Access, quality and wellbeing in engineering Work Integrated Learning placements: Implications for equity and diversity

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Acknowledgements

About the authors

Natalie Lloyd has academic leadership roles in Engineering and Information Technology and is a Fellow of Engineers Australia. She has led a range of engineering education, equity, sustainability and engineering research projects at Curtin University and the University of Technology Sydney. This includes leading research projects exploring gender in engineering education including the impact for women student engineers of creating critical mass classrooms and gendered perceptions of English language development in engineering education. Natalie's expertise is grounded in engineering practice and education strengthened by her lived experiences as an engineer and academic women in non-traditional areas (WINTA).

Megan Paull brings a non-engineering perspective to this study, having led research projects in the areas of business, management, organisational behaviour and not-for-profit management and leadership. She was the chief investigator on the Australian Government Office for Learning and Teaching (OLT) project *Volunteering to Learn* which examined university student volunteering. The outcomes include a range of *Good Practice Guides* to support and inform best practices for universities, students and host organisations to work together to enable successful outcomes for all parties. Megan has been involved in research looking at employability and work engagement, and is a qualitative researcher, usually taking an interpretivist approach which values the voices of participants.

Teena Clerke has participated in a range of educational, equity and health research projects with colleagues at the University of Technology Sydney for more than a decade. This includes equity scholarships in higher education, doctoral education, leadership education in transdisciplinary teams, learning in health partnerships, early intervention and prevention services in child and family health, primary health responses to adolescent self-harm, primary health reform initiatives, as well as feminist research in visual communication design scholarship. Teena's professional expertise is grounded in education and visual communication design practices, and her research expertise in ethnography and visual research methodologies that are underpinned by feminist research principles.

Sally A. Male has the Chair in Engineering Education at The University of Western Australia, where her responsibilities include overseeing the Engineering Professional Practicum and leading the Engineering and Science Education, Society, and Work Research Cluster. Sally wrote the *Best Practice Guidelines for Effective Industry Engagement in Australian Engineering Degrees* for the Australian Council of Engineering Deans and has led major projects on work integrated learning in engineering. Sally is the Editor-in-Chief of the *Australasian Journal of Engineering Education* and an Associate Editor of *Journal of Engineering Education.* She is a Fellow of Engineers Australia and member of the WA Division's Student Practicum Working Group.

Related publications and presentations by the authors

Lloyd, N., Male, S.A., & Paull, M. (2018, February 1–2). *Access to Work Integrated Learning: The lived experience*. Abstract presented at the Teaching and Learning Forum 2018: Student Futures, The University of Notre Dame Australia. https://www.wand.edu.au/Media/Default/Docs/2018_TLF_Final_TimetableAbstracts_31Jan.pdf

Lloyd, N., Male, S.A., & Paull, M. (2018, December 9–12). *Strategies to increase equity of access to engineering internships*. Paper presented at 29th Australasian Association for Engineering Education Conference. The Future Engineer: Accounting for Diversity, Waikato University / WINTEC, Hamilton, New Zealand.

Paull, M., Male, S.A., Lloyd, N., & Clerke, T. (2019, January 31- February 1). *It's about time: Changing profiles of WIL placements for engineering students*. Showcase presentation at the Teaching and Learning Forum: Vision and Voice, The University of Notre Dame, Fremantle, Australia. http://clt.curtin.edu.au/events/conferences/tlf/tlf2019/Showcase%20N-R/Paull_showcase_It%E2%80%99s%20about%20time.pdf

Lloyd, N., Paull, M., Clerke, T., & Male, S.A. (2019, July 7–10). *Improving access to work integrated learning for transition to work*. Good Practice Report, presented at the Students, Transitions, Achievement, Retention, Success (STARS) Conference 2019, Crown Promenade, Melbourne.

Paull, M., Lloyd, N., Male, S.A., & Clerke, T. (2019). Engineering Work Integrated Learning placements: The influence of capitals on students' access. *Journal of Higher Education and Policy Management, 41*(5) 534–549. https://doi.org/10.1080/1360080X.2019.1646382

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Executive summary

Access, quality and wellbeing in engineering Work Integrated Learning placements: Implications for equity and diversity is a mixed methods study which examines student engineers' experiences in Work Integrated Learning (WIL) placements. The study provides insights into how to guide improvements in engineering WIL practice, particularly in relation to access, quality and wellbeing for students in equity groups.

