Evidence Brief for the Tertiary Education Strategy

September 2019

Executive Summary

Tertiary education equips learners with the skills and qualifications for success in work and in life. Tertiary education also helps develop the skills required in a modern economy and is a key source of research and innovation.

The fundamentals of our tertiary education system are largely sound with New Zealanders participating in tertiary education throughout life and attaining, relative to other OECD countries, high levels of tertiary qualifications. Employment outcomes from tertiary education are strong and government's investment in tertiary education compares well internationally. New Zealand also produces a large amount of research output per dollar invested. Much of this research is of high quality when compared internationally, with pockets of world-class excellence.

Alongside these strengths, some outcomes from our tertiary education system need to be improved. Some learners are underserved by tertiary education and continue to face disadvantage in going onto and achieving at Level 4 and above. Those underserved include young Māori and Pacific learners and those with disabilities or learning support needs. The current tertiary education system is also inflexible for upskilling throughout life, and foundation programmes are not supporting progression to higher levels of tertiary education as well as they could.

Whilst the skills levels of the New Zealand workforce compare well with many nations in the OECD who have higher GDP per capita, our productivity and income returns on qualifications, by OECD standards, are low. Whilst many of the drivers of New Zealand's low productivity sit outside the tertiary education system, our high rate of qualification mismatch, relative to other OECD countries, may be contributing to this. Tertiary education research could also be better connected to end users, including communities and industry.

Into the future, the tertiary education system is faced with a number of challenges and opportunities. It will need to be flexible and adaptable, providing access to life-long learning opportunities so people can upskill as technology and the economy change. Clear and well supported career pathways will continue to be important, both for those affected by the changing nature of work and in addressing persistent inequities in tertiary education and employment outcomes.

To remove barriers to participation and improve achievement, tertiary education organisations need to be more responsive to and accessible for all learners. Institutional racism and bias must be addressed seriously and urgently. There is considerable evidence that learners achieve well when educators actively value and reflect their culture, language and identity. For Pacific and Māori learners, provider engagement and partnership with 'aiga/whanau and iwi, hapū and communities is also crucial to supporting success in education. Both the Crown and tertiary providers need to work in partnership with Māori and iwi to ensure Māori aspirations for education are met.

For those with disabilities, there needs to be greater encouragement and support for learners to participate and enrol in tertiary education, improved learning support and active support for job placements.

1. The importance of tertiary education

Developing the skills and knowledge of New Zealanders contributes to the social, economic and environmental well-being of New Zealand. Tertiary education equips learners with skills and qualifications for success in work and life, and to participate more fully in civic and democratic life. There is a positive association between higher education and skills and self-assessed health status, civic engagement, and inter-personal trust (OECD, 2016).

Tertiary education helps develop the skills required in a modern economy. Tertiary education helps people obtain skilled work and higher incomes, provides skills for industries and businesses, and helps people respond to change and innovation. The tertiary education system is therefore an important contributor to economic growth and individual and whānau economic well-being through paid work.

Tertiary education is also a key source of research and innovation, and a significant export sector with high levels of international students participating across New Zealand's tertiary system.

The evidence in this brief contributes to the development of the draft Tertiary Education Strategy. The first section of the paper outlines the current evidence on the performance of the tertiary education system, including where the system does well and where there is a need for improvement. All data presented in this section is from Education Counts, Ministry of Education (www.educationcounts.govt.nz) unless otherwise referenced. The second section of the paper sets out key future challenges for the tertiary education system.

2. Current State: what does the evidence tell us about the tertiary education system?

2.1 The fundamentals of our tertiary education system are largely sound

New Zealanders participate in tertiary education throughout their life

In 2018, 11 percent of the working age population (ages 16 to 64) participated in tertiary education. Just over half of these learners studied at bachelors or higher.

OECD's *Education at a Glance 2018* (OECD 2018a) provides indicators on how New Zealand's education system compares to those of other developed countries. In terms of participation in tertiary education, it shows that:

- When the labour market is relatively weaker, the rate at which young New Zealanders (those 16 to 24) participate in tertiary study tends to be about the same as the OECD average. When the labour market is stronger (as it is currently), participation in tertiary study at these ages is often a little lower than the OECD average.
- However, at older ages, New Zealand continues to have relatively high rates of participation. When non-formal learning is included, New Zealand has the highest rate in the OECD of 25 to 64-year-olds in education.
- While caring for children is a major barrier to participation across the OECD, in New Zealand the participation gap between those who have children and those who do not, is smaller than in most countries.

- Women are more likely than men to enrol in, and graduate from, tertiary education. The rates of female enrolment and graduation in New Zealand are similar to the OECD average.
- New Zealand also has relatively high levels of participation in vocational-level study, including both institution-based and workplace-based.

High levels of New Zealanders attain tertiary qualifications

In 2018, 115,000 domestic students completed a qualification, with over a third of these being bachelors degrees or postgraduate qualifications. The number of students who complete a qualification and the qualification completion rate are useful measures of the effectiveness and efficiency of the tertiary education system.

Our completion rates for full-time study compare well with other countries. However, compared with other countries the New Zealand system is characterised by very high levels of part-time, or part-programme study, which have lower qualification completion rates (OECD, 2018a).

The qualification completion rates for Level 1 to 3 certificates have been steady over the last six years.[1] The trend in the qualification completion rate for level 4 to 7 certificates and diplomas has also been steady.[2] The completion rates for bachelors degree and above have been steadily increasing.[3] Completion rates are higher for postgraduate qualifications than for bachelors degrees.[4]

