SCIENCE & TECHNOLOGY AUSTRALIA POLICY SUBMISSION

4 NOVEMBER 2022

PRODUCTIVITY COMMISSION 5-YEAR PRODUCTIVITY INQUIRY INTERIM REPORT 5: FROM LEARNING TO GROWTH

Science & Technology Australia is the peak body for the nation's science and technology sectors, representing 105 member organisations and more than 90,000 scientists and technologists. We connect science and technology with governments, business and the community to advance science's role in solving some of humanity's greatest challenges.

We thank the Productivity Commission for this opportunity to offer input on From learning to growth, the fifth interim report for its 5-Year Productivity Inquiry.

Education is transformative. It uplifts our entire society to be more productive, more socially equitable, more prosperous, healthier, and safer. As we face the challenges of the coming decades, we need a society that is well-informed and well-equipped to deliver new innovations to support our society and way of life. We will need more university-qualified graduates entering the workforce, and more STEM-skilled graduates in particular, to meet the needs of a future workforce driven by technological advances.

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The productivity gains from a highly educated workforce extend across society. Graduates themselves will gain a significant earnings premium over their careers, but benefits also extend to people without degrees – the 'spillover effects' of university graduates entering the workforce include job creation for non-graduates, boost wages for non-graduates, and make a powerful contribution to Australia's GDP.[1]

MEETING FUTURE SKILLS AND JOB NEEDS

The report notes that the demand for workers with a bachelor level qualification or higher to support a skilled workforce significantly outpace available university places over coming years (p46). This highlights the importance of maintaining a strong and accessible university system that is well-resourced to meet the workforce demands of the future. Support for STEM degrees will be especially

[1] https://www.universitiesaustralia.edu.au/wp-content/uploads/2021/01/The-graduate-effect-higher-education-spillovers-to-the-Australian-workforce.pdf

important, given the Government's goal of building Australia's tech sector to achieve 1.2 million tech jobs by 2030.
Science & Technology Australia supports calls for extra fully-funded university places. Universities cannot be expected to teach more students without additional funding for each extra place. STA also backs more support for equity groups to ensure higher education is accessible to all Australians.

JOB READY GRADUATES FUNDING PACKAGE

Science & Technology Australia welcomes the Productivity Commission's critique of the Job Ready Graduates funding package. The scheme proposed to create 39,000 extra university places over three years – **but with no additional Commonwealth funding**. The scheme included a three-year transitional buffer arrangement, which is set to expire in 2024 – this is when universities will feel the full impact of the funding changes.

The package adjusted Commonwealth funding per place for degrees, as well as the student contribution amounts (student fees). The premise for these adjustments was to direct student choices by reducing the student contributions for degrees in areas of skills shortages – such as STEM.

Science & Technology Australia certainly supports the goal to produce more STEM-skilled graduates. However, the package ultimately created the opposite incentive. It significantly cut the total funding to universities per student place in several STEM degrees – by 17 per cent for mathematics, 16 per cent for science, and 9 per cent for agriculture. Per place funding for other important degrees was also cut – by 8 per cent for nursing and 6 per cent for education[2].

At the same time, the student contribution amounts for several humanities and social science degrees (HASS) degrees were raised, creating a boost to total funding per place for HASS degrees.

Combined, these changes have created a perverse disincentive for universities to produce more STEM graduates in areas pivotal to Australia's future productivity.

The report notes the income-contingent nature of HELP loans support students to undertake university study – which are designed to be repaid only when students earn wages above a designated threshold – makes students much less sensitive to price signals. They choose university courses based on their interests and aptitude.

Given the importance of having STEM-qualified graduates to support the workforce, Science & Technology Australia advocates restoring the previous funding levels for each student enrolled in a STEM degree.

TEACHING QUALITY

The report notes the high number of teaching staff at universities on casual contracts, suggesting that this, and an existing strong focus on rewards gained from a strong research capability, limits universities' ability to improve quality in teaching and enhance student outcomes (p82). Science & Technology Australia is alarmed at the scale of job insecurity in STEM teaching and research in the higher education sector and has consistently advocated for stronger job security and certainty.

