



MINISTRY OF EDUCATION

Te Tāhuhu o te Mātauranga

Expected contributions

Tertiary Education Strategy monitoring 2009

Expected contributions: Tertiary Education Strategy monitoring 2009

Published by:
MINISTRY OF EDUCATION

© Crown Copyright
All rights reserved.
All enquiries should be made to the publisher.

July 2009

This report is available from the Ministry of Education's Education Counts website:
<http://www.educationcounts.govt.nz/>

ISSN 1176-9238 (print)
ISSN 1179-3074 (online)

Expected contributions

1	The Tertiary Education Strategy	1
2	Monitoring the Strategy	2
3	Achieving the expected contributions	4
4	The changing economic context	9
5	Success for all New Zealanders through lifelong learning	11
	Priority Outcome: Increasing literacy, numeracy and language levels for the workforce	17
	Priority Outcome: Increasing educational success for young New Zealanders – more achieving qualifications at level four and above by age 25	20
	Priority Outcome: Increasing the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs	23
6	Creating and applying knowledge to drive innovation	26
	Priority outcome: Improving research connections and linkages to create economic opportunities	29
7	Strong connections between tertiary education organisations and the communities they serve	31
	Notes on data and sources	35
	References	38

1. The Tertiary Education Strategy

Tertiary education is a key strategic investment in the country's cultural, social and economic well-being and future. Tertiary education is associated with improved economic and social outcomes. More than 630,000 New Zealanders participated in tertiary study in 2008, including industry training. The government spends over \$4 billion a year on tertiary education, including research funding and financial support for students.

The Minister for Tertiary Education is required under the Education Act to issue a tertiary education strategy setting out the government's long-term strategic direction for tertiary education, as well as its current and medium-term priorities. The Act requires the Tertiary Education Commission, the New Zealand Qualifications Authority and Career Services to have regard for the strategy in exercising their functions. In practice, the strategy sets out the framework for funding agreements with tertiary education organisations and provides a reference point for policy-making and relationships with the tertiary education sector.

The current strategy was issued in December 2006 and covers the period from 2007 to 2012. It includes the priorities for the 2008 to 2010 tertiary education organisation investment plans. It is the second strategy to be published. The first strategy took a broad and inclusive approach to cover the diversity of tertiary education. This second strategy continued that inclusive direction while sharpening the focus. The focus in this second strategy is much more explicitly on what the government expected of the tertiary education system and the priority outcomes for action.

Since this second strategy was issued, there has been a change of government. The government has announced it will issue a new tertiary education strategy by the end of 2009, which will guide the 2011-2013 funding period.

The 2007-12 strategy accompanied the progressive introduction of a new approach to planning, funding, quality assurance and monitoring in the tertiary education system. Funding of tertiary education was shifted from annual allocations based on student numbers to

negotiated three-year investment plans. Quality assurance arrangements are being reviewed to create a greater focus on learner outcomes. A key focus was on developing a differentiated and complementary network of provision, with better connections with businesses, industry and communities with an interest in the outcomes of tertiary education.

The current strategy sets out three areas in which the tertiary education system was expected to contribute to our society, namely:

- Success for all New Zealanders through lifelong learning
- Creating and applying knowledge to drive innovation
- Strong connections between tertiary education organisations and the communities they serve.

These expected contributions are underpinned by attention to 'distinctive contributions', which recognise the key strengths and differences among different types of tertiary education organisations.

The strategy sets out four priority outcomes where it was seen that there needed to be increased effort, and in some cases investment, in order to achieve a shift in the system. The priority outcomes are:

- Increasing educational success for young New Zealanders – more achieving qualifications at level four and above by age 25
- Increasing literacy, numeracy and language levels for the workforce
- Increasing the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs
- Improving research connections and linkages to create economic opportunities.

2. Monitoring the Strategy

Informing progress

This report is part of the first set of monitoring reports for the 2007 to 2012 strategy. Three reports have been produced:

- **Summary:** providing a brief overview of the tertiary education sector at the start of the strategy period and tertiary education organisation engagement with the current strategy
- **Cross-strategy indicators:** providing a detailed view of the overall health of the tertiary education system, using a set of enduring indicators against which broader changes can be monitored
- **Expected contributions** (this report): providing a detailed view of the tertiary education system with regard to the three areas of expected contribution and related priorities.

The information in these reports is intended to:

- inform decisions about the priorities for future funding allocations across the tertiary education sector
- provide the tertiary education organisations with a fuller, overall picture to inform their planning for the next funding round
- provide information that will help groups such as business and industry, Māori, iwi and Pasifika communities, to enter into discussions with tertiary education organisations on their needs and priorities.

These monitoring reports focus on the tertiary education system as the current strategy unfolded. The reports provide trend data to 2008 and include comment on the direction taken by tertiary education organisations in their 2008 to 2010 investment plans.

Purpose of monitoring

The purpose of monitoring the strategy is to provide ongoing timely information on the progress of the tertiary education system against the strategy. Monitoring can help make sense of the extent to which the intended changes are happening and to what degree. The monitoring

information provides a broad picture that enables understanding of:

- the contribution of tertiary education to wider economic and social outcomes
- the general direction and trends in tertiary education in relation to the focus areas of the strategy
- overall progress towards the priority outcomes.

The results of the monitoring project will:

- inform Ministers of the overall progress being made against the strategy
- provide system-level, contextual information to inform ongoing planning and decisions by tertiary education organisations and the Tertiary Education Commission
- provide context for the monitoring of the Crown entities (Tertiary Education Commission, New Zealand Qualifications Authority and Career Services)
- provide alerts to any possible need to reconsider the policy mix
- feed into further developments of the strategy and associated priorities.

Roles and relationships

The Ministry of Education leads the work on monitoring the strategy and is responsible for the publication of reports. The project draws on and synthesises a wide range of monitoring information that is already being collected and developed across a number of departments, ministries and agencies. It complements these activities by bringing together a broad overview of change and achievement.

The Tertiary Education Commission is responsible for monitoring the performance of tertiary education organisations against their agreed performance measures, while ensuring there is a coherent network of tertiary education provision.

The New Zealand Qualifications Authority is responsible for quality assurance of tertiary education (with the exception of the universities),

including developing self-evaluation standards for providers to assess their own performance and identify areas for improvement.

The Ministry works in close collaboration with the Tertiary Education Commission and the New Zealand Qualifications Authority to ensure that the overall monitoring of the tertiary education system is connected and aligned, and to avoid duplication of effort.

Similarly, the Ministry works with the Department of Labour with regard to monitoring skills and labour market outcomes, with the Ministry of Economic Development with regard to monitoring economic transformation and with the Ministry of Research, Science and Technology with regard to monitoring knowledge development and transfer.

Approach to monitoring

Monitoring of the strategy uses a mix of quantitative indicators that can provide measures of change over time, balanced with qualitative information that can provide information on areas

that are harder to measure meaningfully through quantitative data. There is also a mix of lead indicators, which provide information on change underway, and lag indicators, which provide information on achievements.

A narrow focus on indicators could easily miss the 'real' story. The system may be 'scoring' well on a whole range of indicators but not making the substantive shifts as indicated by the strategy – or the other way around. The challenge of monitoring, therefore, is to highlight the overall messages, not just report on indicators.

Monitoring can only provide a partial and selective view of change across a system that is as complex and dynamic as tertiary education. Therefore, the results need to be considered alongside other information, such as research and expert advice.

The current strategy sets out new areas of challenge for the tertiary education system. In a number of these areas there is a lack of current, robust data to assess progress. In many cases, this data will become available over time.

3. Achieving the expected contributions

This report examines each of the three areas of expected contribution set out in the tertiary education strategy. It also provides information on the state of the system with regard to the four priority outcomes. At the end of each section, the engagement of the tertiary education system with the strategy is highlighted in a discussion of the commitments made in tertiary education organisation investment plans.

The changing economic context

Since the strategy was issued, the global and national economic context has changed.

When the strategy was released in 2006, New Zealand had been through a period of sustained economic growth, which was starting to decrease (from 5 percent in 2003 to 3 percent in 2006). Growth in labour productivity had also decreased as more lower-skilled workers were brought into employment. Unemployment was quite low at 3.8 percent in December 2006. The policy focus at that time was on how to sustain further growth through investment in the skills and knowledge of the workforce.

By the end of 2008, the country was in recession due to major global economic shocks and unemployment was starting to rise, to 4.6 percent in December 2008. The current policy focus is on how best to manage the country through a difficult economic period, while continuing to make strategic investments for the long-term.

Success for all New Zealanders through lifelong learning

The focus of this first contribution was on maintaining broad and equitable participation, and encouraging achievement in tertiary education, matched with a stronger emphasis on relevance and quality.

Ensuring maximum education opportunities for all New Zealanders

Available data for the period to 2008 highlights areas where tertiary education participation and attainment of population groups has remained uneven.

Overall, students from lower socio-economic backgrounds have been less likely to participate in tertiary education, particularly at bachelors

level and above. Recent research indicates that students from lower socio-economic backgrounds are less likely to achieve well at school. For students who go on to tertiary study, school achievement is the main predictor of success, rather than family background. Family aspirations also have an influence on whether students choose to go on to bachelors-level study from school and this in turn drives motivation to achieve well at school.

Māori have had relatively low participation in level 4 qualifications and higher. Māori school leavers have been less likely than others to enter higher levels of tertiary study. Māori students have been less likely to continue in tertiary study after their first year, reducing the proportion completing qualifications.

Pasifika have had relatively low participation at level 4 and above. Pasifika students have been less likely than European and Asian students to enter higher levels of tertiary study. While Pasifika students continue in study at similar rates to others, they have been less likely to pass all of their courses and to complete a qualification.

People with disabilities have been less likely to participate in tertiary education. Those with disabilities relating to hearing, learning and mental-health have been least likely to participate at bachelors level. People with disabilities who do participate in tertiary education have generally done as well as other students, particularly if they were able to access support services. Access to support services has varied across levels of study, with services being more available to students at bachelors level than students at non-degree levels.

Strong foundation skills

In 2006, just over half of the New Zealand adult population had sufficient literacy and numeracy skills to participate fully in a knowledge society. While this situation is similar in other developed countries, and likely to improve as a more educated generation matures, there are still significant concerns about:

- the level of skills of people in the current workforce
- the smaller proportion of the population with higher levels of numeracy and problem

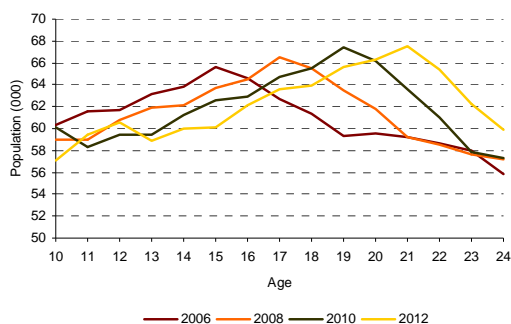
solving skills, compared with the proportion with higher levels of literacy skills

- lower overall literacy and numeracy of Pasifika and Māori populations, and of young people entering the workforce
- English-based literacy skills of people for whom English is a second language.

Successful transitions from schooling

During the period from around 2007 to 2011 there will be a larger number of young people in the 15 to 19 year old age-group. They are the so-called ‘baby blip’ generation. These young people will be a significant part of the future workforce.

Figure 3.1: National population projections



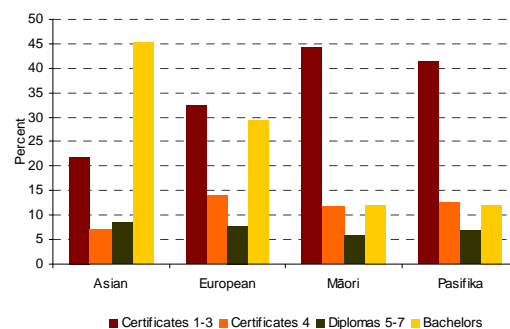
Source: Statistics New Zealand, *National population projections, 2006 base, series 6.*

Seventy-eight percent of students who left school in 2005 were in tertiary education by 2007. The largest proportion studied at level 1 to 3. Around a third of 18- to 19-year-olds who studied at level 1 to 3 in tertiary went on to higher-level study within two years. However, only a fifth of those under 18 who studies at level 1 to 3 in tertiary went onto higher level study within two years.

First-year retention rates for under-20-year-old tertiary students have remained fairly steady, as have five-year completion rates below degree level. However, five-year completion rates for people who started bachelors degrees before they turned 20 have been decreasing slightly.

Māori and Pasifika students were least likely to go into tertiary education from school. Of those that did, most enrolled in level 1 to 3 certificates. Once in tertiary, they had the lowest rates of progression from level 1 to 3, and lowest first-year retention and five-year completion rates.

Figure 3.2: Proportion of 2005 school leavers enrolling in tertiary education by ethnic group and level of tertiary qualification



Building relevant skills and competencies for productivity and innovation

Demand for advanced skills and knowledge has been increasing in the workplace in order to improve innovation and productivity, as a result of the greater use of technology and in response to greater demands on health and social services as the population ages. The current economic downturn will reduce short-term demand in areas such as construction and manufacturing. However, there will continue to be demand for increased skills and knowledge in the long term.