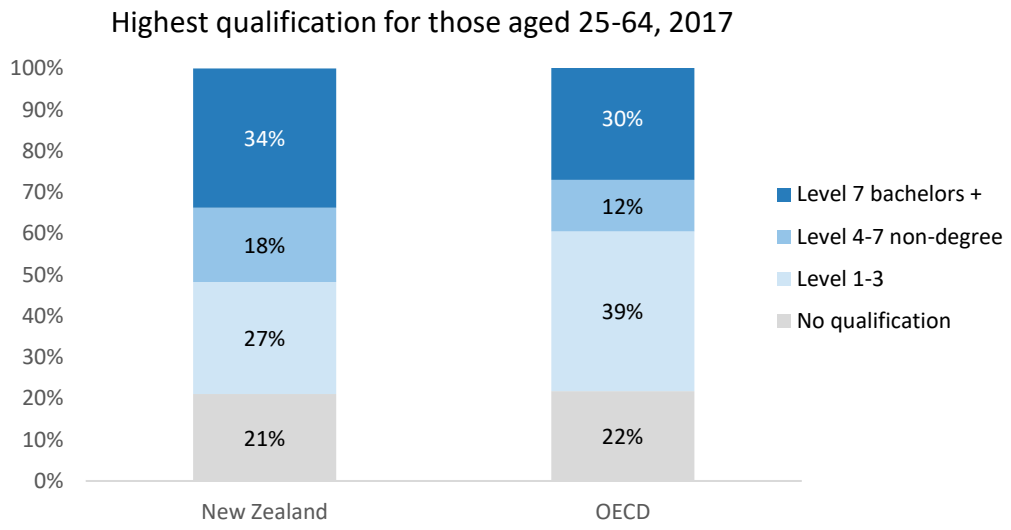
The latest international comparisons (OECD, 2018a) show that the proportion of New Zealand adults with a degree or above (at 34 percent) is just above the OECD average (30 percent). However, the proportion with a level 4 qualification or higher (at 52 percent) places New Zealand well above the OECD average (42 percent).

[1] The three-year completion rate for level 1 to 3 certificates has been around 68 percent for students starting from 2011 to 2016.

[2] The four-year completion rate for level 4 to 7 certificates and diplomas has been between 60 and 64 percent for students starting from 2011 to 2015.

[3] The five-year completion rate for bachelors and above increased from 63 percent for student starting in 2009 to 66 percent for students starting in 2014.

[4] The eight-year completion rates for masters students starting in 2011 was 75 percent, compared with 73 percent for honours degrees, 71 percent for doctorates and 67 percent for bachelors degrees.



Source: Education at a Glance, 2018

New Zealand has also seen strong growth in the share of the workforce employed in high skilled occupations (managerial or professional) (up to over 40 percent, from around 20 percent in the mid-1980s) (OECD, 2017).

Results from the Survey of Adult Skills (MoE & MBIE, 2016a) found that New Zealand adults' literacy and problem-solving skills are on average among the highest in the OECD. New Zealand adults' numeracy skills are on average higher than the OECD average.

At the same time, the skills of young New Zealanders (those aged 16 to 24) rank lower internationally than for adults as a whole (Jones & Satherley, 2017). It may be that young New Zealanders are acquiring fewer skills on average from the education system than earlier cohorts. The results from PISA 2015 show that New Zealand's average achievement in science, reading and mathematics remains above the OECD average. However, scores in science, reading and mathematics all declined from 2009 to 2012, and then remained stable between 2012 and 2015 (May et al., 2016). Alternatively, it may be that New Zealanders acquire more skills on average in adulthood than adults in other countries. As shown previously, adult New Zealanders have relatively high participation in education.

Employment outcomes from tertiary education are strong

OECD data shows that New Zealand has relatively high employment levels across all levels of educational attainment. Adults aged 25 to 64 years of age who have attained tertiary education qualifications have employment rates of 89 percent, compared to 85 percent on average across OECD countries (OECD 2018a).

Earnings increase with the level of qualification completed. Five years after finishing study, the median earnings of young people who complete a bachelors degree is 39 percent above the national median earnings and 2 percent below the median for young people who gain a certificate at levels 1 to 3. Earnings vary considerably by field of study (Ministry of Education, 2017).

In every OECD country, those with higher levels of education have higher rates of employment. However, New Zealand has one of the smallest differences in employment rates between those with the highest and the lowest levels of educational attainment (OECD

2018a). Employment rates for those with less than tertiary education qualifications are among the highest in the OECD. This probably reflects the relatively strong New Zealand labour market, in terms of labour force participation, over the past two decades. This may also be contributing to the low wage premium for skills in New Zealand (see below).

Investment in tertiary education compares well internationally

The OECD provides a number of indicators of government expenditure on tertiary education. One indicator compares the proportion that governments allocate to education from their total expenditure (i.e. on all services). This shows the relative priority that governments give to education, and on this measure, New Zealand has one of the highest proportions in the OECD. This includes all public funding, and holds regardless of how much student lending is counted as public expenditure.

It is important to note that the following OECD comparisons relate to *institutional expenditure* only, so exclude public expenditure to private individuals or organisations that is spent outside of educational institutions, such as student allowances, loans for living costs, and workplace-based training. New Zealand has relatively high public funding to students that is not spent on institutions. This is important to note when making inferences about public funding relativities for institutions versus public funding relativities for tertiary education as a whole.[5]

New Zealand's institutional expenditure per student on tertiary education – including that from both public and private sources – is about the OECD average, but well below that of Australia, Canada, the UK and US. When just publicly-sourced institutional expenditure is considered, the differences between New Zealand, Australia, the UK and US remain, but are significantly smaller. In terms of research we do not invest as much as many other countries (OECD 2018a)[6].

Across the OECD, around two thirds of expenditure on tertiary institutions came from public sources[7]. In New Zealand, tertiary institutions received 52 percent of their funding from public sources and 48 percent from private sources, most of which was household expenditure. The split between public and private funding puts New Zealand in line with comparable countries, especially Australia and Canada. These countries support higher private tuition costs through well-developed government-subsidised financial support.

The OECD also compares expenditure as a proportion of GDP, as a proxy for relative wealth, or ability to pay. On this measure, expenditure in New Zealand institutions is in the top 10, but still below that of the US, UK, Canada and Australia. When expenditure from public sources only is considered, institutional tertiary expenditure as a proportion of GDP is at a

[5] International comparisons are affected by the extent to which public student lending is considered as public or private expenditure. OECD data shows two comparisons; before transfer to students (where it is all effectively considered as public expenditure), and after transfer (where it is all effectively considered as private expenditure). On the first measure, NZ ranks in the top third of countries in terms of publicly-funded institutional expenditure per student, while on the second measure, NZ is about the OECD average.

[6] These comparisons use 2015/16 data, therefore do not reflect the introduction of the fees-free policy in 2018.

[7] This comparison is 'after transfer' so counts all public lending to students that is then paid to institutions (e.g. as tuition) as private expenditure.

similar level to Australia, and ahead of both the US and UK.

Expenditure per student relative to GDP per capita allows investment to be viewed after accounting for national wealth, as well as national demographic differences. On this measure, New Zealand is a little above the OECD average, but still below the level of the US, UK and Australia.