This report outlines the study, its methods and findings that build on knowledge and insights gained from a Systematic Literature Review (SLR) of international research studies and current debates on WIL access, quality and wellbeing, engineering-specific WIL placements and unpaid WIL. The review informed the analysis of data collected from three sources; institutional WIL placement information, student responses to a quantitative and qualitative online questionnaire, and semi-structured interviews with students about their WIL placement experiences supplemented by interviews with university staff working in WIL-related programs in the four participating universities. The purpose was to examine student engineers' narratives of their WIL placement experiences and provide insight into their perceptions of the ease or difficulty of access, degree of placement quality, contribution to or detraction from wellbeing, support or lack thereof; and students' development of engineering professional identity.

Key findings

There are three key findings from this research.

1. Engineering WIL placements are frequently unpaid and underpaid in contrast with arguments that such placements across all industries have a poor record as a route to paid work and are subject to access inequities.
2. Students face challenges in accessing quality WIL placements especially for Women In Non-Traditional Areas (WINTA) and Non-English Speaking Background (NESB) students. These challenges include systemic prejudices, including biases about students' motivations, capabilities and discretionary power; and detracting workplace cultures including those which are discriminatory.
3. Recruitment and employability are driven by practices that privilege high social capitals and vulnerability is exacerbated by the self-sourced nature of WIL placements, compounded by WIL requirements that are mandated by the university.

Recommendations

Building on the evidence presented in this report, the authors make the following recommendations to address the key findings:

1. <u>Industry</u> and universities should acknowledge and address the frequency of unpaid, underpaid and paid-for WIL placements and seek to redress associated equity and wellbeing issues. To minimise risks of exclusion or detrimental impact, particularly for students with less discretion to accept unpaid, underpaid and paid-for WIL because of socioeconomic factors, the following are recommended:
   - Define, implement and advocate minimum 'living wage' remuneration and equity targets for WIL placements.
   - Increase transparency, systematic collection and reporting of WIL placement data.
   - Propose and provide alternative, less intense, innovative WIL models if unpaid placements are unavoidable.

2. <u>Students</u> should be empowered as co-designers of WIL experiences and policy to support a cultural shift from compliance-driven engagement in WIL to a career

curation mindset. To minimise poor quality placements that pose a risk to students' wellbeing and perpetuate prejudices, the following are recommended:

- Engage students and graduates to inform the development of university and industry WIL placement policy and curriculum design.
- Foster a culture of quality, outcomes-driven WIL placements across the triple helix of university-industry-student.
- Increase university staffing and resourcing to strengthen preparedness, integration and support.

3. <u>Universities</u> should consider other disciplinary models and practices, such as those in health and education, to provide equitable access to quality engineering WIL placements. To minimise the burden on students to source, apply for, accept or persevere with poor quality, exploitative or otherwise unsatisfactory placements that may be detrimental to their wellbeing, the following are recommended:

- Allocate students to university and industry-partnered WIL.
- Broaden in-curriculum industry-student engagement.
- Remove or reduce the 'hours' dependent completion hurdle.

Key findings and recommendations

This research found engineering WIL placements are more complex than the traditionally-reported binaries of paid/unpaid, barriers/enablers and positive/negative. We concluded that access, quality and wellbeing were interconnected and current practices and polices contribute to maintaining inequity. Institutions, industry hosts and student interconnectivity were also pivotal to access, quality and wellbeing.

This research examined student engineers' experiences in WIL placements across four Australian universities. The insights that emerged shape our recommendations for improving engineering WIL practice, particularly in relation to equitable access, quality and wellbeing for all students, regardless of status and/or accumulated capitals. This is particularly important for students with a disability, from low SES locations, regional and remote areas, from non-English speaking backgrounds (NESB), who identify as Indigenous, and Women In Non-Traditional Areas (WINTA).

The study built on knowledge and insights gained from a SLR of international research and current debates on WIL practices across disciplines including unpaid WIL, WIL placement access, quality and wellbeing and engineering-specific WIL placements. The review informed the analysis of data collected through a mixed methods approach comprising: collection of institutional WIL placement data; student engineers' responses to an online questionnaire; and semi-structured interviews with student engineers about their WIL placement experiences supplemented by interviews with university staff working in WIL-related programs in the participating universities. These research findings reflect and extend those in the WIL research literature.

Key findings

There are three key findings from this research.