Areas where there has clearly been an unmet need for increased graduates include engineering, building and some areas of health. Other areas where there has been evidence of shortages include early childhood, secondary and Māori-medium teaching and accounting. In most areas, improving the relevance of the qualifications is as or more important than increasing the number of graduates.

Industry training has continued to provide broadly based access to work-based learning for those in employment, with around a third of completing trainees attaining national certificates by the time they exit. Much of the recent growth in participation has been in lower-level programmes.

People who attain postgraduate qualifications can offer the higher-level knowledge and skills which are important for development, innovation and leadership.

There has been an increase in enrolments and completions at postgraduate level – mostly in postgraduate certificates and diplomas and in doctoral degrees. Retention rates have increased. The highest earnings premiums are paid for people with postgraduate qualifications in management and commerce, information technology and engineering.

Building skills and competencies for social and cultural development

Tertiary education also contributes to New Zealand's social and cultural development. Around 16 percent of provider-based provision has been in the areas of creative arts, culture and languages. Three-quarters of students taking courses in these areas were enrolled in qualifications in society and culture or creative arts. People with society and culture or creative arts qualifications work across a wide range of occupations and industries.

Creating and applying knowledge to drive innovation

This contribution relates to further developing research and scholarship to inform teaching and contribute to economic and social development.

Supporting links between research, scholarship and learning

Research activity provides an important base for teaching at degree level and above. This interdependence is required by the Education Act for all degree-granting organisations.

It is difficult to construct cross-system measures of the links between research, scholarship and teaching. One measure is provided in this report. This measure looks at the relationship between the number and quality of research staff (as measured through the Performance-Based Research Fund) and the amount of teaching carried out (as measured through equivalent full-time enrolments).

The conclusions from this measure are that within subjects and across universities:

- at bachelors level there is a consistent match of research and teaching in all subjects
- at masters and doctorate level, in nearly half of subject areas, some universities have a relatively greater concentration on teaching and supervision, while others have a relatively greater concentration on research.

Focusing resources for greatest effect

Efforts over the last few years to identify national research priorities have focused on research in:

- biological and physical sciences
- health, medicine and public health

- mathematics, information sciences, engineering and building.

In 2006, just over half of top-rated research staff in universities were working in these areas. Within these areas, there appears to have been a shift towards agricultural, medical and biomedical research and away from more pure science areas.

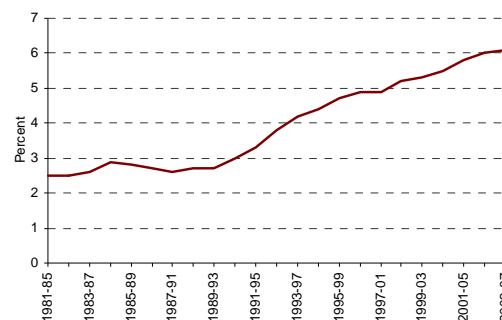
Health and medical research in New Zealand universities has achieved an academic impact which is above the world average.

Improving research connections and linkages

Strengthening research connections and linkages between tertiary education institutions, Crown research institutes and businesses is one way of making research more effective and ensuring greater use is made of new knowledge.

In their planning, most universities have a focus on collaborating on research with other universities, research institutes and business. There has been a trend towards putting a priority on universities commercialising their own research and away from the more general transfer of knowledge and technology to business and industry.

Figure 3.3: Rate of joint authorship across universities in published papers



Source: Thomson Reuters

There is evidence of increased collaboration between universities on research projects. This is reflected in an increased rate of joint authorship of papers across universities.

Strong connections between tertiary education organisations and the communities they serve

The strategy notes that building strong connections is a means of achieving improved outcomes. Strong connections require

organisations and the communities they serve to have and understand a common purpose for outcomes of tertiary education, work together responsively and flexibly and regularly review educational and research needs.

Over the five years to 2007, there has been evidence of increased engagement of tertiary education organisations with communities of interest. This has included:

- greater cooperation among organisations
- some development of relationships with schools
- a steady focus on international connections
- increased attention to industry and business
- most organisations developing relationships with Māori and iwi
- more organisations developing relationships with Pasifika communities.

Improving the quality and relevance of education and knowledge has been a core focus for most relationships. The emphasis has varied from increasing participation through to addressing new education and knowledge needs.

Supporting economic transformation has mainly been a focus of relationships with business and industry. There is greater potential to look at the larger role of education and knowledge in leading economic development and looking at the economic outcomes sought by Māori and Pasifika communities.

Supporting social and cultural outcomes is mostly achieved through relationships with Māori and iwi, and Pasifika communities and largely through encouraging greater participation. Social and cultural outcomes for the wider community have not been a strong focus of relationships.

Priority outcomes

Increased educational success for young New Zealanders – more achieving qualifications at level four and above by age 25

Thirty-nine percent of New Zealanders achieve a level 4 or higher qualification by age 25 through provider-based and work-based tertiary education. While the rates of achievement have been improving, rates for Māori and Pasifika are

significantly lower than for other ethnic groups. Rates are also lower for men overall.

A quarter of New Zealanders achieve a bachelors degree or higher by age 25. This rate has been stable over the last four years. Attainment rates are significantly lower for Māori and Pasifika and for men.

Increasing literacy, language and numeracy levels for the workforce

In 2006, 40 percent of employed people had literacy below the level required to participate fully in a knowledge society, 46 percent had low numeracy and 64 percent had low levels of problem-solving skills.

Labourers and machine workers were most likely to have low literacy. However, the largest numbers of employees with low literacy were employed in service and sales jobs.

The agriculture and fisheries, manufacturing and construction, trade and health and social services industries had higher proportions of people with low literacy working in them. The largest numbers of people with low literacy were employed in the trade industries and manufacturing.

Increased achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs

The proportion of tertiary-qualified trades workers increased from 60 to 70 percent from 1991 to 2005. However, the proportion has dropped back to 60 percent by 2008.

The proportion of professionals with bachelors degrees or higher has been steadily growing, as has the proportion of technicians and associate professionals.

The relative premiums paid for trades workers, technicians and associate professionals and professionals with advanced qualifications have decreased in recent years as wages have increased for workers with lower levels of qualifications.

Improved research connections and linkages to create economic opportunities

The Statistics New Zealand *Business Operations Survey 2007* found that around one in 10 businesses with innovation activity use universities or polytechnics as a source of

innovation information. Around one in 20 have cooperative arrangements with New Zealand universities and polytechnics.

Access to information is only one issue affecting business innovation. The main factors businesses see as hampering innovation are lack of management resources, development costs and lack of appropriate personnel within their organisations.

There is a shift towards universities and polytechnics providing information for innovation to larger businesses. The majority of businesses seeking information from universities and polytechnics are in manufacturing, property and business services, retail trade and health and community services.

Implementing the strategy

The tertiary education organisation investment plans for 2008 to 2010 provide an insight into the ways in which organisations are implementing the strategy.

The largest proportion of commitments in plans related to 'success for all New Zealanders through lifelong learning'. The range of commitments included:

- increased participation of underrepresented groups, particularly Māori
- developing capacity in literacy, language and numeracy in polytechnics and industry training organisations

- increased provision in trades and professions
- increasing enrolments and completions by under 25 year olds
- increasing success in higher level qualifications.

Universities have made significant commitments to 'creating and applying knowledge to drive innovation'. Much of their focus is on increasing research revenue from business and industry, which is used as a reporting measure of their engagement. Polytechnics have responded to this area in terms of increasing their involvement in technology development and transfer. Wānanga are looking at their contribution to the ongoing development of mātauranga Māori.

Polytechnics have been working with providers and communities in their regions build a shared understanding of tertiary education needs, priorities and gaps. Industry training organisations are further developing their leadership role to meet the training needs of industry.

All sub-sectors are looking at how to increase their engagement with their communities of interest and ensuring that they are better meeting their needs. However, there is a tendency to look to satisfaction surveys as a measure of progress, which could result in over-surveying if taken too far.

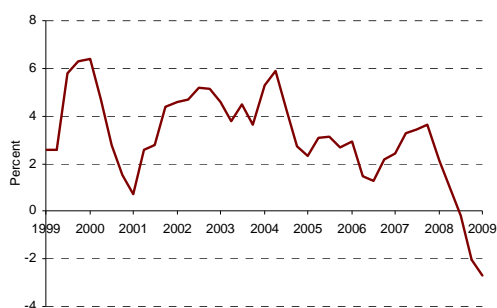
4. The changing economic context

Since the Tertiary Education Strategy 2007-12 was released, the global and national economic context has changed significantly.

Economic context of the strategy

When the strategy was released at the end of 2006, the economy had gone through a period of sustained economic growth. Over the previous three years, growth rates had averaged around 4 percent per annum. By the middle of 2006, annual growth was starting to decrease to just over 1 percent.

Figure 4.1: Growth in real gross domestic product



Source: Statistics New Zealand

Note: Measure used is change in real production-based GDP compared with the same quarter in previous year.

During this period of growth, growth in productivity had been low. Most of the growth had been enabled by the expansion of production and increasing the number of people employed. The growth in the amount produced per worker was not increasing. For the period from 2000 to 2008, average growth in labour productivity was just 1.3 percent, compared with over 2 percent in the previous growth periods.

Table 1: Average annual growth in productivity indexes within growth cycles

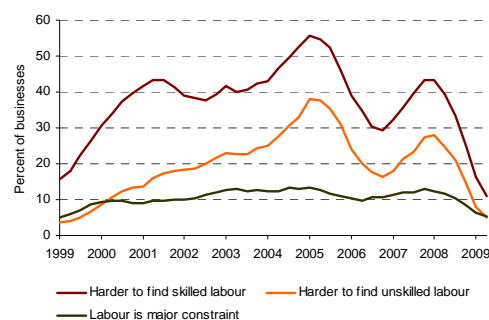
	Labour	Capital	Multifactor
1978 to 1982	1.7	0.8	1.4
1982 to 1985	1.4	-1.9	0.1
1985 to 1990	2.9	-3.7	0.4
1990 to 1997	2.5	1.1	2.0
1997 to 2000	2.9	0.9	2.1
2000 to 2008	1.3	-0.4	0.6
1978 to 2008	2.0	-0.5	1.1

Source: Statistics New Zealand, *Productivity Statistics*.

As demand for labour increased relative to supply, shortages of skilled labour were evident, particularly in the period to 2005. This was almost matched by the difficulty of hiring unskilled labour, driven by the expansion of the

construction industry. While shortages eased in 2006, there were indications of shortages starting to pick up again in 2007.

Figure 4.2: Indicators of labour demand

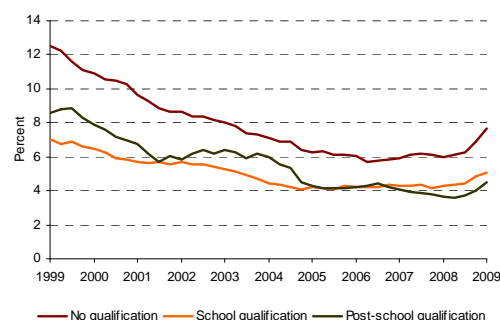


Source: New Zealand Institute of Economic Research, *Quarterly Survey of Business Opinion*, July 2009.

Note: Uses four-quarter rolling averages.

As unemployment also fell to record low levels in 2006, it was clear that further growth would only be possible by increasing the productivity of the current labour force. One of the factors that could achieve this was increasing the skill levels of current and future workers through tertiary education.

Figure 4.3: Unemployment rates by qualification level



Source: Statistics New Zealand, *Household Labour Force Survey*

Note: Uses four-quarter rolling averages.

The policy focus at the time the strategy was issued was on how to sustain further growth through investment in skills and knowledge in the workforce. Policy was also being implemented to encourage the use of new knowledge to stimulate innovation and raise productivity.

Economic changes in 2008

By early 2008, the New Zealand economy was entering recession. During 2008 there were a number of global economic shocks that drove New Zealand's major trading partners into recession.

By the end of 2008, the economy was clearly in recession. Annual growth to December 2008 had dropped to -1.9 percent. There is a high degree of uncertainty about how long the recession will last. It may be at least two years before the country is back into positive growth.

As a result of the recession, immediate demand for labour has dropped dramatically and unemployment has started to increase. The clearest increase so far has been for people with no educational qualifications.

The current policy focus is on how best to manage the country through a difficult economic period, while continuing to make strategic investments for the medium to long-term.

5. Success for all New Zealanders through lifelong learning

This expected contribution focuses on maintaining broad and equitable participation, and encouraging achievement in tertiary education, matched with a stronger emphasis on relevance and quality.

Ensuring maximum educational opportunity for all New Zealanders

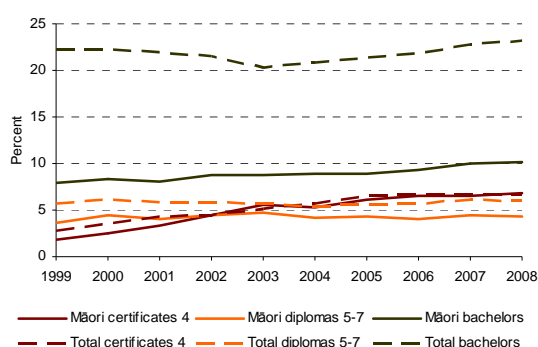
This part of the strategy is about improving both equity of access and achievement, with a particular focus on groups who have historically had less access and/or lower achievement. The strategy lists these groups as including Māori, Pasifika, people with disabilities, migrants and refugees, students from lower socio-economic backgrounds and people needing to upskill in order to re-enter the workforce.