[2] https://www.universitiesaustralia.edu.au/wp-content/uploads/2020/09/200910-UA-submission-to-inquiry-into-JRG-legislation.pdf

Similarly, the report suggests teaching quality and learning outcomes could be improved through greater 'contestability' of funding for universities. In a system where funding is already constrained, yet will be expected to cater to larger numbers of students over the coming decade (p46) this would be highly unlikely to promote a stronger system overall. Universities serve essential functions in both our cities and regions, and pitting them against each other to fight for slices of an ultimately diminishing pie will be detrimental to the sector as a whole.

At the same time, the report acknowledges the very salient issues with relying on performance-based funding for higher education, including the difficulty in establishing appropriate metrics and avoiding potential disincentives for universities to enrol disadvantaged students or those from minority groups. Science & Technology Australia strongly cautions against promoting more use of performance-based funding for higher education institutions. Education must be accessible to everyone in Australian society, and the health of our future workforce depends on supporting a diverse range of Australians to seek out qualifications and skills.

INTERNATIONAL STUDENTS

International students are referred to as a '…key financial factor in tertiary education, but less relevant to productivity' (p47). This extremely limited view fails to recognise the vast potential of international students as valuable skilled migrants that have already made a significant investment in coming to Australia. From a productivity perspective, international students come to Australia at a prime time in their lives, with all the costs of their early and secondary education having been met by their home country. They then immerse themselves in the Australian higher education system and broader society, fully funding the cost of their own university education, and making significant contributions across the entire economy. They graduate from Australian institutions with a high-quality qualification and are ideally placed to support our labour needs.

International students promote intellectual innovation through their diversity and unique perspectives. This diversity enhances the student experience for all students and enhances the quality of work. International graduates who settle in Australia through the skilled migration program, have been vital in enhancing workforce diversity in STEM fields. For example, the engineering workforce is only 13 per cent women[3]. Engineers Australia's analysis found that over the last decade, the only reason this did not decrease is the high women participation through migrant engineers.

Science & Technology Australia agrees visa and migration settings must be carefully considered to maximise the benefits international students and graduates can bring to Australia, but strongly cautions against taking a negative overall perspective or relying on negative anecdotal claims (as per p47) to guide policy.

Most importantly, we need to recognise that Australia has been privileged to attract international talent through high-quality education offerings. It is a highly competitive space, and our traditional source of students are now also investing heavily in their own quality offerings. To protect and enhance Australian productivity, we need to proactively consider the value we offer to the development and lives of our graduates – beyond their initial qualification – to stay competitive. Australia's workforce in many sectors crucial to our productivity largely depends on international graduates, trained at Australian institutions, who have chosen to make Australia home. These sectors include information and computing technology automation and robotics, industry 4.0, and

[3] https://www.engineersaustralia.org.au/sites/default/files/2022-07/women-in-engineering-report-june-2022.pdf

internet-of-things and data analytics. Improved data on the composition of these workforces is needed to properly appreciate the benefits international students and graduates bring to Australia.

SUPPORT FOR EQUITY GROUPS

Science & Technology Australia strongly supports active consideration of how best to support equity groups to improve access, retention and completion rates. These are complex considerations but are critical to ensure we achieve diversity and a range of perspectives and experience in our skilled workforce, as well as a more equitable and productive society more broadly.

Please do not hesitate to contact us if we can assist with any additional information.

Yours faithfully,

Professor Mark Hutchinson
President
Science & Technology Australia

Misha Schubert
Chief Executive Officer
Science & Technology Australia

SCIENCE & TECHNOLOGY AUSTRALIA / PO Box 259 CANBERRA ACT 2601 / 02 6257 2891 /
info@sta.org.au / www.scienceandtechnologyaustralia.org.au / ABN 71 626 822 845

SCIENCE & TECHNOLOGY AUSTRALIA POLICY SUBMISSION

4 NOVEMBER 2022

PRODUCTIVITY COMMISSION 5-YEAR PRODUCTIVITY INQUIRY INTERIM REPORT 3: INNOVATION FOR THE 98%

Science & Technology Australia is the peak body for the nation's science and technology sectors, representing 105 member organisations and more than 90,000 scientists and technologists. We connect science and technology with governments, business and the community to advance science's role in solving some of humanity's greatest challenges.