1. Engineering WIL placements are frequently unpaid and underpaid.

The current landscape of engineering WIL placements includes common occurrence of unpaid placements and underpaid placements (from stipends or placement completion 'bonuses' or unpaid overtime), and students bearing significant costs to access a placement, which affected wellbeing on multiple levels. Students who undertook paid-for, unpaid or underpaid placements had financial and socio-emotional support to enable this choice, which was not necessarily without stressors. Paid-for, unpaid or underpaid placements were not an option for all students, including those from low SES and regional and remote area groups. Institutional data, when collected, was binary (paid/unpaid) and indicated the prevalence of paid WIL placements varies with program type, engineering major, students' years of progression through their program, international (likely NESB) status, and length of placement. The highest frequencies of unpaid WIL are for 12-week placements, which is the mandatory duration for many engineering studies programs, and junior placements of six months' duration. The incidence of unpaid WIL placements contrast with arguments that such placements across all industries have a poor record as a route to paid work and are subject to access inequities.

2. Students face challenges in accessing quality WIL placements.

There are challenges to maintaining and managing universal student-sourced WIL placements to ensure equitable access to placements that support students' wellbeing, especially students of equity status. There is also a paucity of quality WIL placements. To assure quality, there is a need for enhanced preparation and oversight of WIL placements, integration of workplace and university learning and enhanced industry–university interface, currently exacerbated by the lack of institutional resources to support academics and WIL

staff (due in part to not for credit or low credit bearing WIL subjects). Cultural resistance to integrating workplace and university learning is attributed to a lack of time and/or resources, perceptions of disconnect between professionals and academics, or conflicting agendas and needs, for example, assessment and compliance versus graduate recruitment. Challenges arise, especially for WINTA and NESB students, from systemic prejudices, including biases about students' motivations, capabilities and discretionary power and detracting workplace-cultures including those which are discriminatory.

3. Recruitment and success are driven by practices that privilege high capitals.

Students with high capitals are able to leverage social networks to secure initial placements thereby further expanding their industry network, reinforcing their capacity to secure future, quality placements enhancing their employability. The potential benefits of initial, oftentimes unpaid, underpaid or paid-for placements (such as a unique or incomparable experience or strategic resumé building) were only accessible for those with the discretion or privilege to enable this choice. Exploitative or poor quality placements were abandoned by students who had established networks and social capital to readily secure an alternative, more favourable placement. Students vulnerable to accepting or persisting in poor quality WIL placements include those with low social capital and employability which may be attributed in part to disadvantaged or marginalised statuses. Vulnerability is exacerbated by the self-sourced nature of WIL placements compounded by WIL requirements that are mandated by the university.

Recommendations

There are three recommendations to address the key research findings as follows.

1. <u>Industry</u> and universities should acknowledge and address the frequency of unpaid, underpaid and paid-for WIL placements and seek to redress associated equity and wellbeing issues. To minimise risks of exclusion or detrimental impact, particularly on students with less discretion to accept unpaid, underpaid and paid-for WIL because of socioeconomic factors, the following are recommended:

- Define, implement and advocate minimum 'living wage' remuneration and equity targets for WIL placements developed through university-industry-professional body collaboration.
- Increase transparency, systematic collection and reporting of WIL placement data including equity students' participation rates, remunerations, completion and employability impact data to provide:
    - universities, industry stakeholders and influencers with evidence for policy, guidelines and support-services decision making
    - students with accurate representation of the current landscape of WIL information to make informed choices about programs and hosts.
- Propose and provide alternative, less intense, innovative WIL models if unpaid placements are unavoidable:
    - 'shared' short-term placements with multiple industry partners and/or university hosts such as micro-placements, part-time placements, short-term project-based placements, industry mentors and research placements.

2. <u>Students</u> should be empowered as co-designers of WIL experiences and policy to support a cultural shift from compliance-driven engagement in WIL to a career curation mindset. To minimise poor quality placements that pose a risk to students' wellbeing and perpetuate prejudices, the following are recommended:

- Engage students and graduates in reference groups to inform the development of university and industry WIL placement policy and curriculum design.
- Universities should provide opportunities for students to reflect on their placements with their peers through online or physical learning communities. Recommendations

from their reflections should be incorporated into curriculum development processes of universities and reviews of WIL practices in industry and universities.

