Tertiary Education Commission
Te Amorangi Mātauranga Matua

Aide-Memoire: STEM graduates and skills mismatches

To:	Hon Dr Shane Reti, Minister for Universities
From:	Tim Fowler, Chief Executive
Date:	07 February 2025
Reference:	AM-25-00082

Purpose

1. This aide-memoire provides you with information on:

   a. the relationship between qualifications achieved and the industry in which people end up working, in New Zealand compared with the OECD

   b. the number of NZ graduates in science, technology, engineering and mathematics (STEM) and social science-related areas, compared to other economies.

2. This information will inform wider discussions with you about ensuring the tertiary education system is fully contributing to economic growth within constrained funding, as well as enabling broader science and innovation objectives.

3. We recommend that this aide-memoire is proactively released in full.

Skill mismatch measures reflect that New Zealand has an open labour market, a broad economy, and more general qualifications

4. OECD data show that New Zealand graduates are more likely to work in occupations or industries that do not directly match their highest qualification's field of study (43 percent compared with the OECD average of 38 percent). International differences in this measure generally reflect differences between qualification structure and specialisation, as well as the nature of the labour market and economy in each country.

5. New Zealand has a relatively low level of occupational regulation, so there are fewer jobs that are limited to specialist qualifications. Most bachelor's qualifications in New Zealand are broad. They equip graduates with a wide range of skills for a wide range of occupations – or to undertake further specialised postgraduate study.

6. New Zealand's open economy and relatively small total population mean that graduates with broader and more general skills are likely to be in demand, compared with economies that have narrower and more specialist occupations. Lower barriers to employment, such as not having narrow and specific qualification requirements, support greater mobility within our labour market in response to skill and job demands. They also enable greater skills sharing and reduce wage inflation.

7. OECD research shows that field mismatches only have a negative impact when level of the qualification is also mismatched (e.g. a worker with a level 6 diploma in engineering in a job that requires a certificate in chemistry). New Zealand qualification mismatches are not significantly above OECD averages for graduates with a bachelor's degree or above, and mainly occur at lower levels. Ministry of Education analysis found that New Zealand has a larger number of people with Level 4 to 7 non-degree qualifications than jobs that need this qualification level for entry, but no evidence that there are too many people with bachelor's degrees or higher.

New Zealand produces STEM graduates largely in line with comparable economies

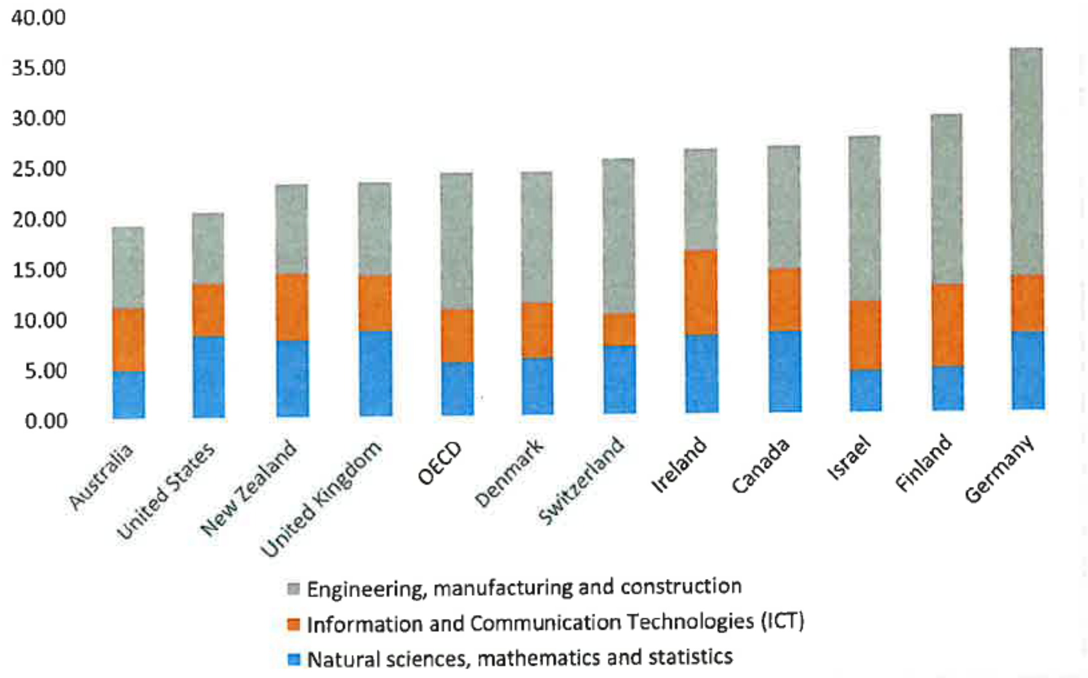
8. New Zealand's total proportion of STEM graduates is slightly below the OECD average but in line with similar countries such as the United Kingdom and above Australia and the United States. International differences reflect differences in economies and educational structures. For example, in Germany, some qualifications that would be delivered at universities in New Zealand, such as allied health, are delivered through dual-system apprenticeships. This means they are not reflected in tertiary graduate numbers which inflates engineering graduates as a proportion. New Zealand produces greater proportions of graduates in agriculture and in health and welfare than the OECD average.