We thank the Productivity Commission for this opportunity to offer input on Innovation for the 98%, the third interim report for its 5-Year Productivity Inquiry.

Innovation – and the ground-breaking transformative research that drives it – is the beating heart of a thriving economy. Indicators like the global Economic Complexity Index, the Harvard Atlas of Economic Complexity and the Global Innovation Index show strong connections between robust R&D funding and economic complexity and innovation. Investment in R&D is money well spent.

Right now, the world is in a fierce science and technology race for economic advantage. Australia must maintain – and lift – investment in both public and private R&D to compete globally and boost our sovereign capability. We need to back our world-class researchers to keep pushing boundaries, and seek the frontier knowledge that will lead to the innovation needed to drive our economy and productivity.

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The living standards and opportunities of our children and grandchildren will rely on the investments we make now in the economy-transforming capabilities of breakthrough research.

If Australia doesn't keep pace with our economic rivals, we face the grave risk of consigning ourselves to be consumers rather than creators, eroding our sovereign capability in science and technology and making us more reliant on other nations amid seismic geopolitical shifts.

DIFFUSION VS ACTIVE INVESTMENT IN RESEARCH AND DEVELOPMENT

The Productivity Commission notes there is a difference between novel innovation and 'diffusion'. However the report's almost exclusive focus on 'diffusion' fails to properly acknowledge the critical importance of transformative novel innovation and the importance to countries and their productivity performance of pursuing such ambitions with targeted research and development goals.

The commission observes: "Innovation at the frontier involves especially high-risk activities that often require scarce upfront capital, are penalised by the tax system and whose returns are diluted because other firms can adapt the ideas without paying for them."

This highlights the importance of government investment in publicly funded research – the high risk, potentially high gain activities – innovation at the frontier – that private companies are not prepared to undertake.

Australia's home-grown research capabilities are one of our economy's superpowers. We cannot rely on a strategy of mostly importing innovation from abroad coupled with 'diffusion' to produce new ideas, new knowledge or create new breakthroughs.

Blue sky research is often incremental in nature, with each study or project building on work that has come before, collating and synthesising knowledge in new ways with new applications. In this respect, some elements of 'diffusion' are inherent in Australia's research system, but the active pursuit of new knowledge cannot rely on simply absorbing ideas from elsewhere.

Strong, consistent and growing investment from governments in public research institutions is essential to build Australia's sovereign capabilities in crucial research areas that will be needed to navigate challenges and threats – both domestic and global – in the coming decades.

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A strategy of offshoring, combined with 'trickle-down innovation' is not a sensible innovation policy for Australia. It would be an absurd and incredibly short-sighted idea that would leave Australia poorer economically and robbed of its inventiveness and creativity. It would be a disastrous 'own goal' for our country's productivity and economic growth.

TAX SETTINGS

The report speaks of better supporting innovation 'diffusion' through supportive tax and regulatory settings. Science & Technology Australia supports tax incentives such as the Patent Box tax break announced in the 2021 Budget to boost commercialisation of research and innovation developed here in Australia.

The report contends 'diffusion' is businesses adopting incremental changes and progress towards best practice. Such activity should not be regarded as research and development, nor innovation. It is simply continuous business improvement – and should not attract tax incentives such as the Research & Development Tax Incentive.

UNIVERSITY RESEARCH COMMERCIALISATION

Public funding of research is an investment. The benefits of this investment flow throughout our economy and society in the many ways university research is translated into everyday benefits.

One of the many gains to the broader Australian community from strong public investment in research is realised when research findings move beyond the laboratory and into industry. Stronger research commercialisation has the potential to significantly boost productivity – spurring the economy through creating new jobs, start-ups and businesses.

We cannot rely on a strategy of 'diffusion' for this to happen. Greater progression of university research along the technology readiness level path requires concerted and directed effort.

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SKILLED MIGRATION

Recommendation direction 2.1
Skilled migration as a means to diffuse technologies and skills
Skilled migrants have skills that are lacking in Australia, thanks to their experiences with frontier technologies and practices developed overseas. Facilitating skilled migration will remove barriers to the diffusion of those technologies and skills. An expanded and adapted employer-nominated migration scheme would allow better matching of the skills and knowledge needed by employees and the unique capabilities held by migrants.