We have a strong international reputation for our tertiary education

The attractiveness of New Zealand to international tertiary students can be used as a proxy measure for the esteem with which New Zealand's tertiary qualifications are held internationally. New Zealand has a strong international education sector, currently holding steady at approximately 120,000 international students enrolled across our education system each year, with around 80 percent studying at tertiary level, including 48 percent of our PhD students.

New Zealand has one of the highest enrolments of international students as a percentage of all students in the OECD. OECD data (OECD 2018a) shows:

- At diploma level, New Zealand had the largest proportion of international students, at 27 percent, compared with 3 percent across the OECD.
- At doctoral level, 48 percent were international students, compared with 26 percent across the OECD. This was the third largest, behind Luxembourg and Switzerland. New Zealand's large proportion of international doctoral students is a result of its policy that international doctoral students pay the same fees as domestic students.
- At diploma level and above in New Zealand, 20 percent of students were international students in 2016, compared with the OECD average of 6 percent.

These results suggest New Zealand is a reputable destination for international students.

New Zealand's tertiary qualifications are also well regarded internationally. New Zealand has arrangements with key education and trading partners, to support recognition of each other's qualifications. These arrangements are the result of technical analysis by international experts, reflect the confidence in the New Zealand's Qualification Framework and the quality assurance system, and formally support recognition of New Zealand qualifications at the same level as those awarded in many European and Asian countries.

Our research system produces relatively high levels of quality research publications

New Zealand is effective in producing a large amount of research output relative to expenditure, producing around three times the OECD average in terms of research publications per research dollar (MBIE, 2018).[8] Much of this research is of good quality when compared internationally and there are pockets of world-class excellence. New Zealand's overall performance on citation-based indicators of research quality (which are limited but relevant indicators) remains ahead of the OECD, but largely behind the other Small Advanced Economies and Australia (MBIE, 2018).

[8] This report covers the entire New Zealand research system, and so includes research outputs from Crown Research Institutes and private research institutes.

The results of the 2018 Performance Based Research Fund (PBRF) Quality Evaluation showed that the quality and number of New Zealand researchers continues to increase. There was particular growth in research fields such as engineering, biomedical science and Māori knowledge. In 2018, 15.6 percent of university researchers were awarded an A Quality Category – compared with 13.2 percent in 2012 (Tertiary Education Commission, 2019).

New Zealand researchers are reasonably well connected internationally, judging by the proportion of New Zealand research with international co-authors (over 50 percent). However, other connections, for example between researchers and industry end-users, appear weaker at least in some areas (MBIE, 2018).

2.2 Some of the outcomes from our tertiary education system need to be improved

Some learners are underserved by the tertiary education system and are less likely to study and achieve at higher levels

Māori and Pacific people have higher rates of participation at lower levels of tertiary education than New Zealand Europeans, but achieve less at degree level.

Earle (2018b) found that some groups continue to face disadvantage, in going on to, and achieving at level 4 and above – even once their school achievement has been taken into account:

- Māori young people are generally less likely to go on to study at Level 4 and above, and those who do are less likely to achieve and complete qualifications, even if they have done well at school.
- Pacific young people are just as likely to go on to study at level 4 and above as other young people with similar school achievement, but less likely to complete qualifications if they are studying for bachelors degrees.
- Young people who receive mental health services are somewhat less likely to go on to study at level 4 and above. Those who do are less likely to achieve and complete higher level qualifications.

Disabled people are also less likely to attain higher level tertiary qualifications than non-disabled people. The Disability Survey estimated that only 19 percent of disabled people aged 25 to 34 held a degree or above qualification, compared with 40 percent of non-disabled people in the same age group. Disabled people in this age group were about as likely as non-disabled people to have a Level 4 to 7 non-degree qualification and twice as likely to have a Level 1-3 post-school certificate (Stats NZ, 2013). Even where disabled people had completed a Level 3 qualification at school, they were less likely than non-disabled people with the same level of school qualification to enrol at degree level.

Results from the OECD's Survey of Adult Skills also show that children of parents with lower levels of education are less likely to attain a higher level of education than children of parents with higher education levels (Norgrove & Scott, 2017). Similarly, if parents have higher levels of education, this is more likely to be passed on to their children. However, these effects in New Zealand are generally lower than for other developed countries. Along with Singapore, Norway and Finland, New Zealand has relatively high levels of educational attainment at degree level or higher, for those whose parents did not have tertiary education. This is mostly due to the impact of migrant families. Intergenerational education mobility for those born in New Zealand is similar to the OECD average.

The current system is focused on early life qualifications, and is inflexible for learning and upskilling throughout life

The Government asked the Productivity Commission (2017) to carry out an inquiry into the performance of the tertiary education system. The Commission stated that:

"A good tertiary education system is one that meets the needs of all students. This includes school leavers preparing for their adult lives and careers, young people needing a second chance after disengaging from education, older adults retraining to meet the needs of a changing labour market, and people of all ages who want to become more educated in areas of interest to them."

The Commission found the current tertiary education system is skewed towards serving the needs of school leavers, and is not well-placed to meet the demands of older adults seeking to retrain or those learners who have been less well served by the education system and need a second chance. The Commission found the tertiary education system is not good at trying and adopting new ways of delivering education or reaching out to groups that traditionally miss out on tertiary education. This means that the tertiary education system is not as well placed as it could be to address equity and the need for flexible, life-long learning that changes in the economy and labour market will inevitably demand.

Foundation programmes are not adequately supporting progression to higher level qualifications or employment

The transition from secondary into tertiary education does not work as well as it could for some learners. In recent years, increases in NCEA Level 2 attainment have not been accompanied by increases in progression to study or training at Level 4 or above.

Our foundation education system has been effective in supporting re-engagement in education and qualification attainment at Level 2 for learners with low or no qualifications. For example, youth guarantee participants are more likely to achieve NCEA Level 2 or equivalent than a comparison group of similar young people (Earle, 2018c). However, for many learners, foundation education is not providing direct pathways into further study or training leading to skilled employment. In 2017:

- the qualification completion rate for Level 1-2 across all providers was 58 percent
- only 44 percent of learners who did complete their Level 1-2 qualifications progressed to higher level of study within a year
- there were high levels of enrolment 'churn' with significant numbers of learners enrolling or re-enrolling at the same qualification level.

The Ministry of Education estimates that, in 2017, approximately 36 percent of young people aged 18 to 19 who enrolled in level 2 qualifications in tertiary education already had a level 2 or higher qualification (from school or tertiary education). This suggests career pathways into tertiary are not working optimally for these learners.

