International Student Assessment
QLD	Queensland
RBDA	Regional Business Development Analysis
SA	South Australia
SGRGSP	Steering Committee for the Review of Government Service Provision
SLA	Statistical Local Area
TAS	Tasmania
VIC	Victoria
WA	Western Australia