Science & Technology Australia agrees with recommendation direction 2.1 on skilled migration.

The success of Australia's science, technology, engineering and maths research sector relies on combining Australia's brilliant home-grown research talent with the best and brightest researchers from all around the world. In many specialist STEM fields, Australia needs to bring PhD students and post-doctoral researchers from overseas as the numbers of Australian students pursuing higher degrees in these crucial capabilities are nowhere near enough to support Australia's economy-powering frontier research.

Some 'diffusion' of ideas and knowledge is inherent in the migration of global research talent into Australia. However Australia's success also relies on global links forged between research institutions, and global collaborations. Ideas and knowledge are 'diffused' in those collaborations, but more importantly, new ideas and research findings are sought, with teams of researchers working in a concerted effort to push the boundaries of knowledge. This is the new knowledge that novel innovation relies upon, and is critical to securing Australia's capability for more sophisticated economic development.

Ensuring our visa systems help Australia to attract and retain talent is crucial to our economic future. The report suggests "An expanded and adapted employer-nominated migration scheme would allow better matching of the skills and knowledge needed by employees and the unique capabilities held by migrants". But it is essential to consider all the other visa classes that facilitate bringing talent to Australia. These include the student visa (subclass 500), post-study work visas (subclass 485) and the Global Talent visa (subclass 585). Policy settings for these visas must remain fit-for-purpose, and the applications and approvals processes must be properly resourced. This wider array of visas is also crucial to enable Australia to secure the world's best research and innovation talent to grow our economy.

Another aspect critical to Australia's STEM sector is to attract Australian STEM talent working overseas to return home, bringing their globally-acquired knowledge and expertise with them. To encourage our scientists and technologists to return to Australia, we need to improve job security in Australia's STEM sector. This is a multi-factor productivity challenge. It includes the productivity-sapping administrative burden of taking researchers away from their research constantly to write grant applications that run to hundreds of pages in some schemes (with very low success rates for grants). And it imposes a cruel state of insecurity and uncertainty by putting some of our best research talent on repeating cycles of precarious short-term employment contracts.

Delivering stronger job security in Australia's STEM sector by shifting to longer research grant terms, and requiring employers to offer longer-term contracts that reflect the full grant length, would help Australia to convince more of our brilliant Australian research talent to come back home and attract more of the rest of the world's best talent.

Delivering stronger job security in Australia's STEM sector by shifting to longer research grant terms, and requiring employers to offer longer-term contracts that reflect the full grant length, would help Australia to convince more of our brilliant Australian research talent to come back home and attract more of the rest of the world's best talent. It would be a gamechanger for Australian productivity.

BUILDING A STRONG STEM PIPELINE

The report highlights the importance of a strong education and skills training system.

It proposes: “Increasing the attainment and quality of education, including early childhood education, schools, higher education and VET, increases workers’ capacity to identify and make productive use of new technologies and practices.” (p37)

Science & Technology Australia supports strengthening the STEM teaching workforce to ensure the next generation of scientists and technologists are well trained and have access to quality teachers with strong expertise.

However, the commission’s report later suggests Australia does not need to encourage the best and brightest to pursue a teaching profession – effectively contradicting its earlier recommendation. It states: “In teaching, for example, the appropriate aspiration may be to attract the good (and those best suited to the role) and to better use pedagogy, coaching and software to maximise their effectiveness as teachers.” (p76)

This sentiment is unwise and undermines the teaching profession. In a context where STEM teachers in particular are in short supply and concerns about the state of STEM education in our schools are growing, statements that effectively devalue the teaching profession are counterproductive and unhelpful.

Boosting Australia’s productivity and building our sovereign capabilities and wealth through innovation rely on a well-resourced and high-quality STEM research sector, underpinned by a strong STEM education pipeline. The importance of targeted funding and ambitious research goals cannot be understated. While it may be more appropriate in other areas of the economy, relying on ‘diffusion’ to enhance our research capabilities simply won’t cut it, and will leave Australia in a weak position to face the challenges of the coming decades.

Please do not hesitate to contact us if we can assist with any additional information.

Yours faithfully,

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President
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info@sta.org.au / www.scienceandtechnologyaustralia.org.au / ABN 71 626 822 845