Recent Ministry of Education research (McGirr & Earle, 2019) looked at how to improve interventions for young people who are likely to have poor lifetime employment. Poorly developed non-cognitive (soft) skills and a lack of work experience were identified as key factors contributing to the risk of poor employment outcomes. Young people with the

poorest long-term employment outcomes have additional risk factors, including experiencing intergenerational benefit dependency and contact with Oranga Tamariki during childhood or adolescence.

International evidence shows that interventions involving job search assistance and work experience or on-the-job training are most effective in improving longer term employment outcomes. Education and training on its own is generally ineffective. The Report concludes that the following areas needed greater focus:

- A clearer, shared understanding of youth employability interventions: there are currently a mix of programmes focused on the same age group. More effective cross sector intervention requires a common understanding of employability interventions that are effective in the long term. The OECD Skills Strategy 2019 also noted that to better support New Zealand youth at risk of limited employment, there needs to be improved co-ordination, cooperation and collaboration across the whole of government (OECD, 2019b).
- Move away from current focus on youth transitions: fewer, longer and deeper interventions are preferable. Also, interventions often focus on the 15 to 24 age range but there is not such clear policy attention on upcoming generations of young people under the age of 15.
- A broader focus is required: the focus needs to be wider than just NCEA Level 2 and NEET. Work experience and non-cognitive skills could be more recognised as an intervention focus for young people at risk.

The OECD finds that career pathways disadvantage is an issue internationally and argues that disadvantaged learners need greater support and access to a view of opportunities through greater interaction with tertiary providers and employers. This needs to happen earlier in the educational pathway and needs to be person to person. Having a view of how study leads to employment opportunities improves outcomes for students (OECD, 2014).

Income returns for qualifications in New Zealand are relatively low

Income returns to tertiary education are low by OECD standards. For example, a 25 to 34 year-old New Zealander with a degree or higher qualification earns 20 percent more than those with a secondary-level qualification, compared to the OECD average premium of 46 percent. The OECD (2017) argues that low skills premiums were due to many New Zealanders being over-qualified for their jobs or working outside their field of training (see below).

However, there may be other labour market and social factors acting to compress income differences across qualification and skill levels. For example, the low income premiums partly reflect the fact that New Zealanders with only school-level qualifications have high employment and earnings outcomes compared to other developed countries (Norgrove & Scott, 2017). They may also reflect New Zealand's success in producing a large supply of tertiary-education employees.

For example, OECD data shows that earnings advantages are largest in countries with a small share of tertiary-educated people, such as Brazil, Chile, Colombia, Hungary and Mexico. Earnings advantages are smallest in countries with a large share of tertiary-educated people, such as New Zealand, Norway and Sweden (OECD, 2017).

There is also a gendered aspect to the low skills premium. Like other developed countries, there remains a persistent gap in earnings between men and women who have the same levels of educational attainment. Although some of this difference is explained by other factors such as age and occupation, in New Zealand, among people with a diploma or higher, women earn 77 percent of what men with a diploma or above earn. On average, across the OECD this figure is 74 percent (OECD 2018a).

We have high skills but low productivity

The skill levels of the New Zealand workforce appear to be on a par with many nations in the OECD who have higher GDP per capita. We also appear to use our skills as intensively as other countries. For example, New Zealanders report in the Survey of Adult Skills very high use of reading skills at work compared to other countries (MoE & MBIE, 2016b). However, New Zealand's productivity is low by OECD standards. Our labour productivity is around 35 percent below the average of the top half of OECD countries (OECD, 2017).

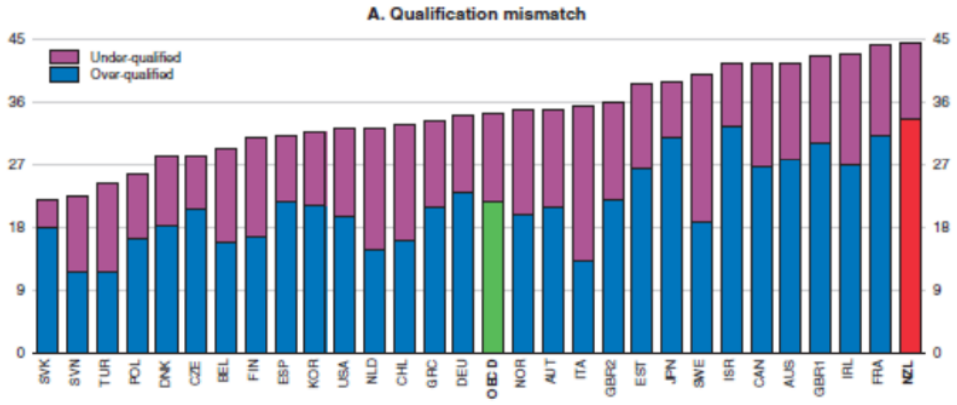
New Zealand's low productivity is due to many factors beyond the tertiary education system. The 2019 OECD Economic Survey attributes New Zealand's low productivity to geographical remoteness, insufficient scale, weak competitive pressures, low rates of capital investment and research and development (R&D) activity, and qualification and skills mismatches (OECD, 2019a).

We have problems with qualification matching

New Zealand has the highest rates of qualifications mismatch in the OECD (OECD, 2016) as shown in the graph below.

Qualification mismatch

Percentage of mismatched workers, by type of mismatch, 2012 and 2015



Source: OECD 2017a, OECD Economic Surveys: New Zealand

The extent to which qualification mismatches are influencing New Zealand's relatively low productivity is difficult to determine. Greater collaboration and coordination between tertiary providers, employers and industry, and greater emphasis on work integrated learning are likely to improve the relevance of skills attainment to economic and labour market demand. Career systems which amplify areas of skills shortage may also support improved skills matching (OECD, 2014).

Vocational education supply is not well matched to industry need

According to the New Zealand Institute of Economic Research's Quarterly Survey of Business Opinion (July 2019), a net 43 percent of businesses reported having trouble finding skilled labour.[9] As discussed above, OECD (2017) comparisons show that skills mismatches are relatively high in New Zealand compared to other countries.[10] Along with skills mismatches, the number of learners enrolling in Institutes of Technology and Polytechnics have also been declining, largely due to a strengthening labour market as the economy has recovered from the impact of the Global Financial Crisis (Stats NZ, 2019). This suggests that New Zealand does not need to increase training volumes so much as to improve training so that it better responds to firm and industry skill needs. As Martin (2018) suggests, a vocational education and training system needs to be closely aligned with the evolving demands for skills in the labour market and have a significant component of work-based learning.