- Foster a culture of quality, outcomes-driven WIL placements across the triple helix of university-industry-student in which:
    - industry provides placement environments and experiences which afford opportunities for learning
    - students' contributions are of impact attracting appropriate remuneration
    - universities respond to students' placement experiences to enrich teaching and relatedness of the curriculum.
- Increase university staffing and resourcing to strengthen industry and student preparedness, provide more opportunities for academic insight into industry practices, monitor students' progress and wellbeing in placements by adopting best-practices of workplace training and learning supervision and respond to students' experiences during WIL placements by providing timely and appropriate support.

3. <u>Universities</u> should consider other disciplinary models and practices, such as those in health and education, to provide equitable access to quality engineering WIL placements. To minimise the burden on students to source, apply for, accept or persevere with poor quality, exploitative or otherwise unsatisfactory placements that may be detrimental to their wellbeing, the following are recommended:

- Allocate students to university and industry-partnered WIL to provide equitable and universal access to break down systemic bias and reliance on socioeconomic advantage.
- Broaden in-curriculum industry-student engagement by provision of industry projects, wider adoption of project-based learning, innovative partnership models and industry engagement practices.
- Remove or reduce the 'hours' dependent completion hurdle of WIL placements to create more flexibility and encourage a cultural shift from duration-focused to outcomes-focused engagement in industry more aligned with contemporary engineering studies.

Connecting WIL access, quality and wellbeing in engineering

Drawing from student and staff narratives, our research identifies good WIL practices that support equitable access to quality placements, nurture students' wellbeing, and scaffold emerging professional engineering identity. Considering the equity implications for all students, we provide recommendations for the engineering WIL community, which may also be relevant in other disciplinary contexts.

Work Integrated Learning

Work Integrated learning (WIL) is the umbrella term most often used in Australia to describe the range of educational experiences that intentionally engage students in workplace situations that contribute to a degree qualification (Ferns, Campbell, & Zegwaard, 2014; Milne & Caldicott, 2016; Peach & Gamble, 2011; Reddan, 2016). The Tertiary Education Quality and Standards Agency (TEQSA) defines WIL as 'any arrangement where students undertake learning in a workplace outside of their higher education provider (or one operated jointly with an external partner) as a part of their course of study' (Australian Government Tertiary Education Quality and Standards Agency (TESQA), 2017, p. 1).

Such experiences are variously referred to as internships, work or industrial placements, industry-based learning, practicums, clinical rotations, sandwich years, clinical education and co-operative (co-op) education. Distinctions have been made between, for example, co-op education (structured, often paid work in industry for academic credit) and internships (paid or unpaid, hours often unspecified, often without academic credit) (Durack, 2013). Broader interpretations of WIL include applied practical or industry projects and simulations (Australian Cooperative Education Network (ACEN), 2018; Patrick et al., 2009; Reddan, 2016).

A recent report (Universities Australia, 2019) found that in 2017, 451,000 Australian university students (34.4 per cent of enrolled students) had a WIL experience. Of these, 104,140 had more than one WIL experience, bringing the total number of WIL activities in 2017 to 555,403.

Engineering WIL context

An influencer of engineering WIL is Engineers Australia (EA); the Australian engineering professional body that institutions invite to accredit their 'entry to profession' educational programs. Accreditation processes use international benchmarks to provide feedback on the capacity of institutions to facilitate students' development of entry to profession Stage 1 competencies (Bradley, 2008). Stage 1 competencies (Engineers Australia, 2017) are defined across three domains: knowledge and skills, engineering applicability and professional and personal attributes. EA accreditation guidelines suggest engineering programs comprise integrated exposure to professional practice, including ethics and management, through a range of strategies including an industry-based final year project or study of industry standards and practices.

EA does not mandate first-hand experience, but many institutions include compulsory exposure to professional practice in addition to embedded professional practice experiences as a course completion requirement for engineering studies. These requirements vary across institutions but (typically) include a minimum number of hours and types of first-hand experiences, variously described as professional practicums, internships, work experience, exposure to professional practice, WIL and work placements. EA accreditation guidelines express EA's position that engineering-practice environment experiences (or alternatives)

are desirable[1] and explicitly acknowledge the challenges for institutions to gain placements for all students.