Māori

Since 2002, Māori have participated in tertiary education at very high rates. However, participation has remained low in higher-level qualifications and for school leavers.

In 2004, Māori had the lowest level of entry into tertiary education from school of any ethnic group (Ussher 2007). Māori aged 18 to 19 years have had significantly lower participation in bachelors degrees than the total population. Their participation rates in level 4 certificates and diplomas have also been lower. These patterns reflect lower school achievement (Ussher 2008).

Figure 5.1: Māori participation rates (18 to 19 year olds)



Māori in this age group have been less likely to remain in study than other students in this age group.

There has been limited change in participation and retention rates for Māori 18 to 19 year olds. A recent study of success in degree study found that even after controlling for differences in school achievement, Māori students were less likely to pass all of their first-year courses and less likely to remain in study (Scott 2008)

There has been growth in participation rates of Māori students aged 25 to 39 at all levels of study, although rates have now levelled off and started to decrease. The most notable growth was in level 4 certificates, which include te reo Māori certificates. In this age group, Māori had similar retention rates to all students in certificates and diplomas, but lower retention rates in bachelors degrees.

The proportion of Māori in industry training exceeds the proportion of Māori in the workforce. However, Māori trainees tend to be concentrated in industries such as forestry and social work. They also are more likely to be studying towards lower-level credits.

Figure 5.2: Māori first-year retention rates (18 to 19 year olds)

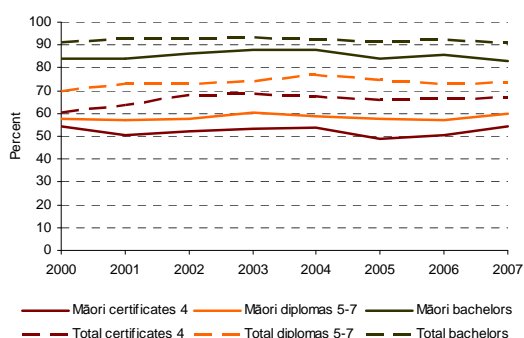


Figure 5.3: Māori participation rates (25 to 39 year olds)

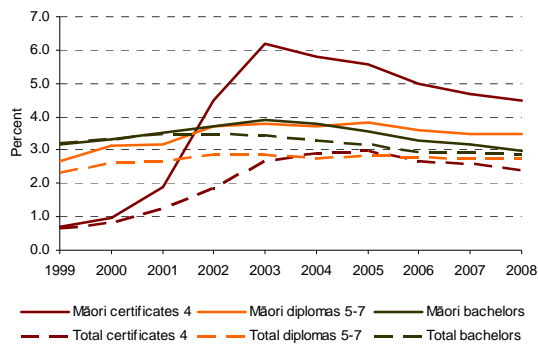
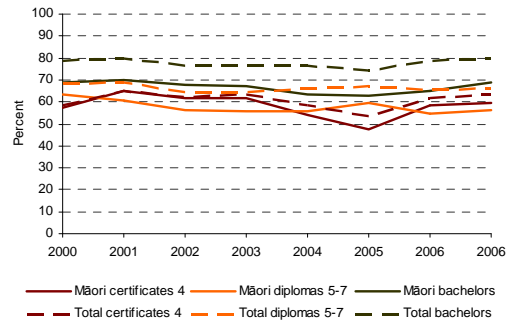


Figure 5.4: Māori first-year retention rates (25 to 39 year olds)



Pasifika

Pasifika students remain underrepresented in tertiary education at level 4 and above. However, those who do participate are as likely to remain in study as other students.

The proportion of Pasifika students moving from school to tertiary study in 2004 was slightly higher than that of Māori, but lower than other ethnic groups (Ussher 2007). This largely reflects their level of school achievement (Ussher 2008).

Pasifika aged 18 to 19 years continue to have lower participation rates in bachelors degrees than the total population. Their participation rates in level 4 certificates and diplomas are also lower.

Pasifika 18 to 19 year olds have similar retention rates at degree level to all students, but retention rates have been lower at level 4 certificate and diploma levels.

A recent study of success in degree study found that even after controlling for differences in school achievement, Pasifika students were less likely to pass all of their first-year courses, but as likely as other students to remain in study (Scott 2008)

Pasifika participation rates for 25 to 29 year olds have followed the overall pattern of participation growth for this age group. However, Pasifika students have remained underrepresented. Pasifika students aged 25 to 39 are about as likely as other students to remain in study.

The proportion of Pasifika in industry training exceeds the proportion of Pasifika in the workforce. However, Pasifika trainees tend to be concentrated in industries such as building services and materials processing. They also are more likely to be studying towards lower-level credits

Figure 5.5: Pasifika participation rates (18 to 19 year olds)

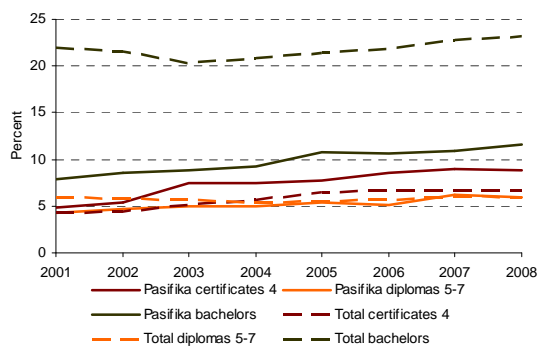


Figure 5.6: Pasifika first-year retention rates (18 to 19 year olds)

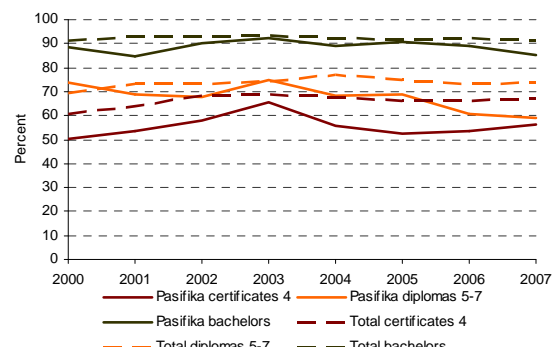


Figure 5.7: Pasifika participation rates (25-39 year olds)

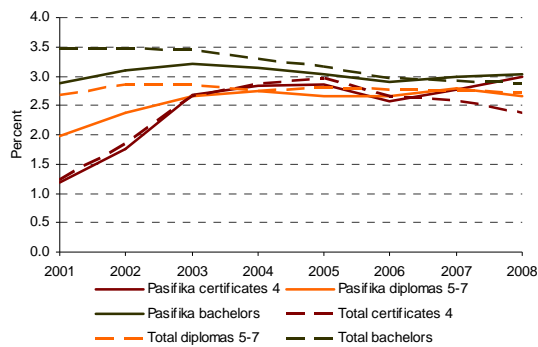
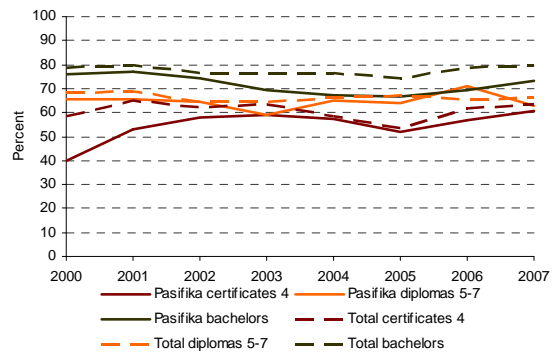


Figure 5.8: Pasifika first-year retention rates (25-39 year olds)



People with disabilities

The proportion of students in provider-based study who stated they had a disability remained steady from 2002 to 2008 at around 5 percent. This compares with 9 percent of the population aged 15 to 44 reported as having a disability in the Statistics New Zealand 2006 *Household Disability Survey*.

The 2006 *Household Disability Survey* found that people who had disabilities at the time they were in education were less likely to have school or tertiary qualifications than those without disabilities (refer Figure 5.9). People with intellectual, learning or speaking disabilities at the time of their education were least likely to have a tertiary qualification. People with hearing, learning and psychiatric or psychological disabilities were least likely to have a bachelors degree (refer Figure 5.10)

The proportion of students with a disability is higher in level 1 to 3 certificates, at around 6 to 7 percent, and lower in bachelors degrees, at around 4 percent.

Students aged 25 and over are more likely to state they have a disability. In 2008, 5 percent of students aged 25 to 39 stated they had a disability and 7 percent of students aged 40 and over. This compares with around 3 percent for students aged under 25. This is consistent with the increased prevalence of disability with age.

Overall, there is little difference in first-year retention rates between people with and without disabilities. When looked at by qualification level, people with disabilities in below-degree-level

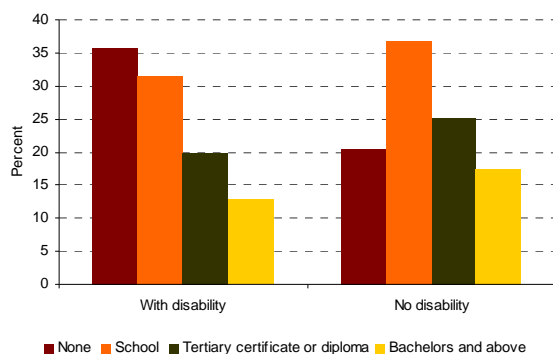
qualifications have slightly better retention than those without. The reverse is true for degree and above qualifications, where people without disabilities have slightly better retention rates. In the 18 to 24 age group, people with disabilities have slightly lower retention, while those aged 40 and over have slightly higher retention than those without disabilities.

In 2006 and 2007, around 19 percent of students with disabilities accessed disability support services at their provider. This proportion dropped to 17 percent in 2008. The main change was at bachelors level and above, where the proportion accessing services dropped from 44 percent to 35 percent from 2007 to 2008.

Students who accessed disability services had higher first-year retention rates than students with disabilities in general – 78 percent compared with 68 percent in 2007. Those accessing services had higher retention rates than other students with disabilities if they were studying at bachelors, masters or doctorate level.

A study of factors influencing completion of bachelors degrees found that once adjusted for demographic and study-related characteristics, there was very little difference in six-year degree completion rates between students with disabilities and students with no disabilities (Scott and Smart 2005). Analysis at the sub-sector level showed that the gap was greater at polytechnics between students with disabilities and students with no disabilities. Interestingly for university students, having a disability made no statistically significant difference to a student's chances of completing their degree.

Figure 5.9: Distribution of people with and without disabilities by highest educational qualification



Source: Statistics New Zealand, *Household Disability Survey 2006*

Note: People with disabilities include only those who experienced a disability at the time of their formal education.

Migrants and refugees

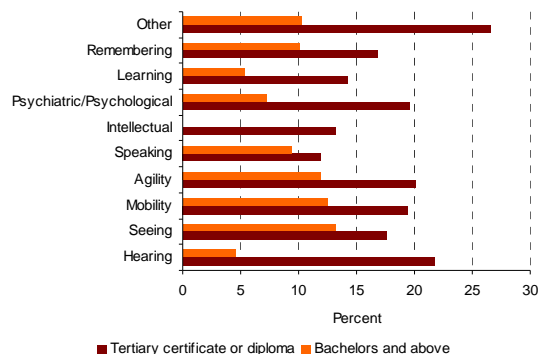
It is not possible to directly identify recent migrants and refugees from the tertiary education data. However, it is possible to identify students at tertiary education providers who are New Zealand permanent residents. These students include both recent and settled migrants and exclude Australian citizens resident in New Zealand.

In 2008, 14 percent of domestic tertiary students were permanent residents. This proportion has been fairly steady since 2004. The proportion was highest at doctorate level at 25 percent and lowest in level 1 to 3 certificates at 12 percent.

While the country of citizenship of New Zealand permanent residents has not been collected, ethnicity can provide a proxy for region of citizenship. Around half of permanent resident students are Asian, just under a third are European, 10 percent are Pasifika and 14 percent are from other ethnic groups. These proportions have been fairly constant from 2001 to 2008.

Overall, permanent residents have higher first-year retention rates than New Zealand citizens – 72 percent compared with 67 percent in 2007/08. The retention rates for permanent residents were higher than those of New Zealand citizens at certificate level, about equal at bachelors level and lower at masters and doctorate level. The retention rates for permanent residents were higher than those of New Zealand citizens across all age groups.

Figure 5.10: Highest educational qualification by type of disability



Students from lower socioeconomic backgrounds

The main information available on the socioeconomic background of tertiary students is the decile rating of the school they last attended. This rating represents the level of deprivation in the community where students attended school, rather than the socio-economic status of individual students and their families.

