How should we spend NPILF funds to improve Work Integrated Learning in generalist Science degrees?

A joint discussion paper from Australian Council of Deans of Science (ACDS) and Australian Collaborative Education Network (ACEN)

The Australian Government's Job-ready Graduates package highlights the importance of Science, Technology, Engineering and Mathematics for the future of Australia. The package provides $900 million to support the National Priorities and Industry Linkage Fund (NPILF); it also redefines the role of universities in society by adding '(iv) the engagement with industry and the local community to enable graduates to thrive in the workforce;' as a distinctive purpose of universities.

The NPILF is designed to support the creation of 'job-ready' graduates through university-industry engagement, and the current proposal is that universities will be block funded from the NPILF program. There will be many proposals around how universities can use the NPILF to support their engagement with industry. How do we decide which plan is most likely to benefit Science students and graduates? How should universities spend the money so it builds on and adds value to work that is already done? What information do we have to help us craft the best possible 'job-ready' development programs for Science students?

In this discussion paper, ACEN and ACDS present a review of the literature on university-industry partnerships and Science Work Integrated Learning (WIL). Our goal is to enrich the national discussion on these topics and assist universities in their decision-making around NPILF expenditure.

We focus on three areas:

(i) the employability of Science graduates;
(ii) what we already know about establishing sustained, effective and mutually beneficial Work Integrated Learning (WIL) partnerships between university Science programs and industry; and,
(iii) how the NPILF could support an improvement in provision of WIL and work preparation for students in Science.

THE EMPLOYABILITY OF SCIENCE GRADUATES

Science graduates are valuable employees. They are knowledgeable in their disciplines, creative, curious, ethical, and data-driven. During their education, Science students have opportunities to attain effective communication, critical thinking, problem solving, data analysis, and digital skills. Perhaps most importantly, they are able to make decisions. Generalist graduates, such as those from fundamental arts and Science degree programs, are very well placed to adapt and grow into the jobs of the future. The issue is, however, that Science students and graduates are often unaware that they possess the capabilities that employers seek (Rowland et al., 2020). Employers can also be unaware of the value a Science graduate can bring to their organisation.

To help students and their potential employers understand just how valuable a Science graduate can be, we need to dramatically increase Science student-industry interactions. One way to do this is through WIL – an educational approach that integrates 'theory with the practice of work within a purposefully designed curriculum' (Patrick et al., 2008, p vi). WIL provides students with an opportunity to learn transferable skills,

increase their job capability, and develop a work-ready mindset (Ferns & Lilly , 2015; Jackson, 2013; Ithaca Group, 2013; Johnsonn & Boud, 2010). Offerings of placement WIL are increasing in Science programs across Australia but student participation is still relatively low (Johnson et al., 2019). This missed opportunity should be a matter of national concern as we prepare Science students for the workforce, and the NPILF can help address the problem.

With sponsorship from the Office of the Chief Scientist, ACDS, and the former Office for Learning and Teaching, two significant national graduate employability projects have been undertaken in Science education in Australian Universities. Both projects addressed WIL. *The WIL in Science: Leadership for WIL Project* [1] identified effective approaches to improving Science graduate employability that could be 'lighthouses' for other Science educators. The *Successful WIL in Science*[2] project (SWiS) engaged with Science Faculties to better understand how Science curricula could integrate WIL (Johnson et al., 2018). These projects have established a vibrant community of Science educators who committed to improving Science graduate employability through WIL. A key aspect of WIL implementation, namely, the formation of Science-industry partnerships, was not a focus of these two projects, but is now a priority.

THE PROBLEM WITH DEVELOPING SCIENCE GRADUATE EMPLOYABILITY THROUGH WIL

Commonly, WIL is delivered using internships, practicums, or field-work (Orrell, 2011) in a workplace or a 'campus setting that emulates key aspects of the workplace' (Beard & Wilson, 2006, p. 205). These are resource-intensive pedagogies that rely on university-industry partnerships. To enable WIL-related Science-industry partnerships and support the goals of NPILF, several issues need to be addressed.