Some learners are currently underserved by vocational education

There are currently inequitable education and employment outcomes from vocational education for some learner groups. Although Māori participation in vocational education is high, Māori learners tend to participate at lower levels of study, are more likely to be involved as trainees rather than higher-level apprentices, and are more likely to be in lower-skilled, lower-paying employment.

Pacific people also experience inequitable education and employment compared to non-Pacific people. Although Pacific participation in vocational education is high, these learners tend to participate at lower levels of study and are less likely to be doing apprenticeships (or apprenticeship equivalent qualifications at Level 4 and above) than New Zealand Europeans.[11]

Disabled people are also under-served by the current vocational education system and have significantly poorer employment outcomes than the general population. Disabled people also have poorer transitions into further education, training, or employment. In the June 2017 quarter, 42 percent of disabled youth aged 15–24 years were not in employment, education, or training, more than four times the rate of non-disabled 15–24 year-olds (Stats NZ, 2017c).

Women are also underrepresented in vocational education, although this partly reflects their higher representation at university study. Women that do participate in vocational education are underrepresented in traditional trades, and are overrepresented in industries like personal services and human welfare that have lower employment and income outcomes.

[9] This is a broad measure of skilled labour shortages, so would include both vocational and university-level qualified workers.

[10] Note that these measures are at least partly driven by the relatively strong New Zealand labour market.

[11] 39 percent of Pacific learners engaged in vocational education in 2017 were studying at Level 3, compared to 35 percent of New Zealand European learners. 34 percent of Pacific learners in VET were doing apprenticeships or apprenticeship-equivalent qualifications in 2017 compared to 44 percent of New Zealand European learners.

Tertiary education research needs to be better connected to end users and engage a more diverse range of participants and stakeholders

OECD data shows that New Zealand is in the bottom third of OECD countries in terms of gross expenditure on R&D as a proportion of GDP (OECD, 2018a). This is primarily due to low business expenditure – although this is increasing rapidly. Government expenditure is 0.5 percent in New Zealand compared to the OECD average of 0.68 percent (MBIE, 2018).

The current Government has set a target of raising economy-wide R&D investment to two percent of GDP over 10 years. Effective investment in R&D will help support economic growth and a higher standard of living for all New Zealanders. Investment in innovative solutions to climate change and clean technology are also vital as New Zealand transitions towards a zero carbon economy by 2050.

The low rate of business expenditure on R&D in New Zealand can be attributed in part to its industrial structure. Strong business R&D investment growth coupled with a developing start-up ecosystem suggests system-change in this area. Increased business R&D was driven by higher average investment per firm in increasingly important but less established computer services and manufacturing sectors, rather than long-standing primary and tourism industries.

New Zealand's economic productivity continues to lag behind its peers. Low R&D investment and innovation rates appear to be important factors behind New Zealand's low economic productivity (MBIE, 2018). Additionally, New Zealand tertiary research is not as well linked to industry and as impactful as it could be. OECD (2017) found that collaborations between firms, education and research institutions is low in New Zealand compared to other countries. Academic-business collaboration is problematically low, with only 1.5 percent of publications having academic-business co-authorship and 4.6 percent of higher education research being funded by business in 2016 (MBIE, 2018). This is indicative of relatively weak connections between higher education research and industry end-users at a system level.

The data for connections with other end-users, (e.g. communities, iwi and NGOs) are not as good, but there is likely to be similar scope for improvement. There are also limited data on how well the system currently supports Mātauranga Māori research through research funding.

In terms of gender, the system consistently produced around 20 percent more female doctoral degree completions, but the limited data on overall workforce structure shows room for improvement in gender diversity in senior academic and academic leadership positions (MBIE, 2018). This is particularly true for universities.

In terms of ethnicity, Māori are a particularly under-represented ethnic group among doctoral degree completions (eight percent of doctoral completions over the last five years versus around 14 percent of the total population aged 25 to 54 years). Asian and Pacific people are also poorly represented in the research workforce. Asian people make up 4.4 percent of the research workforce versus 14 percent of the population, and Pacific people 0.6 percent versus seven percent. These proportions worsen at more senior levels.

Doctoral degree completion data for domestic students indicates a potential improvement will be seen over time: 2018 data shows that 71 percent of students completing doctoral degrees identified as European, 17 percent as Asian, ten percent as Māori and three percent

as Pacific. These proportions are trending closer towards the general population than 2008 researcher population numbers.

There is currently not a coordinated approach to workforce development across the tertiary research sector. Tertiary education institutions generate this workforce and supply other research providers including Crown Research Institutes and business. Government research funding including the Performance-Based Research Fund (PBRF) and a number of other funds incentivises the production of PhD and postdoctoral students (the core of the future research workforce) in a way that is not necessarily matched to current or expected future demand for their skills.

3. What are the future challenges and potential responses?

3.1 The Future of Work and Technological Change

The impact of technology on work will be transformational

Increased technological and workplace changes are increasing the vulnerability of jobs to automation (Frey & Osbourne, 2017). It is very difficult to predict what the world of work will look like in the future. Initial estimates of up to half of existing jobs disappearing have been replaced with more nuanced predictions.

Analysis using the PIAAC survey found that across participating countries, 14 percent of jobs had a high probability of automation, and another 32 percent have a moderate probability. New Zealand had one of the lowest proportions of jobs likely to be automated, with around 10 percent with a high probability and 22 percent with a moderate probability. In general, those with higher levels of tertiary education and in higher income jobs have a lower risk of automation. Jobs held by young people are also most at risk of automation (Nedelkoska & Quintini, 2018).

It is likely that emerging and new jobs will require higher levels of skills. OECD data shows that demand for high skills is increasing, while demand for routine and physical work has decreased (OECD, 2019b). Demand will likely remain for skills that are not rules based and are less amenable to automation, including complex communication and expert thinking skills.

The demand for skills will also change as technology creates new types of jobs. New Zealand's transition to a more environmentally sustainable economy, in line with the Government's target to reduce carbon emissions to zero by 2050 (see the Climate Change Response (Zero Carbon) Amendment Bill) will also shift the demands for skills as some types of jobs are reduced and others created. These new jobs are likely to require higher skills.