Recent studies show that school decile has a weak relationship to tertiary participation and achievement once school achievement levels have been taken account of. Having taken account of the level of school achievement:

- the likelihood of participating in bachelors degrees is not significantly associated with school decile (Ussher 2008)
- students from medium and high-decile schools are more likely to participate in industry training and level 4 to 7 non-degree study than students from low-decile schools (Ussher 2008)
- school decile is not a significant factor in first-year success and first-year retention in bachelors degrees for students entering from school (Scott 2008, Earle 2008a).

An analysis of factors influencing the success of Māori adult students entering degree studies for the first time found that students who had attended low-decile schools did slightly less well in their first year, after controlling for school achievement (Earle 2008a).

Further work needs to be done to look at the association of socio-economic status and

achievement in non-degree vocational training, including industry training.

Research on the relationship between parental income, school achievement and tertiary participation shows that parental income has a definite relationship to school achievement. However, once school achievement is accounted for, tertiary participation is not strongly affected by parental income. The exception to this is the choice of university over other providers, where parental income continues to have an influence (Ministry of Education 2007).

Longitudinal research on education to age 16 shows similar patterns. Family income when the learner was aged 5 has a stronger effect on achievement at 16 than family income at age 14. Also, maternal qualifications have a stronger effect than income. This study also found that higher-income families had a stronger desire for their children to attend university (Wylie and Hodgen 2007, Wylie et al 2008).

Another longitudinal study has found that family educational aspirations directly contribute to later educational achievement, as do childhood cognitive factors. This study did not find a direct relationship between economic resources and later educational achievement. The study noted that a substantial proportion of the link between socio-economic status and educational achievement remained unexplained by the variables considered in the model. The study proposes that this unexplained variance may be due to the accumulation of small effects

associated with lower socio-economic status (Fergusson et al 2008).

People upskilling to reenter the workforce

An important role of tertiary education is to help people who have been out of the workforce develop the skills they need to re-enter work. The tertiary education data does not include information on reasons for entering study. However, it is possible to look at students entering tertiary study who are 25 or older and were not in employment or study prior to enrolling.

Most of these students enrolled in a level 1 to 3 certificate. The numbers of these students in level 1 to 3 certificates increased from 2001 to 2004 and have since decreased. The decrease is likely to be a result of both more jobs being available in the period to 2008 and tighter funding policies to reduce the number of low-value, low-quality courses. These students made up 40 percent of all level 1 to 3 certificate students aged 25 and over in 2001, reducing to 25 percent in 2006 and remaining steady since then.

The numbers at level 4 and above increased from 2001 to 2003, remained steady and then decreased in 2007 and 2008. However, they have been a fairly steady proportion of all students aged 25 and over, making up around 20 percent of level 4 certificate students and level 5 to 7 diploma students, 14 percent of bachelors students and 6 percent of postgraduate students.

Figure 5.11: Students 25 and over in level 1 to 3 certificates who had been out of the workforce

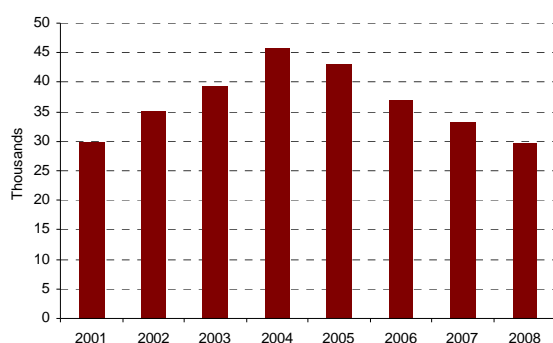
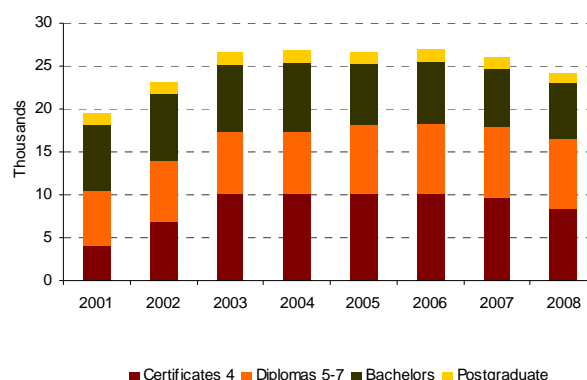


Figure 5.12: Students 25 and over in level 4 certificates and above who had been out of the workforce



Strong foundation skills

This part of the strategy focuses on ensuring that all adults have the foundation skills they need to participate in society and work. A priority focus is on raising the literacy, numeracy and language skills of adults.

New Zealand has participated in two international studies of adult literacy – the International Adult Literacy Survey in 1996 and the Adult Literacy and Life Skills Survey in 2006.¹ These surveys provided comparative measures of prose and document literacy skills in the adult population. The Adult Literacy and Life Skills Survey also provides information on numeracy.

Overall skill levels

In 2006, 56 percent of the adult population, aged 15 to 64, had sufficient prose and/or document literacy to participate fully in a knowledge society.² This was an improvement on 54 percent and 50 percent respectively in 1996. In 2006, 50 percent of the adult population had sufficient numeracy skills to participate fully in a knowledge society. New Zealand's results are similar to those of Australia and Canada.

Age and literacy

In each skill domain in 2006, people aged 25 to 54 had, on average, better skills than younger people (aged 16 to 24) and older people (aged 55 to 65). This may indicate that people continue to develop their skills up to age 25. For the older age group, it may reflect the more restricted education opportunities of that generation.

Comparing the results from the IALS survey in 1996 with the results of the ALL survey in 2006, it can be seen that for each age cohort, their skills improved over the 10-year period: that is, people aged 25 to 34 in 2006 had better skills on average than the same group did in 1996 when they were aged 16 to 24 (Satherley and Lawes, 2008a).

Gender and literacy

In 2006, women had higher prose literacy than men, but men and women had similar document literacy levels. Men performed better than women,

on average, in numeracy (Satherley and Lawes, 2008a).

Ethnicity and literacy

The ALL assessments were conducted in English, which affects the results for people who have English as a second language. To help correct for this, the following analysis looks at ethnic group by place of birth (New Zealand or overseas).³

Across the adult population, aged 15 to 64, Europeans and Asians born in New Zealand had the highest levels of prose literacy. Māori, New Zealand-born Pasifika and overseas-born Asians had the next highest levels, while overseas born Pasifika had the lowest levels. The pattern was similar for document literacy.

In numeracy, Europeans and New Zealand-born Asians again had the highest levels of skill. However, overseas-born Asians had higher levels of skill than Māori and New Zealand-born Pasifika. Again, overseas-born Pasifika had the lowest levels.

¹ See page 35 for further details on these surveys.

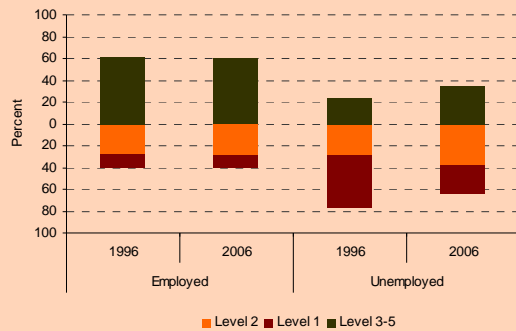
² This is the proportion who attained levels 3 to 5 on the ALL assessments. These figures differ from those reported in *Cross-strategy indicators*. The figures in this report refer to all people aged 15 to 64. In the *Cross-strategy indicators* report the age group of interest is 25 to 34.

³ The following analysis differs from that reported in Satherley and Lawes (2008b), which looked at ethnic groups as a whole. It also differs from that presented in the *Cross-strategy indicators* report, which only looked at the 25 to 34 year old population.

Priority Outcome: Increasing literacy, numeracy and language levels for the workforce

In 2006, 40 percent of employed people had prose or document literacy below the level required to participate fully in a knowledge society. These proportions have not changed much since 1996. People who are unemployed are more likely to have low levels of literacy.

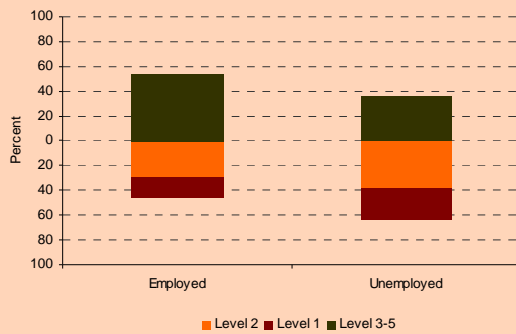
Figure 5.13: Prose literacy and labour force status



Sources: *International Adult Literacy Survey 1996* and *Adult Literacy and Life Skills Survey 2006*.

In 2006, 46 percent of employed people had low levels of numeracy, along with 76 percent of unemployed people.

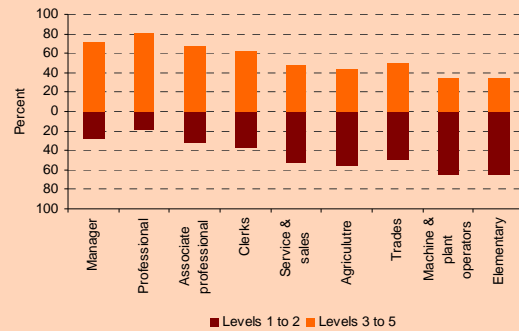
Figure 5.14: Numeracy and labour force status



Source: *Adult Literacy and Life Skills Survey 2006*.

In 2006, labourers and machine workers had the highest proportion of people with low levels of document literacy. Professionals had the lowest proportion. The largest number of employees with low document literacy were in service and sales jobs, followed by clerks and machine and plant operators.⁴

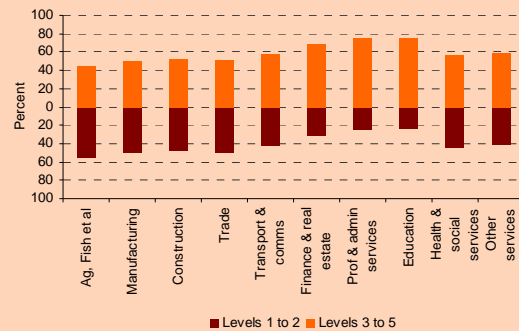
Figure 5.15: Document literacy by occupation



Source: *Adult Literacy and Life Skills Survey 2006*.

In terms of industries, agriculture and fisheries, manufacturing, construction, trade, and health and social services had the highest proportions of people with low document literacy. The largest number of people with low document literacy are employed in trade industries and manufacturing.⁵

Figure 5.16: Document literacy and numeracy by industry



Source: *Adult Literacy and Life Skills Survey 2006*.

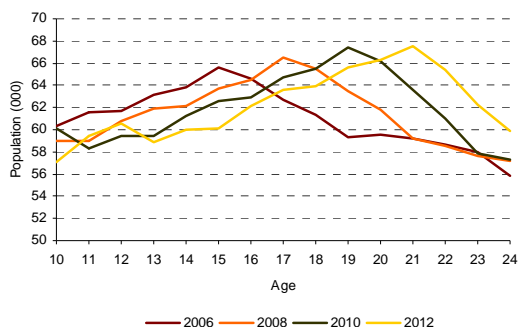
⁴ These proportions are based on the NZSCO99 and differ from proportions reported in Satherley et al (2008b), which used the international occupation classification (ISCOR).

⁵ These proportions are based on the ANZSIC06 (with some further grouping of like industries) and differ from proportions reported in Satherley et al (2008b), which used the international industry classification (ISCI).

Successful transitions from schooling: ensuring the 'baby blip' generation achieves its potential

During the period from around 2007 to 2011 there will be a larger population of young people in the 15 to 19 year age group. These are the so-called 'baby blip' generation. These young people will be a significant part of the future workforce.

Figure 5.17: National population projections



Source: Statistics New Zealand, National population projections, 2006 base, series 6.

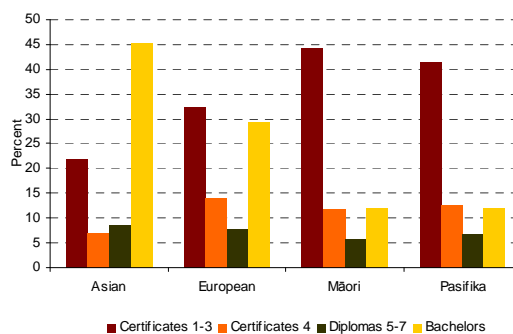
The strategy emphasises the need to ensure not only that there is capacity for these young people to participate in tertiary education at current rates, but also that the opportunity is taken to increase the achievement for this generation.

Moving into tertiary from school

Seventy-eight percent of students who left school in 2005 were in tertiary education by 2007. The largest proportion (32 percent) studied level 1 to 3 certificates, followed by bachelors degrees (26 percent), level 4 certificates (13 percent) and level 5 to 7 diplomas (7 percent).

Māori and Pasifika school leavers were least likely to go into tertiary education, with just over half enrolling within two years. In both cases, the majority of students enrolled in level 1 to 3 certificates and just over 10 percent enrolled in bachelors degrees.