Table 1: Distribution of new graduates by field of education (proportion of all graduates), 2022

	STEM	Health and welfare	Agriculture, forestry, fisheries and veterinary	Social sciences
Australia	19.15	20.04	0.86	5.80
United States	20.36	20.02	0.98	12.90
New Zealand	**23.17**	**18.92**	**2.24**	**10.50**
United Kingdom	23.28	15.92	0.70	13.60
OECD	**24.10**	**15.76**	**1.68**	**9.90**
Denmark	24.23	20.67	1.16	9.90
Switzerland	25.40	17.22	1.40	6.90
Ireland	26.24	17.69	1.27	6.50
Canada	26.47	15.50	1.05	10.70
Israel	27.46	9.64	0.38	13.90
Finland	29.40	21.18	1.97	6.60
Germany	35.94	7.91	1.69	7.00

9. STEM includes three subfields: Natural and physical sciences, mathematics and statistics; information and communication technologies (ICT); and engineering, manufacturing and construction. In the first two of these, New Zealand is above the OECD average. However, we do produce fewer graduates in engineering and related fields.

Figure 1: Distribution of new graduates by STEM field (proportion of all graduates), 2022



10. The skills required for innovation are also broader than traditional STEM subjects. To gain economic benefits, other skills need to be integrated within science and technology. These include marketing, productisation and commercialisation, logistics and chain management, intellectual property, and global management, along with critical thinking, problem-solving, creativity, communication, collaboration and divergent thinking.

Economic growth requires both adequate numbers of graduates, and ensuring they have the skills and connection to industry required

11. Within STEM there are some areas of potential undersupply, such as in engineering and specialist ICT. There may also be some specialist post-graduate science fields. In other areas, such as general sciences, there is less evidence of undersupply. Post-study outcome data also shows that STEM and health sciences graduates are more likely to go overseas after completing their studies than other graduates (13 to 24 per cent compared with an average of 10 per cent). This does not support the case for an undersupply in these fields and suggests that improving the retention of graduates and pathways to priority sectors may be more important than increasing enrolments. Over- and under-supply can also vary between levels within the same field.

12. To support economic growth and innovation, the type of education STEM graduates experience, including how it integrates with industry and builds broader skills, is as important as graduate volumes. This ensures graduates have the connections and skills to contribute to these fields.

13. The Science System Advisory Group (SSAG) has advised that a major focus of its next report will be the academic, science and innovation workforces. It notes the importance of career pathways and retention of talent in New Zealand, in both the public and private sectors. It also identifies the critical need to continue to build a more diverse workforce that better reflects the demographics of the country to ensure an equitable and inclusive research and innovation environment.

14. The SSAG is also in favour of increasing entrepreneurial training in universities, citing the blurring of traditional knowledge boundaries and the increasing need to work across disciplines.

15. The University Advisory Group (UAG), which operates in parallel with the SSAG, will also make recommendations on the tertiary funding system as it applies to universities, including how it can best support teaching and research in areas of national need.

Where there is need for growth in priority areas, TEC supports this through a range of levers

16. Increasing participation in specific STEM areas where there is unmet demand has been the ongoing focus of our investment for some time. Our annual Plan Guidance targeted priorities have consistently included STEM, at bachelor's level and above, for specific health pathways, engineering, food and fibre, innovation, and ICT. Our published investment priorities are reinforced by engagement with providers throughout the year and, ultimately, our funding decisions and ongoing monitoring.

17. Achieving significantly better retention and achievement rates is the most efficient way for the sector to improve overall STEM graduate numbers. These learners are already in the system and have met prerequisites. This is also less likely to attract learners from other priority fields, such as health. Supporting providers to do better for all learners is a key strategic focus for the TEC through our Learner Success programme.

18. A focus on increasing volumes in priority areas is often most effective when broader initiatives are also in place. These include working with industry to build learner demand, as well as to create industry pathways that ensure graduates meet their requirements and are more likely to pathway into their industry. The Engineering Education to Employment initiative is a good example.

Case study: Engineering Education to Employment Initiative

In 2010, the Institute of Professional Engineers NZ's (IPENZ) raised concerns about a growing shortage of engineering professionals, technologists, and technicians. This led the Minister for Tertiary Education, Skills and Employment, Steven Joyce, to set a goal of producing 500 more engineering graduates per annum from 2017. To support this goal, he increased the funding rates for engineering provision by 8.8 percent.

This funding boost resulted in significant increases in enrolments in university engineering programmes. However, this was partly due to universities lowering their entry requirements, which attracted students who might otherwise have attended an institute of technology and polytechnic (ITP) to train as an engineering technologist or technician. A significant portion of the universities' initial growth came from reducing numbers within ITP programmes. This exacerbated concerns about a drift towards employers using professional engineers for work that technicians could do, limiting opportunities for others, and increasing supply problems and costs.

In response, the Minister announced the Engineering Education to Employment (e2e) initiative in 2014, which brought industry, schools, ITPs and TEC together to promote engineering as a career to students, with bridging courses, work placements, scholarships, and a public awareness campaign. This aimed to provide degree pathways below the professional level (the B.Eng.Tech), mainly from ITPs. This was supported by a Budget 2015 initiative of $6 million over 4 years.

In 2017, the "500 graduates" target was met, reflecting the importance of broader supports, in addition to funding rate increases, to achieve sustainable pipelines of skills. These supports included a coordinated and sustained effort across the whole system to increase the number of students choosing an engineering career, and to identify and remove the barriers to their success.

19. We also support science research capability and capacity through the Performance-Based Research Fund (PBRF) which recognises and rewards research excellence, and the 10 Centres of Research Excellence, which incentivise and support increased postgraduate students. We have also supported MBIE to develop and procure a provider for a national applied doctorates scheme.

We look forward engaging further with you in supporting economic growth

20. Tertiary education has a significant role to play in enabling economic growth, including within the science and innovation sector. The SSAG and UAG are both focused on these areas, and in 9(2)(f)(iv) [redacted]

Tim Fowler

Chief Executive

Tertiary Education Commission

07 February 2025

Hon Dr Shane Reti

Minister for Universities

11 / 2 / 2025