Inequality could increase as the economy changes

The US experience over recent decades has been that technological change and automation have shaped an hourglass (or polarised) labour market structure. This sees medium skill level job numbers dropping, a higher proportion of people in low-skilled non-routine jobs at the bottom that are difficult to automate, and growth in highly-skilled jobs at the top (Autor, 2019; Slate Star Codex, 2018; Muro et al., 2017). It is important to note that this polarisation is less evident in New Zealand (Dixon, 2012).

There are rising concerns about whether automation will continue this polarisation of the labour market, and about the resulting impact on inequality, which has already been increasing across developed countries. Polarisation makes pathways from low skilled to higher skilled and better paid jobs less likely, requiring greater external skill development. As skill requirements become more complex the need to use networks to gain employment will increase (Piketty, 2014; Goldin & Katz, 2008; and Acemoglu & Autor, 2012).

Challenges for tertiary education

How should the tertiary education system respond to these challenges in the future? It is not clear which qualifications, in both vocational education and training as well as university education, will be needed for the jobs of the future. Some of the skills that tertiary education currently provides will no longer be needed, or needed less. "Routine cognitive

skills that involve reproducing subject-matter content – in other words, the skills that are easiest to teach and easiest to test – are also the skills that are easiest to digitise, automate and outsource" (OECD, 2012).

Rapid technological advances are therefore likely to increase the need for employees' non-routine skills such as abstract thinking, creative work and problem solving. Technological change will also increase the need for strong foundation skills, including literacy and numeracy to be able to retrain and upskill. Also, as computers accelerate workplace change, being able to read and understand descriptions of new procedures is an ever-more frequent task (OECD, 2010).

Those with the least skills are at most risk of being left behind. This makes addressing the unequal acquirement of skills and inequitable outcomes from the tertiary education system increasingly important to address. In order to ensure that automation does not lead to significant unemployment and rising wage inequality, governments will have to put in place a multi-pronged strategy. This will need to encompass education and training policies to promote life-long learning and effective active labour market policies to assist displaced workers to find new jobs (Martin, 2018).

At the same time, technology will also continue to open new possibilities for how tertiary education may be delivered, allowing for greater flexibility in how learners participate in and access tertiary courses and qualifications throughout their lives. While this will apply to both vocational education and training and university education, it is vital that the delivery of tertiary education continues to meet the needs of all learners, including those who lack access to the internet and the technology or skills required to engage in online learning. Interactive, face-to-face delivery also continues to provide learners with the best opportunities to develop and augment skills in complex communication and expert thinking. In person delivery is also particularly important in supporting the success of disadvantaged learners (OECD, 2014).

3.2 Equity for all learners

There is a need for intervention to support equity in outcomes

For all New Zealanders to enjoy decent work and incomes, investment is needed in the development and skills of people. Achieving this relies on a tertiary education system that serves the diverse needs and potential of all learners. This is increasingly important as New Zealand's population becomes more diverse, with Māori, Pacific and Asian ethnic groups making up a growing proportion of New Zealand's population (Stats NZ, 2017a).

For many of our learners we need to be doing much better. Some groups of learners are consistently underserved by the tertiary education system. These learners are disproportionately from lower socio-economic backgrounds, from parents with low educational attainment, and are Māori and/or Pacific people (Earle, 2018b; Norgrove & Scott, 2017). Given the benefits tertiary education can have on social and economic outcomes this is an important area for equitable intervention.

The Government has committed to addressing some of the economic and financial barriers to participation in tertiary education through its fees-free initiative. In addition to economic barriers, the tertiary education system needs to address the systemic barriers which limit the potential and achievement of Māori and Pacific learners and learners with disabilities and learning support needs.

Better supporting Māori and Pacific students in tertiary education

While recent trends show that Māori and Pacific people are increasingly participating and achieving in tertiary education, they still tend to be concentrated in lower levels of study, have lower completion rates in comparison to other learners. To address barriers to achievement and participation at a higher level, a whole of system approach is needed to ensure tertiary education delivery reflects and responds to the nation's diversity of cultures, languages and identities, particularly for Māori and Pacific learners.

There is considerable evidence that learners achieve well when education actively values and reflects their culture, language and identity (Airini et al., 2011; Chauverl & Rean, 2012; Theodore et al., 2017; Blank et al., 2016; Chu et al., 2013; Mayeda et al., 2014). Areas identified as supporting Māori and Pacific student success include: using culturally appropriate practices; supporting the confidence, mana, and empowerment of learners; and creating a place for learners to belong and thrive (Airini et al., 2011).

Teaching is a key component that can help or hinder Māori and Pacific student achievement in tertiary education (Sciascia, 2017). Research commissioned by the Tertiary Education Commission in 2012 identified that a culturally responsive and relevant learning environment is consistently recognised in literature as fundamental to Māori doing well in tertiary education (Chauverl & Rean, 2012).

Other socioeconomic and cultural factors are also important for Māori educational success. Research at the University of Otago identified that for the Māori university graduates who identified factors that helped them to complete their qualification, whānau was the most frequent response (39.3 percent) (Theodore et al., 2017). However, whānau was also the most commonly stated factor that hindered qualification completion (21.3 percent); including caregiving responsibilities, whānau commitments and crises. Therefore, how tertiary providers engage with whānau and communities and how they respond to students' additional commitments is important for Māori learners.

There is considerable research that engagement and partnerships with Pacific 'āiga and communities is crucial to support the educational achievements of Pacific learners (Chu, C. et al., 2013). Research across the education system has identified that good practice for Pacific learners across the education system looks like (Chu et al., 2013; Alton-Lee, 2003; Siope, 2013; Robinson, Hohepa & Lloyd, 2009):

- Respecting and valuing identity, language and culture
- Educationally powerful connections with and 'āiga communities, and home-school partnerships
- Appropriately high expectations
- Culturally responsive pedagogy
- Culturally locating all learners
- Knowing all learners and building reciprocal learning relationships
- Multiple opportunities for collaborative learning.

The tertiary education system needs to address racism

For learners to thrive they need to be free from both interpersonal and institutional racism and discrimination, including the bias of lowered-expectations. Māori educational underachievement is often attributed to the proportion of Māori learners who come from disadvantaged backgrounds but there is evidence that a higher socioeconomic position does not account for all advantages experienced by non-Māori (Blank, et al., 2016).

Racism can manifest as low teacher expectations and incorrect assumptions about the capabilities and motivations of both learners and their whānau/families, which can impede the development of good relationships and the use of effective teaching strategies. Research has signalled the importance of high expectations both for the standards that can be reached, and the pace at which learning should proceed (Webber et al., 2017).