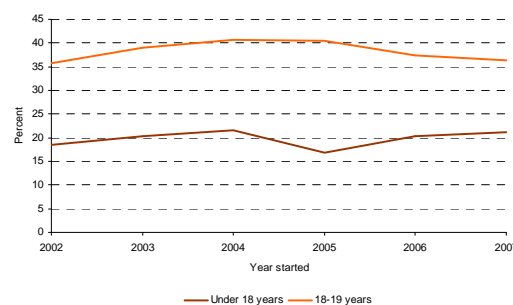
Figure 5.18: Proportion of 2005 school leavers enrolling in tertiary education by ethnic group and level of tertiary qualification



Around 70 percent of European and Asian students enrolled in tertiary education within two years of leaving school. Asian students were the most likely to enrol in bachelors degrees, with over 50 percent enrolling at this level.

Progression from tertiary level 1 to 3 certificates

Figure 5.19: Proportion of students in level 1 to 3 certificates moving to higher level study within two years

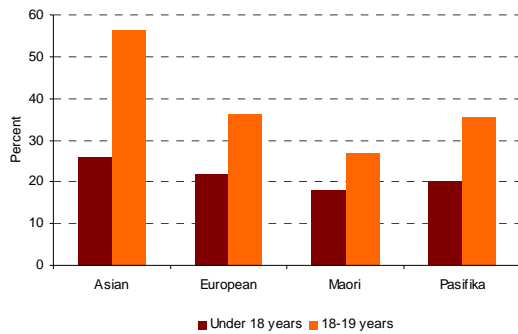


Note: Includes both full-time and part-time students

For some students, level 1 to 3 certificates at a tertiary education provider provide a pathway from school to higher levels of tertiary education. Students who went into tertiary level 1 to 3 certificates before they turned 18 are quite unlikely to go on to higher level study within two years. Those who enter level 1 to 3 certificates aged 18 or 19 are much more likely to go onto higher level study within two years.

Asian students were most likely to move on to higher-level study and Māori were least likely to do so.

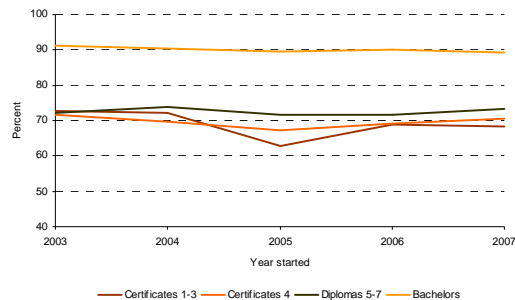
Figure 5.20: Proportion of 18 to 19 year old students enrolled in a level 1 to 3 certificate in 2007 and moving to higher level study by 2008 by ethnic group and age



Note: Includes both full-time and part-time students, and includes those who did not complete their first qualification before moving to a higher level of study.

Staying in study

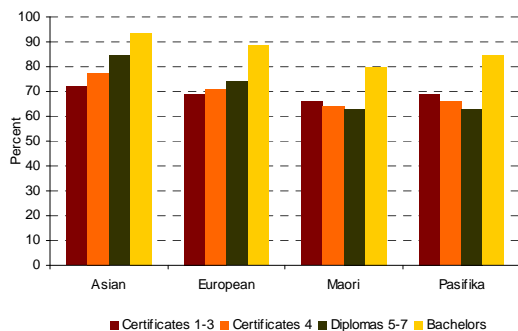
Figure 5.21: First-year retention rates for under-20 year old students by level



Note: Includes both full-time and part-time students

First-year retention rates for students entering tertiary study before the age of 20 have been fairly stable over time. As with other age groups, retention rates are higher for bachelors than for below-degree-level study.

Figure 5.22: First-year retention rates for under 20 year old students who started study in 2007 by level and ethnic group



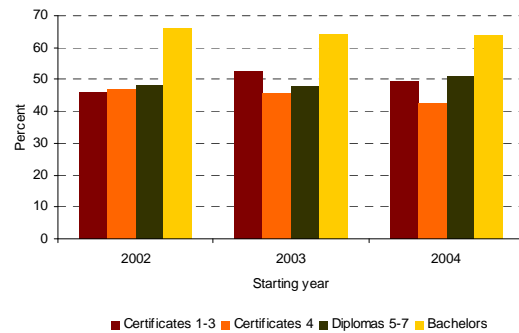
Note: Includes both full-time and part-time students

Asian students have the highest rates of first-year retention in this age group across all levels. Māori and Pasifika students have the lowest rates of retention across all levels.

Completing qualifications

Five-year completion rates for student who started below-degree level qualifications under the age of 20 have remained fairly stable. Completion rates in bachelors degrees for this group have been decreasing slightly.

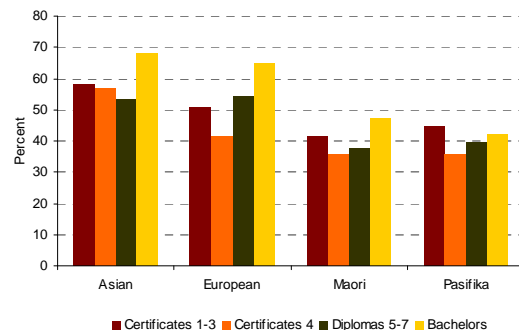
Figure 5.23: Five-year completion rates for under 20 year old students by level



Note: Includes both full-time and part-time students

Asian students had the highest five-year completion rates at all levels. Māori and Pasifika students had the lowest five-year completion rates.

Figure 5.24: Five-year completion rates for under 20 year old students who started study in 2004 by level and ethnic group

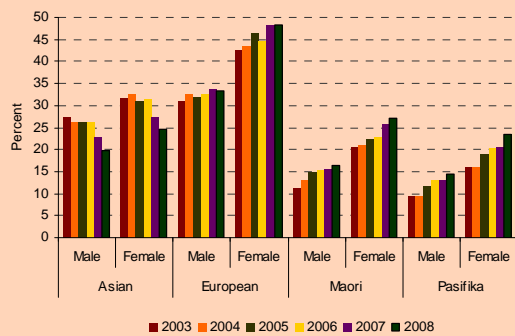


Note: Includes both full-time and part-time students

Priority Outcome:
Increasing educational success for young New Zealanders – more achieving qualifications at level four and above by age 25

In 2008, 35 percent of 25 year olds had achieved a tertiary qualification through a New Zealand tertiary education provider at level 4 or above. Women were more likely to achieve this than men. The highest rates of achievement were by European females and the lowest by Māori and Pasifika males. Rates have been improving for Māori, for Pasifika and for European females.⁶

Figure 5.25: Proportion of 25 year olds who had completed a level 4 certificate or above at a tertiary education provider

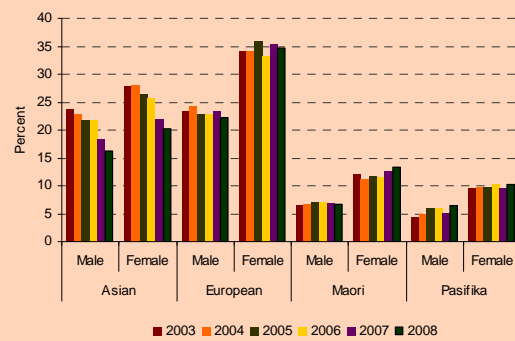


Industry training completions are not available over the same time period as provider-based completions. However, some estimates can be made for the population aged 25 in 2008.⁷

If people completing their highest qualification at level 4 or above through industry training are added in, then the overall completion rate increases to 39 percent in 2008. The completion rate for men increases from 28 percent to 36 percent and for women from 41 percent to 42 percent. European males were most likely to have completed their highest qualification through industry training – at 10 percent of 25 year olds in 2008, followed by Māori males at 5 percent.

In 2008, 24 percent of 25 year olds had achieved a bachelors degree or higher. However, the rates of attainment for Māori and Pasifika are much lower than for the other ethnic groups. Rates have remained steady across all ethnic groups.

Figure 5.26: Proportion of 25 year olds who had completed a bachelors degree or above



⁶ The achievement rates are based on completion of a qualification at a New Zealand tertiary education provider and do not include qualifications completed overseas. This is likely to underestimate the rate for the Asian ethnic group, where a proportion are new, skilled migrants who completed their tertiary education before coming to New Zealand.

⁷ These estimates cover qualifications completed between 2003 and 2008 by people between the ages of 20 and 25. Ninety-six percent of qualifications completed by industry trainees under 25 are completed in this age period.

Building relevant skills and competencies for productivity and innovation

Increased demand for advanced qualifications

There has been increased demand for more advanced skills and knowledge in the workplace, driven by:

- the desire to improve innovation and productivity
- greater use of new technology
- demographic changes in society and the workplace
- construction and infrastructure development
- increased registration requirements for a number of occupations.

Over the last eight years, increased demand for advanced skills and knowledge has been almost, but not quite, met by increased supply of people with those skills. However, there are particular occupations where there have been significant and persistent skill shortages that fall within the following groups:

- professionals
- technicians and associate professionals
- trades workers.

What constitutes an advanced qualification varies across occupational groups, from level 4 certificates for many trades to degrees and above for professionals (Earle 2008b).

Addressing skill shortages through tertiary education

Increasing the number of people with advanced trade, technical and professional qualifications is only one part of the solution to persistent skill shortages. Other parts of the solution include:

- improving the attractiveness of work (not just pay rates) so as to retain skilled workers within New Zealand
- making more effective use of skills in the workplace
- ensuring that tertiary qualifications are of quality and relevant to the current workplace

- making best use of migration to meet immediate skill shortages.

Areas of increased demand

There are a number of fields of study where there has been increased demand for graduates which had not been met.

Skill shortage data suggested that there was a high unmet demand for people with information technology qualifications. However, further investigation has shown that the unemployment rates for people with diplomas in information technology are high and the number of people who have graduated at this level is likely to have exceeded demand. Therefore, at diploma level at least, the key issue may be more about the quality of provision than the number of graduates. At bachelors level, it appears that supply of information technology graduates is adequate to meet demand. Given relatively high unemployment rates, there may also be issues of quality of bachelors degrees. At postgraduate level it appears that the number of graduates has not been sufficient to meet workplace demand.

The growth in the construction industry peaked in 2005. The industry is in overall decline now as the economy contracts, although there appears to be growth continuing in some specific areas. The key issue will be to ensure that there is an ongoing steady supply of new graduates in the building- and construction-related areas to meet medium- to long-term needs and with the skills required to deal with new technologies in the industry.

In engineering, there has been a significant skill shortage and there is a reasonable case for increasing the number of graduates to meet the future demand, particularly at diploma level and above. Even with a slow-down in the economy, current levels of graduation are unlikely to be sufficient to meet ongoing demand.

There is a similar situation in the building industry. While the overall demand for builders is likely to reduce in the short-term, increasing demand for registered builders is likely to raise the demand for tertiary qualifications in this area. As the economy recovers again, the current supply of people with up-to-date building qualifications will again be unlikely to meet growing demand.

In the health area, overall graduate supply seems to have been adequate to meet overall demand. However, there are likely to be some specialist areas where demand has not been met and others where there is over supply.

Other fields of study where there is evidence of shortages include architecture, early childhood and secondary teaching and accounting. (Earle, 2008b, 2008c and 2009).

Work-based learning

The number of employees engaging in industry training has continued to increase, from 140,000 in 2004 to 195,000 in 2008. In 2008, 34 percent of trainees were in programmes at level 4 and above. This is down from 40 percent in 2004, which indicates that much of the growth has been at lower levels of the framework.

In 2008, people exiting industry training had attained an average of 40 credits. This equates to the minimum size of a National Certificate. On average, 35 percent of learners attain a national certificate by the time they exit industry training. In 2008, 40 percent of National Certificates awarded were at level 4 and above. This is down from 44 percent in 2004, which also indicates increased growth at lower levels.

Postgraduate qualifications

People with postgraduate qualifications can offer high-level knowledge and skills which is important for development, innovation and leadership.

In the five years from 2003 to 2008, the number of people enrolled in honours degrees and postgraduate certificates and diplomas increased by 25 percent to 20,700. Masters degree enrolments remained steady at 10,500 and doctoral enrolments increased by 25 percent to 4,750.

Over the five years from 2003 to 2008, the number of students completing honours degrees and postgraduate certificates and diplomas increased by 29 percent to 7,340. The number completing masters increased by 16 percent to 3,100 and the number completing doctorates by 30 percent to 650.

The first-year retention rate for honours and postgraduate certificate and diploma students was 78 percent in 2007, up from 76 percent in 2004. For masters students the rate was 85 percent, up from 81 percent in 2004. For doctoral students it was 98 percent, up from 96 percent in 2004.

The five-year completion rate for honours and postgraduate certificates and diplomas was 65 percent for 2004 starters. For masters it was 64 percent and for doctorate students it was 34 percent. The doctoral completion rate rises to 55

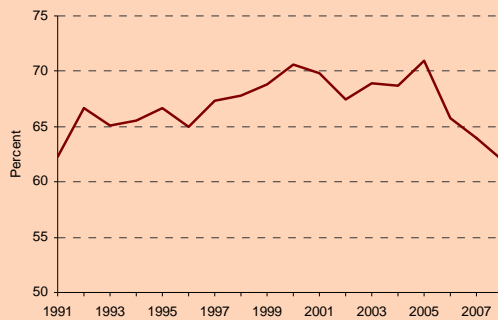
percent over a seven year period and 63 percent over a nine year period.