1. Questions around employment prospects for Science graduates

Over the last 20 years, the proportion of students taking Science and Mathematics subjects at school and university level has declined (ACDS, 2003; Kennedy, Lyons & Quinn, 2014; Australian Government, 2017). While this decline is abating, participation has flat-lined, rather than increased (ACARA, 2018). Although the potential pool of university-level Science students is shrinking, universities and the government are keen to increase Science, Technology, Engineering, and Mathematics (STEM) enrolments. Perhaps because of some disturbing statistics around the speed at which Science graduates find employment (Norton & Cakitaki, 2016) students are concerned that studying Science at university may not guarantee them a satisfying career (Jorre de St Jorre & Oliver, 2018). Although Science graduates are slower than many other graduates to find full time employment, we know that over time they do find employment in a wide range of fields (Office of the Chief Scientist, 2020). It is not correct to think that Science graduates are doomed to unemployment. It is important, however, to produce a body of accessible evidence around how studying Science can contribute to a graduate's employability and career pathway (Bennett, Knight & Bell, 2020) so that students feel confident about choosing Science subjects at school and university.

2. The paucity of WIL experiences in the Science curriculum

[1] http://www.acds-tlcc.edu.au/wp-content/uploads/sites/14/2017/05/WIL-in-Science-project-report-2016.pdf and http://www.acds-tlcc.edu.au/wil-guide-for-science/case-studies-of-successful-wil/

[2] Funded by the Office of Learning and Teaching and led by representatives of the ACDS. https://ltr.edu.au/resources/ID16-5420_Johnson_FinalReport_2019.pdf

Science students experience less WIL than students in most other STEM disciplines (Edwards, Perkins, Pearce & Hong; 2015; Prinsley & Baranyai, 2015). WIL requires engagement between universities and industry. Engagement and partnerships between universities and industry in Science are not new, and they have been the subject of many studies. Science, more than many disciplines, has successfully partnered with industry, but these collaborations have mostly been formed to facilitate research programs (Rybnicek & Ronigsgruber, 2019). This failure to provide WIL experiences within Science disciplines can be attributed to many factors. The most obvious is that, unlike profession-focused degree programs, most Science degree programs privilege discipline-based, knowledge building over employability or career education. As a result, students can struggle to link their knowledge and skills with their potential employment destinations (Jorre de St Jorre & Oliver, 2018; Rowland et al., 2020). Unlike the USA, we have not had a government-funded push to link Science research dollars to Science student professional development[3]. The NPILF, if spent wisely by universities, may redress this problem.

3. Resistance from WIL university and industry staff

Some academics who teach university Science resist the idea of incorporating employability learning into the curriculum (Edwards et al., 2015; Prinsley & Baranyai, 2015). Other academics are willing to address it, but they can meet resistance from colleagues and university leadership (Papdopoulos, Taylor, Fallshaw & Zanko, 2010). In some cases, Science academics resist employability initiatives because they lack familiarity with non-university workplaces, they have 'general ambivalence' towards WIL development, and feel like inauthentic mentors for students (Edwards et al., 2015, p. 79). In others, it stems from the significant resource costs around building and maintaining the university-industry connections that are needed to support WIL for large Science cohorts. It is also clear that industry experience is often administered as a curriculum 'bolt-on' by staff whose under-resourced work is poorly recognised (Prinsley & Baranyai, 2015).

Industry also resists placing students in the workplace. Industry partners have difficulty identifying appropriate projects and tasks for students, matching the right student with a project, and supervising students (Jackson et al., 2017). They also have difficulty navigating their connections with universities and aligning projects with their commercial needs (Prinsley & Baranyai, 2015). The resistance seems to be particularly high around placing international students. Employer prejudice has been reported against these 'outsider' students, who are seen as lacking the "cultural and linguistic capital privileged in the Australian contexts" (Tran, 2016, p. 346).