It is important to understand the pervasive nature of institutional bias and racism, and how this impacts Māori, Pacific and ethnic minority learners in tertiary education. There is evidence in New Zealand that there are lower expectations of Māori and Pacific students and that they are treated differently in English medium education, including frequent experiences of racism and discrimination (Mahuika, Berryman & Bishop, 2011). Māori and Pacific tertiary education students taking part in a study raised the topic of racism autonomously when explaining factors that motivated their academic success and identified their university as a 'white place' due to Eurocentric curricula and on-campus racism (Mayeda, et al., 2014).

The system needs to honour Te Tiriti o Waitangi and Māori aspirations for tertiary education

In addition to their rights as New Zealand citizens, Māori also have the right to exercise authority over the education of Māori learners under Te Tiriti o Waitangi. This reflects Te Tiriti o Waitangi jurisprudence developed by the Waitangi Tribunal in terms with respect to education and other sectors (WAI 262 Ko Aotearoa Tēnei, 2011).

Both the Crown and tertiary providers need to work in partnership with Māori and iwi to ensure tino rangatiratanga and Māori aspirations for education and economic and social development are met. To achieve this, Māori should contribute to decision making across all levels of the tertiary education system, from the development of government education policies to the direct delivery of tertiary education by providers.

The Waitangi Tribunal has also emphasised the importance of balancing the relationship between tino rangatiratanga and the Crown's role of kāwanatanga, that is, the prudent stewardship of public resources and interests, including Māori as members of the public. For Māori learners this includes ensuring optimal educational and employment outcomes from tertiary education.

Te Tiriti o Waitangi also places a duty on the Crown to actively protect Māori taonga. With respect to education this includes Te Reo Māori and Mātauranga Māori. Education, in particular, has a vital role in supporting the development and sharing of cultural knowledge, such as Te Reo Māori and Mātauranga Māori. The Government has committed to work in ongoing partnership with Māori and iwi to establish how the Crown can better support these taonga.

Greater support for those with learning support needs is required

To improve tertiary outcomes, tertiary achievement for those with disabilities and learning support needs additional support is needed. The 2013 Disability Survey results suggest that physical access for disabled students at tertiary institutions is relatively well addressed for those students who do participate. Physical access may still be a barrier for those who do not participate. A major unmet need for disabled students is around learning support, particularly for students with higher support needs.

Transitions from secondary school to the world of work are also particularly challenging for students with additional needs and they face further attitudinal, access and support barriers even before they begin to seek employment. The tertiary education system will need to play a key role in improving these outcomes through encouraging these students to enrol, providing improved learning support and having an active role in job placements (Ministry of Education, report in progress).

3.3 Life-long learning and career pathways

The changing nature of work requires life-long learning

Given the rapidly changing nature of work, people will need to be adaptable to meet opportunities and challenges through their lives. Along with the impact of people working longer as lifespans increase (the labour force participation of people over the age of 65 has nearly tripled since 2001)[12], there is a need to move from a front-loaded education system to life-long learning (OECD, 2019b). Life-long learning provides benefits beyond ensuring people can continue to participate in the economy. People who continue to learn things in mid to later life have better health and quality of life (OECD, 2016). There are also potential social and intergenerational benefits from life-long learning (OECD, 2016), including in its role in revitalising and protecting Te Reo Māori and Mātauranga Māori.

As technology changes the demand for skills, the tertiary education system will need to ensure people have access to opportunities to re-skill and re-train so that they can adapt to changing skills demands in the labour market. Tertiary education will need to be flexible and accessible for learners of all ages and will need to fit in with work and caring or whānau responsibilities. It will also need to be valued and recognised by employers and highly relevant and responsive to the skills the economy demands. A greater emphasis on micro-credentialing, on the job training, and work integrated learning will support this (Martin, 2018; OECD, 2019).

The importance of career advice and support

It is important that young people are equipped early in their learning journey to navigate a changing labour market. Those who are supported to think about tertiary education and employment options from a young age are more likely to make well-informed decisions with positive outcomes (Ministry of Education, 2018). Younger people need quality career advice early to support them in realising their potential and identifying and making the most of the opportunities available to them (OECD, 2014).

[12] New Zealand has an aging population who are working longer. This is due to both New Zealanders living longer than ever before and decreasing birthrates. It is expected there will be 1.32–1.42 million people aged 65+ in 2043, over a fifth of New Zealand's total population. (Stats NZ, 2017b).

Workers who are displaced by automation and other technological change will also need quality career advice and support to ensure they can capitalise on new or emerging opportunities. New types of jobs will require new types of training and education. In addition, people remaining in the workforce for longer will mean access to quality career advice will continue to be important throughout life.

According to the OECD (2014) employer engagement is essential to an effective careers system. In addition, effective career guidance should:

- begin early in the learning journey and intensify at transition points
- challenge gender and ethnic stereotyping
- target young people from the most disadvantaged backgrounds
- amplify skills shortage areas
- and be enriched by plentiful employer engagement.

For disadvantaged learners, career guidance needs to broaden the expectations of students as well as raising expectations. It also needs to break down stereotypes and bias around jobs and careers (OECD, 2014). Where there is disadvantage, programmes need to create a greater connection between the world of work and education. For disadvantaged students, people to people connections are particularly important.

Learners from disadvantaged backgrounds have less access to opportunities, less choice and less resource (OECD, 2014). Collaboration by employers, industry, tertiary providers and schools can compensate where there is a lack of social capital and natural connections in a student's background. Making connections between employers and students also gives more meaning to education and can illustrate to learners why education is worthwhile and relevant.

4. Bibliography

Acemoglu, D. & Autor, D. (2012). *What does human capital do? A review of Goldin and Katz's The Race between Education and Technology.* NBER Working Paper 17820.

Airini et al. (2011). "Teaching for student success: Promising practices in university teaching" *Pacific-Asian Education* Vol. 23, No. 1 (pp. 71-90).

Alton-Lee, A. (2003*). Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington: Ministry of Education.

Autor, D. (2010). *The Polarization of Job Opportunities in the U.S. Labor Market*. A paper jointly released by The Center for American Progress and The Hamilton Project.

Autor, D. (2019). *Work of the past, work of the future.* NBER Working Paper No. 25588.

Blank, A. et al. (2016). *Unconscious Bias and Education: A Comparative Study of Māori and African American students*.