People who have studied at a postgraduate level earn around 19 percent more than those who have studied only at bachelors level, after adjusting for other factors. The highest earning premiums for people with postgraduate qualifications, five years after study, are paid to those with qualifications in management and commerce, information technology and engineering (Nair, 2007).

Priority Outcome:
Increasing the achievement of advanced trade, technical and professional qualifications to meet regional and national industry needs

The proportion of trades workers with a tertiary qualification increased from around 60 percent in 1991 to 70 percent in 2005, at the peak of the construction industry. The proportion has reduced down towards 60 percent in the last two years.

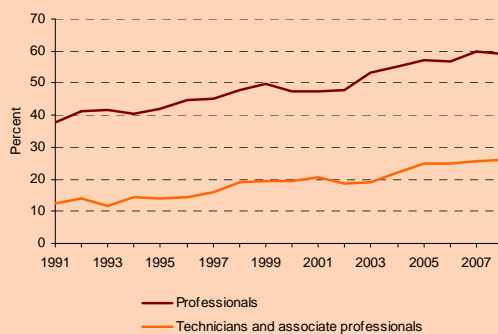
Figure 5.27: Proportion of trades workers with a tertiary qualification



Source: Statistics New Zealand, *Household Labour Force Survey*.

The proportion of professionals with bachelors degrees or above increased from 40 percent in 1991 to 60 percent in 2008. The proportion for technicians and associate professionals increased from 10 to 25 percent over the same period.

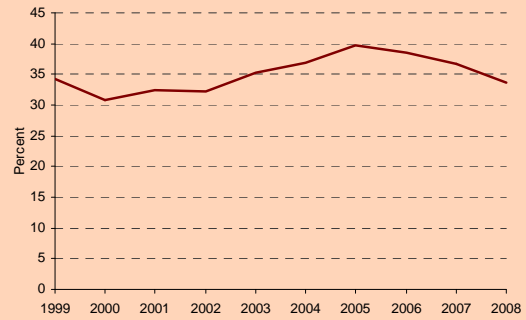
Figure 5.28: Proportion of professionals and technicians and associate professionals with bachelors degrees and above



Source: Statistics New Zealand, *Household Labour Force Survey*.

Earning premiums for trades workers with tertiary qualifications gradually increased up to 2005. Since then, premiums have decreased as wages for school qualified workers have increased more rapidly.

Figure 5.29: Earning premium for trades workers with tertiary qualifications



Source: Statistics New Zealand, *New Zealand Income Survey*.

Earnings premiums for professionals and technicians and associate professionals with bachelors degrees decreased in recent years, as earnings for people with lower tertiary qualifications have increased. The premiums for technicians and associate professionals have increased in 2008, as wages for people with bachelors degrees in this occupation have grown more than wages for people with lower level tertiary qualifications.

Figure 5.30: Earnings premiums for professionals and technicians and associate professionals with bachelors degrees



Source: Statistics New Zealand, *New Zealand Income Survey*.

Building skills and competencies for social and cultural development

The strategy recognises the important contribution of tertiary education to the development of New Zealand's society and culture. While this contribution is made across all subjects, the areas of culture, languages and creative arts have a particular role to play.

In 2008, 19 percent of students at tertiary education providers⁸ were enrolled in courses in creative arts,⁹ culture¹⁰ and/or languages.¹¹ The largest provision of creative arts, by equivalent full-time students, was at bachelors level. The largest provision of culture was in level 1 to 3 certificates (mostly through the wānanga) and at bachelors level. The largest provision of language was in level 1 to 4 certificates (mostly te reo Māori) and at bachelors level.

From 2003 to 2008, the proportion of equivalent full-time students enrolled in these courses remained steady at around 16 percent. The proportion in creative arts remained steady at 5 percent, while the proportion in culture courses increased from 3 to 5 percent and the proportion in language courses decreased from 10 percent to 6 percent. The decrease in languages was mostly in non-formal courses and level 4 certificates.

While most formal students taking these courses in 2008 were enrolled in society and culture or creative arts qualifications, 28 percent were in qualifications in other fields.

The 2006 Census shows that people with qualifications in creative arts, culture or languages work across a range of industries. Around a quarter worked in education and training and a quarter in professional, scientific and technical services, retail trade and public administration. The remaining half is spread across other industries.

⁸ Includes both formal and non-formal students.

⁹ Narrow fields of 'performing arts', 'visual arts and crafts' and 'graphic and design studies'.

¹⁰ Narrow fields of 'studies in human society' - includes sociology, anthropology, history and human geography.

¹¹ Narrow fields of 'language and literature'- includes English language, te reo Māori, other languages and literature studies.

Implementing the strategy ...

Commitments made by tertiary education organisations in their 2008 to 2010 investment plans provide a sense of how they plan to implement the strategy.

The largest proportion of commitments in 2008 to 2010 investment plans relates to this area of the contribution, with a good focus on increasing the participation of underrepresented groups, especially Māori learners. Commitments focus on improving participation, retention and course completion.

Polytechnics have a particular focus on developing capacity in literacy, language and numeracy delivery, improving outcomes for Māori and Pasifika learners and increasing progression from entry-level to higher level learning. They have also committed to increasing higher-level provision in engineering technology, health science and advanced trades qualifications, while decreasing provision in other areas.

Universities have given priority to increasing postgraduate enrolments and degree completions, as well as continuing to focus on enrolments by under-25 year olds. A focus on Māori learner success has been included in all university plans.

Wānanga have focused on increasing literacy, language and numeracy, increasing success for younger students and strengthening provision at diploma and higher levels.

The main focus of industry training organisations is on continuing to meet industry needs. They are less certain about their ability to influence student outcomes and to improve the participation of underrepresented groups, as this relies on employers' cooperation. There is good attention in investment plans to literacy, language and numeracy improvements.

Private training establishments and other tertiary education providers have a well-focussed set of commitments anticipating moderate improvements in student achievement. Their focus is on around increasing provision at higher levels and increasing the participation and achievement of younger learners.

6. Creating and applying knowledge to drive innovation

This expected contribution focuses on ensuring that research and scholarship inform teaching and contribute to economic and social development. It builds on the changes to research funding and infrastructure introduced under the first tertiary education strategy.

Supporting links between research, scholarship and teaching

Research activity provides an important base for teaching at degree level and above, in ensuring that content reflects the latest developments and in introducing students to research methodologies and analytical reasoning.

It is difficult to construct cross-system measures of the links between research, scholarship and teaching. This report presents one measure which uses information from the Performance-Based Research Fund and from student enrolments.

The measure looks at the relationship between the number and quality of research staff and the amount of teaching carried out within universities.

The Performance-Based Research Fund provides information on the number and quality of research staff within subject areas. It is possible to work out the number of degree and postgraduate students enrolled in these areas in each institution, by calculating enrolments as equivalent full-time students. This measure provides an estimate of the relative teaching load within each area.

The correlation between the number of researchers and number of students taught can then be examined within each subject area. A high correlation shows that the universities with larger numbers of research staff also have larger amounts of teaching, while those with smaller numbers of research staff have smaller amounts of teaching. A low correlation shows that there are universities with relatively large numbers of research staff and relatively less teaching and others with relatively large amounts of teaching and relatively smaller numbers of research staff.¹²

At degree level

The match of research activity to bachelors degree teaching can be examined by looking at the correlation between the number of full-time

equivalent research staff¹³ and the number of equivalent full-time students at bachelors and bachelors with honours level.

For bachelors degree teaching, the biological sciences, humanities and law, mathematics and information science, and medicine and public health show high correlations. Creative and performing arts, education and health show slightly lower correlations.

Table 6.1: Correlation between research staff and bachelors and bachelors with honours students across universities by panel

PBRF panel	2003	2006
Biological sciences	0.96	0.95
Business and economics	0.87	0.84
Creative and performing arts	<i>0.62</i>	0.80
Education	0.84	0.82
Engineering, technology and architecture	0.89	0.86
Health	0.71	0.84
Humanities and law	0.97	0.96
Mathematical and information sciences and technology	0.91	0.97
Medicine and public health	0.92	0.96
Physical sciences	0.96	0.93
Social sciences and other cultural / social studies	0.95	0.94

Note: *Italics* indicates that the result is not statistically significant ($p > 0.05$). **Bold** indicates that the correlation for the panel exceeds correlations for subjects within the panel, suggesting mismatches across the panel subjects.

The correlations were similar for both the 2003 and 2006 periods across the panels, with some possible strengthening evident in health.

From these numbers it can be concluded that there is a consistent match between research staff and teaching effort within each subject and across universities.

Masters and doctorates

The match of research activity to postgraduate teaching and supervision can be examined by looking at the correlation between the number of full-time equivalent research staff who were

¹² See notes on data sources on page 36 for a full explanation of methodology.

¹³ The number of staff assessed as 'A', 'B' or 'C' was used here, in order to provide comparable numbers across institutions and subject areas.

assessed as producing work of international or national standard¹⁴ and the number of equivalent full-time students in masters and doctorates at universities.

Table 6.2: Correlation between A- and B-rated research staff and masters and doctorate students across universities by panel

PBRF panel	2003	2006
Biological sciences	0.78	0.95
Business and economics	0.62	0.54
Creative and performing arts	0.67	0.43
Education	0.91	0.70
Engineering, technology and architecture	0.92	0.91
Health	0.73	0.83
Humanities and law	0.97	0.99
Mathematical and information sciences and technology	0.79	0.73
Medicine and public health	0.95	0.88
Physical sciences	0.96	0.95
Social sciences and other cultural / social studies	0.93	0.93

Note: *Italics* indicates that the result is not statistically significant ($p > 0.05$). **Bold** indicates that the correlation for the panel exceeds correlations for subjects within the panel, suggesting mismatches across the panel subjects.

For postgraduate teaching and supervision, high correlations were found for the humanities and law, biological sciences and physical sciences panels. However, the correlations for the two science panels mask some mismatch of teaching and research effort within the individual subjects making up these panels.

The correlations for education and health were lower at postgraduate level than degree level.

From 2003 to 2006, the correlations strengthened for biological sciences and health. However, the correlations became weaker in education. This result may reflect transitional issues as colleges of education merged with universities.

These numbers suggest that in nearly half of the subject areas, some universities have a relatively greater concentration on teaching and supervision, while others have a relatively greater concentration on research.

Focusing resources for greatest effect

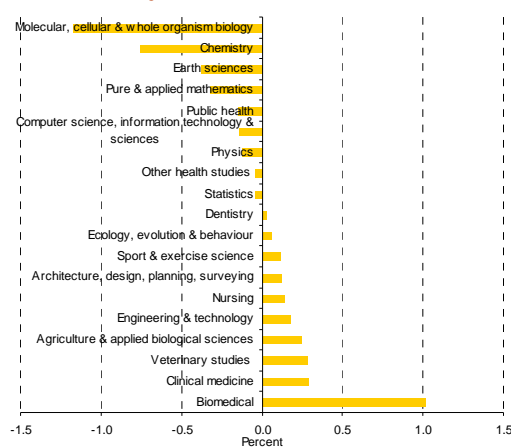
The strategy notes that “the research effort of our tertiary sector can better contribute to national goals by concentrating resources in areas:

- uniquely relevant to New Zealand’s economy, communities and environment
- where we have comparative research strength
- where we have the greatest opportunities to deliver economic and social benefits.”

Recent efforts to identify national research priorities (Minister for Economic Development 2008, Ministry of Research, Science and Technology 2008) have focused on research that relates to the following Performance-Based Research Fund panels:

- biological sciences
- engineering, technology and architecture
- health
- mathematical and information sciences and technology
- medicine and public health
- physical sciences.

Figure 6.1: Change in distribution of full-time equivalent staff rated A and B in PBRF evaluations at universities by selected subjects.



The proportion of university staff rated ‘A’ and ‘B’ in the PBRF who are in these panels provides an indicator of the extent and quality of research being undertaken. From 2003 to 2006, the number of A- and B-rated staff in universities increased by 22 percent (in full-time equivalents), so using proportions of the total provides a clearer picture of shifts.

In both 2003 and 2006, 54 percent of A- and B-rated staff (by full-time equivalents) were in these six panels. Looking at the subjects within the panels, there has been a shift in the distribution of staff towards agricultural, medical and biomedical research and away from more pure science subjects. There are a numbers of factors

¹⁴ That is, rated A or B on the PBRF quality evaluation in 2006.

influencing these shifts as explored in Smart (2008).

Improving research connections and linkages

The strategy notes the importance of strengthening research connections and linkages between tertiary education institutions, Crown research institutes and businesses to make research more effective and to ensure that more effective use can be made of new knowledge and the application of new technology.

There is limited systematic information available on research linkages. Three sources of information are presented below.

Research linkages and connections in university annual report objectives

Analysis of university annual reports from 2002 to 2006 found that around half of universities had objectives to develop research collaborations with other universities and tertiary education providers, and with stakeholders, including iwi, research institutions and government and industry (Earle 2008d).