These multiple barriers can push WIL into the 'too hard' basket for both universities and industry. Universities can use NPILF funds to support the additional resource costs associated with WIL, build a culture of recognition for staff and industry partners who support WIL, and help international students prepare for the Australian workplace.

4. Resistance to WIL from Science students

Although students are concerned about their employment prospects, they can also resist engaging with placement WIL. Inflexible program structures, questions about the 'value' of work placement, lack of cultural capital, and lack of awareness of WIL for-credit opportunities can all impede student participation in placement WIL. We know that access to WIL is skewed against students with a disability, from regional and remote areas, from non-English speaking backgrounds, and of lower socio-economic status (Harvey et

[3] See, for example, the NIH-funded Student Research Training Programs (https://www.niams.nih.gov/labs/career-development-outreach/student-research-training and https://www.nigms.nih.gov/training/Pages/Home.aspx)

al., 2017 and references therein). We also know that financial pressures are a disincentive when students consider WIL participation, particularly if they need to leave their current accommodation and quit their job to participate (Edwards et al., 2015). As an indication of the need for WIL financial support, consider the ACEN WIL scholarships. ACEN funds eight scholarships for WIL placement students annually; each year over a 1000 worthy applications are received. Universities can address this very real barrier by using NPILF funds to directly offset the costs students incur as they engage with industry.

5. Ideas about what 'counts' as WIL and employment preparation for Science students

The traditional conception of WIL revolves around student placement in a professional environment with co-workers who do things that draw closely on the student's field of study. We know, however, that it is difficult to place all Science students in workplaces that look like a traditional 'Science' environment. There are two important ways we can address this problem.

The first is to expand our conception of what 'counts' as WIL. Physical placement in a workplace is not the only option for students as they learn about the world of work in their discipline—indeed, Peach and Gamble (2011, p. 170) argue there are many ways to address WIL, and 'the specific educational worth of providing student with practicum experiences needs to be considered'. We can introduce a wide variety of 'simulated, virtual, authentic and industry-based activities' (Dean, Eady & Yanamandram, 2020, p. 1) into the Science curriculum; for many of our students these may be more appropriate and accessible ways to experience WIL.

The second is to broaden our horizons of what 'counts' as discipline-relevant WIL. Science graduates have expansive and adaptable skill sets and they find work in extremely diverse fields (Office of the Chief Scientist, 2020). Thus, educators, industry, and Science students must embrace the idea that Science students can "transgress into, and discover learning from, a workplace that is foreign to their mental model of 'legitimate' and future-predictive work for a Science graduate" (Rowland et al., 2020 p. 321). Take, for example, recent statitics around the undergraduate degrees held by top CEOs in Australia (Apollo Communications, 2019); these business leaders are more likely to hold a Science undergraduate degree than one in Commerce, Business, Law, Engineering, Psychology, or Economics. As universities and industry work more closely together, both sides will benefit from embracing possibilities, rather than looking for boundaries.

PARTNERSHIPS BETWEEN UNIVERSITIES AND INDUSTRY

It is important to form partnerships between universities and industries to support the provision of WIL through placements in professional workplaces (Bennett, 2016) and other collaborative WIL formats. While there is a history of such partnerships in professions-based degrees, Science-industry partnerships are less common (Edwards et al., 2015). Successful WIL programs that enhance Science graduates' employability will be difficult to deliver and sustain until we address the issues around university-industry engagement and formation of sustainable, mutually beneficial partnerships. The successful achievement of such an enterprise requires a profound cultural shift by both universities and Australian industries and businesses. The NPILF spending, if carefully targeted, could encourage and sustain this change at a national level.

1. Principles for guiding partnerships

Studies regarding what employers expect of graduates in terms of knowledge and capabilities (see for example Phillips KPA, 2014) are largely consistent in their findings. Employers want graduates who have effective skills around communication, analysis, and collaboration (Prinsley & Baranyai, 2013; Deloitte Access Economics, 2014) alongside a willingness to learn (Coll & Zegwaard, 2006). Studies of conditions for

effective partnerships between universities and industry are similarly consistent. They advocate reciprocity for all stakeholders, trust-building, establishment of shared goals, and a focus on long-term relationships (National Council of University Research Administrators, 2006; Rybnicek & Königsgruber, 2019).