Chauverl, F. & Rean, J. (2012). *Doing Better for Māori in Tertiary Settings: Review of the literature*. Tertiary Education Commission.

Chu, C. et al. (2013). *Educational practices that benefit Pacific learners in tertiary education.* Wellington: Ako Aotearoa.

Dixon, S. (2012). *Technological change and the demand for skills: Are job opportunities becoming polarised?* Internal Department of Labour paper.

Earle, D. (2018a). *Monitoring Youth Guarantee 2017: Youth Guarantee Fees-Free places*. Wellington: Ministry of Education.

Earle, D. (2018b). *Going on to, and achieving in, higher-level tertiary education*. Wellington: Ministry of Education.

Earle, D. (2018c). *Secondary-Tertiary Programmes: Monitoring Youth Guarantee 2017.* Wellington: Ministry of Education.

Frey, C. & Osborne, M. (2017). "The future of employment: How susceptible are jobs to computerisation?" *Technological Forecasting and Social Change*, Vol. 114 (pp. 254-280).

Goldin, C. & Katz, L. (2008). *The race between education and technology.* Cambridge: Harvard University Press.

Jones, M. & Satherley, P. (2017). *Youth Skills: Survey of Adult Skills (PIAAC).* Wellington: Ministry of Education.

Mahuika, R., Berryman, M. & Bishop, R. (2011). "Issues of culture and assessment in New Zealand education pertaining to Māori students" *Assessment Matters*, Vol. 3 (pp. 183-198).

Martin, J. (2018). *Skills for the 21st Century: Findings and policy lessons from the OECD survey of adult skills*. OECD Education Working Papers. No. 166. Paris: OECD Publications.

May, S., Flockton, J. & Kirkham, S. (2016). *PISA 2015: New Zealand Summary Report*. Wellington: Ministry of Education.

Mayeda, D., et al. (2014). "You've gotta set a precedent: Māori and Pacific voices on student success in higher education" *AlterNative* Vol. 10, No. 2 (pp. 165-179).

McGirr, M. & Earle, D. (2019). *Not just about NEETs: A rapid review of evidence on what works for youth at risk of limited employment.* Wellington: Ministry of Education.

Ministry of Business, Innovation and Employment (2018). *Research, Science and Innovation System Performance Report*.

Ministry of Education & Ministry of Business, Innovation and Employment (2016a). *Skills in New Zealand and around the world. Survey of Adult Skills (PIAAC).* Wellington.

Ministry of Education & Ministry of Business, Innovation and Employment (2016b). *Skills at Work. Survey of Adult Skills (PIAAC)*. Wellington.

Ministry of Education & Ministry of Business, Innovation and Employment (2016c). *Skills and Education. Survey of Adult Skills (PIAAC).* Wellington.

Ministry of Education (2017). *How much more? Earnings premiums for young, domestic graduates.* Wellington.

Ministry of Education (2018). *Children and young people have good transitions and pathways through the education system.* Draft evidence brief to the Tomorrow's Schools Taskforce.

Ministry of Education (in progress) *People with disabilities and tertiary education.*

Muro, M. et al. (2017). *Digitalization and the American Workforce*. Brookings Institution.

Nedelkoska, L and Quintini, G (2018). "Automation, skills use and training" *OECD Social, Employment and Migration Working Papers,* No. 202. Paris: OECD Publications.

New Zealand Institute of Economic Research (2019). *Quarterly Survey of Business Opinion*.

New Zealand Productivity Commission (2017). *New models of tertiary education*.

Norgrove, A. & Scott, D. (2017). *How does New Zealand's education system compare? OECD's Education at a Glance 2017*. Ministry of Education.

OECD (2010). *How Technology Changes the Demand for Human Skills.* Paris: OECD Publications.

OECD (2012). *Better Skills, Better Jobs, Better Lives: A Strategic Approach to Skills Policies.* Paris: OECD Publications.

OECD (2014). *Skills Beyond School: Synthesis Report*. Paris: OECD Publications.

OECD (2016). *Skills Matter: Further Results from the Survey of Adult Skills*. OECD Skills Studies. Paris: OECD Publications.

OECD (2017a). *OECD Economic Surveys New Zealand*. Paris: OECD Publications.

OECD (2017b). *Education at a Glance 2017.* Paris: OECD Publications.

OECD (2018a). *Education at a Glance 2018.* Paris: OECD Publications.

OECD (2018b). *Seven Questions about Apprenticeships*. Paris: OECD Publications.

OECD (2018c). *Equity in Education: Breaking Down Barriers to Social Mobility*. Paris: OECD Publications.

OECD (2019a). *OECD Economic Surveys: New Zealand 2019*. Paris: OECD Publications.

OECD (2019b). *OECD Skills Strategy 2019: Skills to Shape a Better Future.* Paris: OECD Publications.

Piketty, T. (2014). *Capital in the Twenty First Century*. Cambridge, MA: Belknap Press.

Robinson, V., Hohepa, M. & Lloyd C. (2009). *School leadership and student outcomes: Identifying what works and why: Best evidence synthesis iteration*. Wellington: Ministry of Education.

Sicascia, A. (2017). *Māori learner success in tertiary education: highlights from Ako Aotearoa research projects.* Ako Aotearoa.

Siope, A. (2013). "'A culturally responsive pedagogy of relations': Coming to understand" *Waikato Journal of Education*, Vol. 18, No. 2 (pp. 37-49).

Stats NZ (2013). *Disability Survey: 2013*.

Stats NZ (2017a). *National Ethnic Population Projections: 2013(base)–2038 (update)*.

Stats NZ (2017b). *National Population Projections Overview*.

Stats NZ (2017c). *Labour Market Statistics (Disability): June 2017 quarter.*

Stats NZ (2019). *Labour Market.* Available at https://www.stats.govt.nz/topics/labour-market.

Tertiary Education Commission (2019). *Improving Research Quality: The interim results of the PBRF 2018 Quality Evaluation.*

Theodore, R. et al. (2017). "Māori University success: what helps and hinders qualification completion", *AlterNative*, Vol. 13(2) (pp 122-130).

Waitangi Tribunal (2011). *WAI 262 Ko Aotearoa Tēnei: A Report into Claims Concerning New Zealand Law and Policy Affecting Māori Culture and Identity*.

Webber, M. et al. (2018). *Starpath Phase Three – Final Report*. Auckland: The University of Auckland, Starpath Project.