The analysis also found a definite increase in the number of universities with objectives to develop commercial utilisation of research. These objectives covered the use of research in business and industry and generation of a commercial return on research findings. However, the trend in the objectives has been towards university commercialisation of research and away from more general transfer of knowledge and technology to business and industry.

The analysis found that up to half of the universities in each year had objectives relating to improving non-commercial utilisation of research. The wording of these objectives suggested a shift over time from developing knowledge about society and culture to applying knowledge to improve well-being.

Joint authorship of research papers

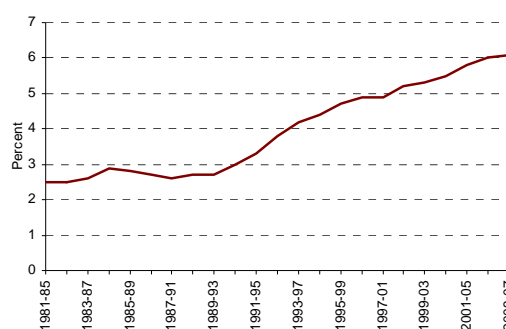
From bibliometric data it is possible to estimate the rate of joint authorship of published papers across New Zealand universities. This is the proportion of all papers from New Zealand universities within the bibliometric database that have authors from at least two different universities.

This provides a very conservative measure of research linkages between universities. It only

looks at published works covered by the database and doesn't count situations such as, two authors separately publishing single-author papers from the same research project.

However, the trend from this measure shows a definite increase in the cross-university collaboration since the early 1990s. The rate has increased steadily from around 2.5 percent in the 1989 to 1993 period to just over 6 percent in the 2003 to 2007 period.

Figure 6.2: Rate of joint authorship across universities in published papers



Source: Thomson Reuters

Information used to inform business innovation

The Statistics New Zealand Business Operations Survey collects data from businesses about how they source information to help with innovation activities. Results from this survey are presented in the following box on the priority outcome of improving research connections and linkages to create economic opportunities.

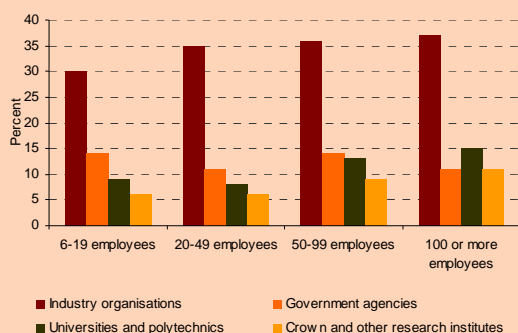
**Priority outcome:
Improving research connections and linkages to create economic opportunities**

In 2007 9 percent of businesses with innovation activity used universities or polytechnics as a source of information. This was down from 11 percent in 2005. In 2007, 4 percent of businesses had cooperative arrangements with New Zealand universities or polytechnics, down from 5 percent in 2005 (Statistics New Zealand, *Business Operations Survey 2007*).

The main factors hampering business innovation were lack of management resources, development costs and lack of appropriate personnel. Access to information was reported as a minor barrier to innovation.

The most common sources of information for innovation for businesses are staff, customers and suppliers. Around a third of businesses seek information from industry organisations. Government agencies, universities, polytechnics and research institutions are less common sources of information. Small businesses are more likely to seek information from government agencies. Larger businesses are more likely to engage with universities and polytechnics, as well as with research institutions.

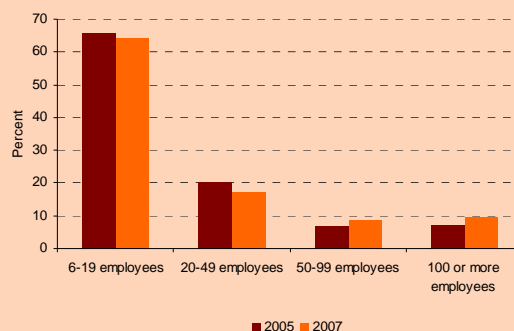
Figure 6.3: Percentage of businesses with innovation activity seeking information from selected sources by business size



Source: Statistics New Zealand, *Business Operations Survey 2007*

From 2005 to 2007, there was a shift in the distribution of businesses engaging with universities and polytechnics on innovation, with larger businesses being more likely to engage and proportionally less engagement from small to medium-sized enterprises.

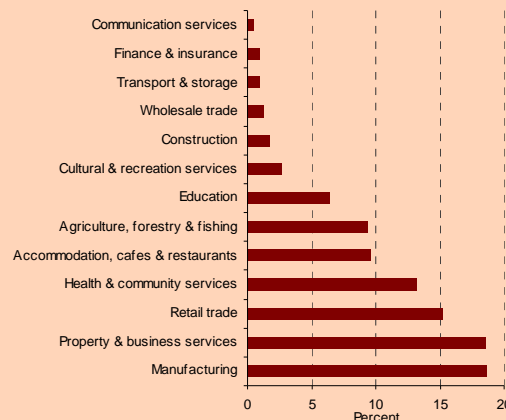
Figure 6.4: Distribution of businesses with innovation activity seeking information from universities and polytechnics by size of business



Source: Statistics New Zealand, *Business Operations Survey 2007*

The majority of businesses seeking information for innovation from universities and polytechnics were in manufacturing, property and business services, retail trade and health and community services. While businesses in the area of wholesale trade made up 11 percent of businesses with innovation, they made up only 1 percent of businesses seeking information from universities and polytechnics.

Figure 6.5: Distribution of businesses with innovation activity seeking information from universities and polytechnics by industry



Source: Statistics New Zealand, *Business Operations Survey 2007*

Businesses entering into cooperative relationships with universities and polytechnics were most likely to do so to access management skills, production processes and research and development.

Implementing the strategy ...

While all sub-sectors engage in activities related to creating and applying knowledge, only a few TEOs made strong progress-oriented commitments in their 2008 to 2010 investment plans.

Universities have made a significant commitment in this area. Their commitments focus on increasing research revenue as the highest priority, closely followed by research productivity. Commitments are also made around improving research connections and linkages, including some initiatives to enhance capability.

Polytechnics are focused on increasing their involvement in evidence-based technology development and transfer. Around half of polytechnics have made commitments in this area. Just over half also made general commitments to improving applied research.

Wānanga have given more limited attention to this area, with the focus being primarily on their contribution to the ongoing development of mātauranga Māori.

Industry training organisations, private training establishments and other tertiary education providers were not expected to develop commitments in this area.

7. Strong connections between tertiary education organisations and the communities they serve

The strategy notes that building strong connections is “not really an outcome but more a way of doing things”. This expected contribution is about organisations being able to identify and respond effectively and efficiently to the national goals and needs of their communities. Three focus areas are specified:

- connections to improve quality and relevance of education and knowledge
- connections to support economic transformation
- connections to support social, cultural and environmental outcomes.

The discussion in this section brings together information up to 2007, from a range of sources on connections between tertiary education organisations and the communities they serve. The focus is on the overall health and quality of the relationships, rather than measuring the number of connections or engagements. Quality is assessed with regard to the mutually agreed outcomes being achieved from relationships for providers, learners and communities of interest. The discussion summarises findings from research with communities (Paterson et al 2006), analysis of tertiary education organisation annual plans (Earle 2006), evaluation of the first tertiary education strategy (Ministry of Education 2006) and analysis of university annual reports (Earle 2008d).

A conceptual model of effective engagement

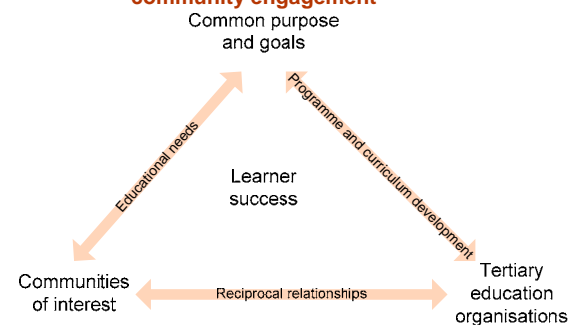
A study on tertiary education providers’ engagement with communities of interest proposed a conceptual model of effective engagement (Paterson et al 2006). The research found that:

“Effective engagement results from optimal alignment between the needs of stakeholders and the products produced by [tertiary education providers] within the short timeframes for the modern economic environment. Such engagement is premised on shared goals arrived at through the establishment of reciprocal relationships. It is nurtured by regular and meaningful communication and it is a dynamic process that is regularly and critically reviewed.”

The proposed model set out the need for providers and their communities of interest to:

- hold and understand a common purpose for the outcomes of tertiary education
- work responsively and flexibly to collaboratively produce the curriculum needed to meet the needs of students and stakeholders
- review educational needs on an ongoing basis.

Figure 7.1: A model of effective tertiary education - community engagement



Source: Adapted from Paterson et al (2006)

This should be supported by advisory processes that are highly focused on common goals, structured and accountable and that foster innovation and mutual respect.

State of connections made

With other tertiary education organisations

The last five years or more years have seen a shift in emphasis away from competition between tertiary organisations to greater collaboration.

Research covering the 2002 to 2007 period found evidence of increased cooperation between tertiary education organisations. This included:

- industry training organisations working more closely with each other and with polytechnics to improve provision for learners

- polytechnics working with a range of organisations, particularly around pathways for learners
- universities working mostly with other universities in New Zealand and overseas, to develop learner opportunities and exchange knowledge.

With schools

The development of connections between tertiary education organisations and schools has been slowly developing and, in some cases, has been limited in scope.

Development of these relationships has been a strategic focus for only some organisations. Relationships have covered tertiary provision within schools (e.g. Gateway), aligning school and tertiary curricula and recruiting students.

International connections

The level of emphasis on international connections in tertiary education organisation plans and reports over the last five years has been modest, even though there has been uncertainty about international student numbers. Universities have had a strong focus on teaching and research linkages with other universities overseas.

With industry and business

Industry training organisations are required to develop their linkages with business and industry and provide leadership in meeting training requirements. They are in the distinctive position of being both an education organisation and an industry stakeholder. Building connections with industry has been a consistent part of their work. These connections have been focused on ensuring that training and qualifications meet the needs of industry, as well as expanding the coverage of their training.

Most polytechnics have had a focus on building relationships with business and industry. This has involved developing partnerships, relationships and joint ventures with industry and involving industry in the development of qualifications.

Universities have tended to focus more on the research and knowledge needs of industry than on teaching and learning requirements. There has been a shift from seeing business as a source of research funding to more balanced relationships focusing on the knowledge and educational needs of business and industry.

Research conducted in 2006 on community engagement found that tertiary education providers surveyed were satisfied with their level of engagement with industry and believed they contributed substantially to economic and social goals of business and industry.

On the other hand, the same research found that people within industry reported wide-ranging levels of engagement with tertiary education providers. They were generally critical of the quality of engagement, often seeing it as narrowly based and lacking mutual respect. Where successful engagement did occur, it was dependent on the people and providers involved and willingness from both sides to identify and work on areas of mutual interest.

Industry participants acknowledged that tertiary education was an important contributor to both social and economic goals through the development of skilled, able and well-rounded graduates. However, several industries did not see tertiary education as directly contributing to their economic goals and thought there was more that could be done in this area. Comments were made by industry about the perceived lack of focus on active knowledge transfer and commercialisation.

The research also raised issues about the variability of skills of graduates and their suitability for the workplace. There was concern about the lack of practical and workplace skills held by graduates, with a shift towards more theoretical knowledge. It was commented on that employers did not always understand the nature and content of qualifications.

With Māori and iwi

Most tertiary education organisations have been developing relationships with Māori and iwi to some extent.

In the industry training sector, the focus has been on improving Māori participation and, in some cases, developing qualifications relevant to Māori and iwi business needs. In the public providers, the focus has been on relationship development, although the goals of the relationships are not always clear.

The research on community engagement found that all providers surveyed considered they were making moderate to substantial contributions to Māori social and economic goals. Māori and iwi organisations saw tertiary education as making a strong and vital contribution to their social and economic goals. However, their engagement with

TEOs is driven by their own aspirations, rather than the drive coming from TEOs themselves. The quality of engagement was mixed. Some reported difficulties in successfully articulating their views and aspirations through engagement at governance level.

With Pasifika communities

By 2006, around a half of tertiary organisations were developing relationships with Pasifika communities. However, only a few cases were found where the focus of the relationship was clearly on meeting the needs and aspirations of the community.

The research on community engagement highlighted that about half of providers surveyed thought they were making a moderate contribution to Pasifika social and economic outcomes.

The Pasifika community organisations interviewed in the research thought that, while they had lots of engagement with providers, these engagements varied in kind and intensity. They tended to be narrow in focus, with an emphasis on recruiting Pasifika students and providing information (from and to the community). There were varied levels of satisfaction with engagement. All of those interviewed stated that their engagements with providers did not contribute to their achieving their social goals. Some thought that tertiary education did help achieve their economic goals through student success and contracts to Pasifika organisations.

With wider communities

Connections with wider communities have only been examined for universities. Most universities referenced relationships with various parts of their communities in their annual reports. These focused on sharing knowledge and expertise through activities such as lectures, performances and publications. There were few examples of building partnerships with their communities, other than with Māori and Pasifika.