These worthy principles can be adapted and adopted by Science leaders, educators and industry. However, University-industry engagement, based on reciprocal partnerships and aimed at graduate employability, remains a multifactored problem. Government agendas for higher education, industry workforce needs, and university research and education missions often become mismatched and hinder progress (Mackaway, 2018). To successfully address and integrate these conflicting agendas, and to achieve sustained, worthwhile engagement, both sides of this potential partnership need guidance as they work to understand and appreciate one another.

The change to the purpose of universities in the NPILF legislation is a very welcome first step; it places university-industry engagement at the forefront of the university mission. Industry-engaged WIL no longer needs to be a fringe activity that lurks in the university enterprise as the "the poor cousin of teaching" (Edwards et al., 2015, p. 89).

2. Pathways to partnerships

Dorado and Giles (2004) identified three pathways of engagement between university and community agencies—tentative engagement, aligned engagement, and committed engagement. They argue that many 'partnerships' are tentative and episodic, conducted through random opportunistic events. The starting point for these events is to find a 'work placement for a student'; the prospect of a longer-term partnership and the needs of the host organisation can be under-considered in this situation. Reliance on episodic partnerships is ineffective and costly. Episodic partnership does not help parties gain a workable understanding of their different priorities or foster their capacity to negotiate and manage competing agendas. Furthermore, episodic partnerships are not particularly amenable to systematic evaluation, so it can be unclear whether they achieve benefits that warrant their cost.

Aligned partnerships are those in which each partner seeks opportunities to achieve their own particular goals and largely, can do so. Such partnerships are effective for the individuals and groups involved, but are vulnerable when the needs of one party are not met (Harvey, Geall & Moon, 1998). In contrast, committed partnerships are far more resilient and more cost effective. Partners who commit to sustained engagement learn to understand, share, and progress the particular goals of each partner. Committed mature partnerships are also evidenced by changes to the mission and practices of each partner. Parties in a sustained partnership understand and demonstrate commitment to the cause of the other at multiple levels of the institution. The engagement in these partnerships goes beyond mere alignment.

These three distinctive pathways are grounded in different assumptions held by partners about their role in contributing to the next generation of practitioners. Despite the distinctiveness of these pathways, Dorado and Giles (2004) did not consider these constructs as exclusive. They suggested that their framework can be understood as an evolutionary process towards partnership. Partnerships may be enacted at first through tentative and random opportunistic events; as they progress they lead each partner to invest their organisational assets in the agendas of the other with an expectation that benefits will accrue for each partner organisation. Science has a successful history of achieving such partnerships in regard to research. The NPILF could be used to help universities and industry achieve these partnerships for Science WIL.

3. Impediments to forming partnerships

Universities face many challenges around delivering partnership-focused reciprocity. At the management level, partnerships between universities and host organisations lack visibility in the universities' education

missions (in contrast to their visibility within research missions). Universities regularly market their commitment to students' employability and aspire to establish impactful partnerships, but the work required to develop and maintain successful WIL experiences for students is often invisible and unaccounted for in-role statements, workload calculations, and resource allocation (Papadopoulos et al., 2010).

Achievement of mutual benefit from WIL is often fortuitous, rather than the result of deliberate planning. At worst, WIL has a one-sided benefit for the university. Industry and community organisations can perceive inequality and lack of power in their relationship with universities. Some industry representatives, particularly in SMEs, report that they do not know where to start in making overtures to universities so they can engage in WIL programs.

In workplaces, students on placement can experience resistance and resentment from organisational staff due to the extra supervision workload imposed by students. Workplace supervisors and managers have reported feeling exploited as free educators for university students who impact their bottom line. Staff in workplaces often feel unprepared to support and mentor students and unsure of what to expect of them; at the same time they are unsure of their own role and expectations.