Outcomes of connections

Improving the quality and relevance of education and knowledge

This appears to be a core focus of most relationships with other educational organisations and the communities they serve. The emphasis varies from encouraging greater participation in education and knowledge transfer to genuine efforts to address new education and knowledge needs.

Supporting economic transformation

This is most clearly a focus in relationships with business and industry. There has been some consideration in relationships with Māori and iwi and with Pasifika communities.

The focus on the last five years has been on ensuring that programmes and qualifications meet industry needs and on transfer and commercialisation of specific knowledge already developed and held by TEOs. There is little evidence of engagement around the larger role of education and knowledge to lead to economic transformation and development.

Supporting social, cultural and environmental outcomes

Support for social outcomes has been mostly articulated through relationships with Māori and iwi and Pasifika communities. This has been mainly through encouraging and supporting participation in tertiary education. Supporting language and cultural outcomes has sometimes been a focus for relationships with Māori and iwi.

Engagement of universities with wider communities appears to be limited to the promotion of social and cultural events, rather than working in partnership to address social and cultural needs.

Information is not available at this stage on the extent to which tertiary education organisations work with communities on environmental outcomes.

Implementing the strategy ...

In 2007, polytechnics were asked to work with education and training providers, industry training organisations, community organisations, Māori and iwi, Pasifika communities and wider communities to pool information and gain a shared view of tertiary education needs, priorities and gaps. The resulting reports were used to inform the development of investment plans for 2008 to 2010. Initial efforts tended to focus more on producing reports, than on taking on active leadership. There was also a tension related to protecting polytechnics' own provision at the expense of creating more linkages and cooperation in their region. The process continued in 2008 with a focus on improving the information base and addressing gaps in the 2007 reports. There was a shift in focus from reporting needs to developing shared understandings of how needs can be addressed through a network of provision.

In their 2008 to 2010 investment plans, all sub-sectors anticipate good progress in this area. An unintended consequence in this area may be that communities become over-surveyed by TEOs over the next few years, reducing their willingness to engage constructively.

Polytechnics are taking an active role in their regions, as described above. They also have some well-focused and strong commitments in the area of engagement with industry.

Universities made a good start in this area, with a focus on engagement, satisfaction surveys and maintaining or increasing accreditation to meet business and industry needs.

Wānanga set out well-focused efforts to increase engagement with iwi and Māori learners.

This is the strongest area of contribution for industry training organisations, with commitments set to increase engagement with industry, as part of their leadership role. Most have included commitments to increase the proportion of employers that participate in industry training, as well as developing industry skills strategies.

Private training establishments and other tertiary education providers anticipate good progress in further developing their relationships with their communities of interest, and in many cases, identify new communities that they wish to engage with.

Notes on data and sources

Ethnic groups

Ethnicity is reported on a total response basis where possible. This means that each person is counted in each ethnic group they identify with and may be counted in more than one ethnic group.

Participation rates

The tertiary education participation rate is the total domestic student enrolment count expressed as a percentage of the population aged 15 and over.

In this report, participation rates include both provider-based and work-based tertiary education. Rates have not been age-standardised.

First-year retention rates

The first-year retention rate is the proportion of students that start a qualification and either complete it in the first year or continue in study in the following year. Rates include completion or continuance at the same or a higher level.

Five-year completion rates

The five-year completion rate is the proportion of students who have started study towards a registered qualification and have completed the academic requirements for a qualification at the same or a higher level within five years.

Five-year progression rates

The five-year progression rate is the proportion of students who started study towards a registered qualification in a specified year and went on to study a higher-level qualification within five years. The rate includes students who progressed to higher-level study without completing a qualification first and those who took a break between completion and re-enrolment.

Household Disability Survey

The 2006 Household Disability Survey measured the prevalence of disability among the resident New Zealand population living in households. Statistics New Zealand selected 40,665 people for the survey. The achieved response rate was 81 percent. The total number of respondents with disabilities was 7,059. Data obtained through the 2006 Census was used to develop the sample frame and supplement survey responses.

International Adult Literacy Survey 1996 and Adult Literacy and Life Skills Survey 2006

These surveys investigated the distribution of certain skills (such as literacy, numeracy and document interpretation) among the adult population. The surveys were conducted across a number of countries and provide both national and international comparisons.

Both surveys measure 'functional literacy', which is the ability to apply literacy skills to everyday situations.

The Adult Literacy and Life Skills Survey 2006 covered prose literacy (understanding passages of text), document literacy (understanding text with tables and charts), numeracy and problem-solving. The first two were also included in the International Adult Literacy Survey 1996.

Results are reported in five levels, where 1 is the lowest level. Level 3 and above is considered the level required to function adequately in a knowledge-based economy and society.

Household Labour Force Survey

The Household Labour Force Survey, conducted by Statistics New Zealand, is a quarterly survey of 15,000 households, providing information on labour force status.

Data in this report is taken from the June quarters.

New Zealand Income Survey

The New Zealand Income Survey is a supplement to the Household Labour Force Survey and is run every June quarter.

Earnings premiums

Earnings premiums in this report are calculated as the ratio of the median earnings of one group compared with the median earnings of another.

For trade workers, the earnings premium is the ratio of the median income of those with tertiary qualifications to those with school qualifications.

For professionals and technicians and associate professionals, the earning premium is the ratio of the median income of those with bachelors degrees to those with tertiary qualifications below degree level.

Earnings are measured as the hourly wages from the person's main job. The median earnings is the level of earnings at which half of the population earn below that level and half earn above it.

Three-year rolling averages of median income were used to smooth out differences due to sample error and estimate the longer term trends.

Performance-Based Research Fund

The Performance-Based Research Fund allocates research funding to tertiary providers based on a systematic assessment of the research outputs and activities of staff. A quality score can be derived for each provider and each subject area based on these assessments.

Match of research and teaching

The first measure of research and bachelors teaching compared:

- the number of full-time equivalent research staff who scored A, B or C in the 2003 and 2006 Performance-Based Research Fund quality evaluation; with
- the number of equivalent full-time students in bachelors degrees, bachelors with honours degrees, and graduate and postgraduate certificates and diplomas in 2004 and 2007 respectively.

The former represents the number of research staff who have been directly engaged in producing research outputs over the preceding six years. The latter approximates the amount of teaching undertaken that focuses on building academic and professional knowledge and skills.

The second measure of research leadership and masters and doctoral study compares:

- the number of full-time equivalent research staff who scored A or B in the 2003 and 2006 Performance-Based Research Fund quality evaluation; with
- the number of equivalent full-time students in masters (including taught masters) and doctorates in 2004 and 2007 respectively.

The former represents the number of research staff who are recognised as national or international leaders in their field. The latter approximates the amount of teaching, supervision and self-directed research being undertaken by students at a level where they are expected to develop specialist expertise in their field.

The subject areas for the Performance-Based Research Fund were mapped to the subject of course enrolment, as classified by the New Zealand Standard Classification of Education. The information has been aggregated to the Performance-Based Research Fund panels for presentation in this report. The Māori Knowledge and Development Panel has not been included as teaching by people researching in this area is embedded across a range of subjects, making comparison inappropriate.

Colleges of education were included with the universities they have merged with for both enrolments and Performance-Based Research fund staff for both periods.

The comparisons are made within subject areas and across universities. This removes issues of the comparing relative teaching and research across subjects within the same institution. It also provides a better system-based measure.

The correlation coefficients were calculated using the natural log of both measures. This approach assumes that a percentage increase in one measure will relate to a percentage increase in the other. It also reduces distortions due to the order of magnitude differences in the two scales.

Thomson Reuters

The Thomson Reuters database provides information on research published in selected academic journals, mostly based in Europe and North America. The database provides information on the authors, their institutional affiliations and citations of works.

The database excludes research published in books and book chapters, as well as research in the form of performances or exhibitions. Therefore, the research output in subject disciplines such as the social sciences, humanities and performing arts is not well represented compared with the biological and physical sciences. The database also excludes a large proportion of research published in New Zealand and Australian journals.

Nevertheless, despite these caveats, this data source still provides one of the few independent ways of monitoring the international impact of New Zealand tertiary education research.

Business Operations Survey

The Business Operations Survey 2007 was conducted by Statistics New Zealand in August 2007. The survey had a modular design and

included an innovation module (sponsored by the Ministry of Research, Science and Technology) and a business performance module. The modular design enables analysis of the effect of businesses' practices on their performance.

In 2007, the innovation module was refined to make the way innovation is measured clearer. As a result, more details are available on innovation activities and expenditure on product development and related activities.

The innovation module of the Business Operations Survey is designed to collect innovation data in accordance with the Organisation for Economic Co-operation and Development (OECD) guidelines contained in the third edition of the *Oslo Manual* (2005).

An **innovation** is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new

organisational method in business practices, workplace organisation or external relations.

The *Oslo Manual* identifies four types of innovations:

- product innovations – new or significantly improved goods or services
- process innovations – new or significantly improved methods for production or delivery (operational processes)
- organisational innovations – new or significantly improved methods in a firm's business practices, workplace organisation or external relations (organisational or managerial processes)
- marketing innovations – new or significantly improved marketing methods.

References

- Earle, David (2006) *Lining up? The influence of the Tertiary Education Strategy 2002/07 on tertiary education organisation profile objectives*, Wellington: Ministry of Education.
- Earle, David (2008a) *Hei titiro anō i te whāinga: Māori achievement in bachelors degrees revisited*, Wellington: Ministry of Education.
- Earle, David (2008b) *Advanced trade, technical and professional qualifications – identifying demand*, Wellington: Ministry of Education.
- Earle, David (2008c) *Advanced trade, technical and professional qualifications – matching supply to demand*, Wellington: Ministry of Education.
- Earle, David (2008d) *University objectives – an analysis of university annual reports 2002-2006*, Wellington: Ministry of Education.
- Earle, David (2009) *Advanced trade, technical and professional qualifications – trends in supply*, Wellington: Ministry of Education.
- Fergusson, David M., Horwood, L. John and Boden, Joseph M. (2008) The transmission of social inequality: examination of the linkages between family socioeconomic status in childhood and educational achievement in young adulthood, *Research in Social Stratification and Mobility*, 26, pp 277-295.
- Minister for Economic Development (2008) *Economic transformation: progress update May 2008*, paper to Cabinet Policy Committee.
- Ministry of Education (2006) *Getting started: report on stage 1 of the evaluation of the Tertiary Education Strategy 2002/07*, Wellington: Ministry of Education.
- Ministry of Education (2007) Parental income and the choice of participation, in *Profile and trends 2006 – New Zealand's tertiary education sector*, pp. 131-134, Wellington: Ministry of Education.
- Ministry of Research, Science and Technology (2008) *Transformational Research, Science and Technology*, <http://www.morst.govt.nz/current-work/transformational-rst/>, accessed 3 September 2008.
- Nair, Bhaskaran (2007) *Measuring the returns on investment in tertiary education three and five years after study*, Wellington: Ministry of Education.
- Organisation for Economic Cooperation and Development (2008) *Education at a glance 2008 – OECD indicators*, Paris: OECD.
- Paterson, Gordon, Mitchell, David, Oettli, Peter, White, Hera, Kalavite, Telesia and Harry, Kenneth (2006) *Engagement of key stakeholder groups with the tertiary education providers*, Wellington: Ministry of Education.
- Satherley, Paul and Lawes, Elliot (2007) *The Adult Literacy and Life Skills (ALL) Survey, an introduction*, Wellington: Ministry of Education.
- Satherley, Paul, Lawes, Elliot and Sok, Saila (2008a) *The Adult Literacy and Life Skills (ALL) Survey: overview and international comparisons*, Wellington: Ministry of Education.
- Satherley, Paul, Lawes, Elliot and Sok, Saila (2008b) *The Adult Literacy and Life Skills (ALL) Survey: education, work and literacy*, Wellington: Ministry of Education.
- Satherley, Paul and Lawes, Elliot (2008a) *The Adult Literacy and Life Skills (ALL) Survey: age and literacy*, Wellington: Ministry of Education.
- Satherley, Paul and Lawes, Elliot (2008b) *The Adult Literacy and Life Skills (ALL) Survey: gender, ethnicity and literacy*, Wellington: Ministry of Education.
- Scott, David (2008) *How does achievement at school affect achievement in tertiary education?*, Wellington: Ministry of Education.
- Scott, David and Smart, Warren (2005) *What factors make a difference to getting a degree in New Zealand?* Wellington: Ministry of Education.
- Smart, Warren (2008) *Trends in measured research quality: an analysis of PBRF Quality Evaluation results*, Wellington: Ministry of Education.

Ussher, Scott (2007) *Tertiary education choices of school leavers*, Wellington: Ministry of Education.

Ussher, Scott (2008) *Post-school choices: How well does academic achievement predict the tertiary education choices of school leavers?* Wellington: Ministry of Education.

Wylie, Cathy and Hodgen, Edith (2007) *Competent learners @ 16 – competency levels*

and development over time, Wellington: Ministry of Education.

Wylie, Cathy, Hipkins, Rosemary and Edith, Hodgen (2008) *On the edge of adulthood – young people's school and out-of-school experiences at 16*, Wellington: Ministry of Education.