4. Learning to initiate and maintain partnerships

Moving forward, universities need to approach the establishment and management of industry partnerships with greater understanding of the complexity involved. The initial focus needs to be the interests of the industries and communities, not the placement of students. This initial engagement takes time and deliberateness of intent to partner—this is what Cooper and Orrell (2016) describe as universities exercising 'deliberate reciprocity'. It requires new insights and conceptions regarding the role of universities, their leaders, and their academics in society. University leaders, themselves, need to perceive the value to the university in fostering deep engagement with industries and communities. They need to appreciate just what this engagement will entail in terms of resource inputs and relationship maintenance.

Universities can increase the visibility and valuing of partnerships in universities (through both policies and systems). They can also innovate and flex their curriculum to enable engagement with, and benefit for, external organisations. In part, these reforms can be achieved by a change in funding to universities that better rewards community and industry-engaged teaching. The NPILF is an important part of this reward structure.

EMERGING RISKS

Multiple third-party organisations now provide WIL experiences for students. They have stepped into the workplace-learning gap that Universities have left unattended (Koziol, 2018). Students who use these private providers pay relatively large fees to obtain internships, often with disappointing outcomes. The sustainability of this model and the consequences for students, businesses and universities in this emerging arena are unknown. We do know that, for students, the twin risks of financial exploitation and poor educational outcomes will no doubt impact on those who are most vulnerable. Industries are also at risk of being swamped by requests for placements that are not supported by the necessary educational, legal and risk-management resources, and that fail to provide worthwhile recruitment outcomes.

There are also risks around establishing a Science student pipeline into WIL. Industry is interested in supporting WIL student placements, and is willing to offer positions (even paid positions). ACEN and ACDS members have seen those places go unfilled in their universities—a deeply discouraging outcome for the invested industry partner and the university staff who work to recruit and support students.

As noted earlier, there are significant barriers to student engagement in placement WIL; these include student poverty and the difficult financial choices associated with going on a work placement (Johnson et al., 2019). Importantly, and unlike other university programs, there are currently few expectations around work-engagement during the Science degree. Perhaps it is time to up the ante on WIL in Science programs. If students, universities, and industry partners know that meaningful WIL is an expectation for Science graduates, we will see a cultural and curriculum shift in Science degree curricula.

INDUSTRY PERSPECTIVES

We must recognise that there is no single 'correct' approach or solution to the university-industry engagement problem. Some large organisations have already incorporated infrastructure to facilitate university WIL—internal internship programs are an example. There may well be effective models within these programs. It would serve both industry and universities to examine them and define what works well, and what adjustments are needed to ensure that they are worthwhile for university graduates transitioning to employment. A stocktake of the full range of industry-driven training activities, and the cost effectiveness for all stakeholders, is overdue.

There are around 4000 large businesses in Australia, but there are many more medium and small businesses – around 50,000 and 2 million respectively (ASBFEO, 2016). These small to medium business enterprises can contribute to and benefit from partnering with universities and Science WIL students. Many of these businesses cannot afford to underwrite infrastructure to establish and support student placements, particularly in this volatile time of Covid-19. However, with the right programs in place and feasible partnerships established, it may well be possible for them to more fully engage in collective partnerships with universities and thus enjoy some of the benefits that employer organisations report, such as recruitment of new graduates, insights into new development in research, and professional development of their staff.

BRINGING UNIVERSITIES AND INDUSTRY TOGETHER

Partnerships between universities and employers have long been hampered by a conception that the work is the key role of industry and traditional education and research is the primary role of universities. In fact, this is not the case, and the new NPILF legislation legitimises the university-industry co-educational bond. The work of Boud (2001) and Billett (2010) demonstrates that successful industry enterprises are also learning organisations that make significant contributions to the continuing education of their workforce. Similarly, universities employ, and are keen to collaborate with, experienced practitioners with extensive industry experience to infuse practice-based knowledge and skills into curricula. The foundations for partnership are already there—now we need to move forward and build.

Universities need to understand what WIL models and curriculum structures best suit, and develop, both students and industry. Industries need to know how they can engage with universities, and how they can best train their incoming workforce. Industry also needs to accommodate students who are not yet 'job ready', and invest in helping them attain the capacities that industry needs. Students need to know that industry, and their universities, want them to engage in WIL as a routine part of their education. WIL, in all its forms, should not be limited to the exclusive domain of the privileged. WIL should be an expectation, and indeed a right, for all Science students. We encourage universities to spend their NPILF allocations to establish a WIL culture for their Science students. We also encourage universities to use this culture to

engage industry in long-term, and mutually-beneficial partnerships that build understanding and prosperity for all involved.

REFERENCES

ACARA (2018) National Report on Schooling data portal. Sydney: Australian Curriculum, Assessment and Reporting Authority. Online: https://www.acara.edu.au/reporting/national-report-on-schooling-in-australia/national-report-on-schooling-in-australia-data-portal

Apollo Communications (2019) *Australian Top 50 CEO Report 2019.* Sydney: Apollo Communications.

ASBFEO (2016) *Small business counts.* Australia: Australian Small Business and Family Enterprise Ombudsman. Online: https://www.asbfeo.gov.au/sites/default/files/Small_Business_Statistical_Report-Final.pdf

Australian Council of Deans of Science (2003) *Is the study of Science in Decline? Occasional Paper* November, 2003. Canberra: Australian Council of Deans of Science

Australian Government (2017) *Australia's National Science Statement.* Canberra: Australian Government. Online: https://publications.industry.gov.au/publications/nationalsciencestatement/index.html

Beard C & Wilson JP (2006) Experiential Learning: Best Practice Handbook for Educators and Trainers (2nd edn). Philadelphia: Kogan Page.

Bennett D, Knight E & Bell K (2020) Graduate employability and the career thinking of university STEMM students. *Teaching in Higher Education* 25(6):750-765.

Billett S (2010) *Learning Through Practice - Models, Traditions, Orientations and Approaches*. Berlin: Springer

Boccanfuso A (2010) Why university-industry partnerships matter. *Science Translational Medicine.* 2(1):51cm25.

Boud D (2001) *'Knowledge at work: issues of learning',* in D Boud & N Solomon (eds), Work-based learning: a new higher education. Buckingham, UK: The Society for Research into Higher Education and Open University Press.

Coll RK & Zegwaard KE (2006) Perceptions of desirable graduate competencies for science and technology new graduates. *Research in Science & Technological Education* 24(1):29-58.

Cooper L & Orrell J (2016) *University and Community Engagement: Towards a Partnership based on Deliberate Reciprocity.* In F. Trede & C. McEwen (Eds.), Educating the deliberate professional: Preparing practitioners for emergent futures. New York: Springer.

Dean B, Eady MJ, Yanamandram, V (2020) Editorial: Advancing non-placement Work Integrated Learning across the degree. *Journal of University Teaching and Learning Practice* 17(4):Online

Deloitte Access Economics (2014) *Australia's STEM workforce: a survey of employers.* Deloitte Access Economics.

Dorado S & Giles D (2004) Service-learning partnerships: Paths of engagement. *Michigan Journal of Community Service Learning* 11(1):25-37.

Edwards D, Perkins K, Pearce J & Hong J (2015) *Work Integrated Learning in STEM in Australian Universities.* Canberra: Office of Chief Scientist & Australian Council for Educational Research.

Ferns S & Lilly L (2015) Driving institutional engagement in WIL: Enhancing graduate employability. *Journal of Teaching and Learning for Graduate Employability* 6(1):116–133.

Freudenberg B, Brimble M, & Vyvyan V (2010) The penny drops: Can work-integrated learning improve students' learning? *E-Journal of Business Education & Scholarship of Teaching* 4(1): 42-61.

Harvey L, Geall V & Moon S (1998) *Work experience: Expanding opportunities for under-graduates.* Birmingham, UK: Centre for Research into Quality, UCE. Online. Retrieved from http://aces.shu.ac.uk/employability/resources/CIHE%20-%209803WorkExperience.pdf

Harvey A, Andrewartha L, Edwards D, Clarke J & Reyes K (2017) S*tudent equity and employability in higher education.* Report for the Australian Government Department of Education and Training. Melbourne: Centre for Higher Education Equity and Diversity Research, La Trobe University.

Jackson D, Rowbottom D, Ferns S & McLaren D (2017) Employer understanding of work-integrated learning and the challenges of engaging in work placement opportunities. *Studies in Continuing Education* 39(1):35-51.

Jackson D (2013) Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education* 40(2):350-367.

Johnson ED, Rice J, Varsavsky C, Holdsworth J, Ward J, Skelly D, Campbell M, Jorre de St Jorre T, Elliott J & Aughterson J (2018) *Successful WIL in Science.* Canberra: Department of Education and Training.

Johnson ED, Jorre de st Jorre T & Elliott J (2019) *WIL snapshot study report.* Melbourne: : Australian Council of Deans of Science. Online at http://www.acds-tlcc.edu.au/wp-content/uploads/sites/14/2019/11/ACDS-WIL-Snapshot-Report-Sep-2019.pdf.

Johnson E & Rice J (2016) *WIL in Science: Leadership for WIL Final report.* Canberra: Australian Council of Deans of Science.

Jorre de St Jorre T & Oliver B (2018) Want students to engage? Contextualise graduate learning outcomes and assess for employability. *Higher Education Research & Development* 37(1):44-57

Kennedy J, Lyons T, & Quinn F (2014) The Continuing Decline of Science and Mathematics Enrollment in Australian Schools. *Teaching Science* 60(2): 34-46.

Koziol M (2018) The Internship industry: why young people are now paying to work. Sydney Morning Herald March 18, 2018. Online at https://www.smh.com.au/politics/federal/the-internship-industry-why-young-people-are-now-paying-to-work-20180315-p4z4kw.html

National Council of University Research Administrators (2006) Guiding Principles for University-Industry Endeavors. Online at www.ncura.edu/content/regions_and_neighborhoods/resources/docs/guidance.pdf

Norton A & Cakitaki B (2016) *Mapping Australian higher education 2016.* Melbourne: Grattan Institute.

Orrell J (2011) *Good Practice Report: Work-integrated learning.* Canberra: Australian Learning and Teaching Council.

Patrick C, Peach D, Pocknee C, Webb F, Fletcher M & Pretto G (2008) *The WIL report: A national scoping study (Final report).* Brisbane: Queensland University of Technology.

Peach D & Gamble N (2011) *Scoping Work-Integrated Learning Purposes, Practices and Issues. pp 169-186* In Billet, S. & Henderson, A (Eds.) Developing Learning Professionals: Integrating Experiences in University and Practice Settings (Volume 7: Professional and Practice-based Learning) Germany: Springer

Phillips KPA (2014) Engaging employers in work integrated learning: current state and future priorities. Melbourne: Phillips KPA.

Prinsley R & Baranyai K (2015) *STEM trained and job-ready*. Canberra: Office of the Chief Scientist.

Prinsley R T & Baranyai K (2013) *STEM skills in the workforce: what do employers want?* Canberra: Office of the Chief Scientist.

Rowland S, Gannaway D, Pedwell R, Adams P, Evans R, Bonner H & Wong KS (2019) Legitimising transgression: design and delivery of a science Work Integrated Learning program that draws on students' extant work in diverse, non-science fields. *Higher Education Research and Development* 39(2): 1-14.

Rybnicek R & Königsgruber R (2019) What makes industry-university collaboration succeed? A systematic review of the literature. *Journal of Business Economics* 89(2): 221-250.

Tran LT & Soejatminah S (2016) 'Get Foot in the Door': International Students' Perceptions of Work Integrated Learning. *British Journal of Educational Studies* 64(3): 337-355.