> *… there is no real substitute for first-hand experience in an engineering-practice environment, outside the educational institution. Engineers Australia strongly advocates that all engineering schools include a minimum of 12 weeks of such experience (or a satisfactory alternative) as a requirement for the granting of qualifications, in addition to the other elements suggested, and make strenuous effort to assist all students to gain placements of suitable quality. However, it is recognised that this may not always be possible.*

> *Some educational institutions offer programs in which students are required to gain substantial practical experience in industry, or other engineering-practice settings and interspersed with the academic program. These are generically known as cooperative education programs, involving cooperation between the education provider, the student, and one or more engineering employers … The Board acknowledges these programs, and accredits them in the same way as any other professional engineering program (Bradley, 2008, pp. 17–19).*

Periods of exposure in engineering or industry-like environments outside the educational institution ideally engage students in social learning opportunities evolving their emergent professional engineering identity by developing personal and professional competencies (Male & King, 2014, 2019). Although the EA accreditation guidelines do not use the term WIL, exposure to professional practice outside the educational environment falls under the umbrella of WIL; and substantial engineering-practice experiences of workplace learning and cooperative learning, are defined in this research as **engineering WIL placements**.

Students of equity status

Equity status is defined by the Australian Department of Education (2016) to include students who have a disability, are from low socioeconomic status (SES) locations, are from non-English speaking backgrounds (NESB) who may be referred to as culturally and linguistically diverse (CALD), are women in non-traditional areas (WINTA) or fields of study, are from regional or remote locations, or identify as Indigenous (Australian Government, 2017).

Low participation rates (around 14 per cent) of women in engineering undergraduate education align with relatively static national rates of 12 per cent women in the engineering profession (Kaspura, 2017). Women student engineers' experiences in undergraduate classes are shaped by being a visible minority (Lloyd & Szymakowski, 2017). In addition to lower participation rates, women engineers' experiences in the profession differ to their male counterparts; they are less likely to be reemployed following career breaks and face increased early-retirement pressure (Kaspura, 2017). These differences establish women in engineering as part of an equity group — WINTA.

Participation rates of students across all equity groups in higher education are growing, while overseas students are increasingly engaging in engineering and related technologies education (Australian Government, 2018; Robinson, 2018; Universities Australia, 2017). Such students are potentially positioned as having equity status through the intersection of multiple criteria, for example, NESB/CALD and women, including international students.

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[1] The EA guidelines have been revised since the study, although a position of strong advocacy for all student engineers 'to build a meaningful portion of their experiences from workplaces where engineers exercise professional judgment in the practice of engineering.' is still conveyed (Engineers Australia 2017, pp. 18).

Access, equity and quality

Access and equity are social justice principles enjoining all people be treated fairly. Equity refers to fairness, and in the context of WIL placements, access means that a student's social and educational background, beliefs and experiences should not disadvantage them in being able to source, apply for, and undertake successful WIL placements. Quality WIL placements, in this report, refer to quality experiences contextualised in professions or industries related to students' chosen field of study and future career direction that provide suitable learning opportunities and engender a sense of having contributed to the host organisation (Drewery, Nevison, et al., 2016). Quality engineering WIL placements therefore require apposite interaction between education and industry stakeholders in generating, managing, monitoring, administering, supervising, assessing and evaluating placements to facilitate learning, connectedness and value for students and employers alike.

Wellbeing and WIL

Quality WIL placements support and, importantly, do not detract from students' wellbeing, which is a combination of physical, mental, emotional and social health (Grant-Smith, Gillett-Swan, & Chapman, 2017, p. 3). Research found that students' wellbeing during intense periods of learning in WIL placements may be adversely affected by multiple and connected stresses, including those associated with unpaid WIL such as practicums, typical of teaching, nursing and allied health (Grant-Smith et al., 2017).

> *WIL wellbeing occurs at the intersection of personal coping strategies, and institutional and community support. It is therefore imperative that all stakeholders involved in managing, administering and promoting universal WIL participation are cognisant of the potential impacts of WIL on participants' wellbeing (p. 38).*

Engineering WIL placements may be similarly unpaid and intense, potentially increasing time and financial pressure on students, which can detract from WIL wellbeing.

Connecting access, equity, quality, and wellbeing in engineering

Our research considered how student engineers experience WIL placements, and what insights might emerge to guide improvements in engineering WIL practice, particularly in relation to access, quality and wellbeing for students in equity groups. It was hypothesised that students of equity status may have magnified and/or unique stresses that negatively affect wellbeing and/or hinder equitable access to quality engineering WIL placements. Additionally, such students may have a lower degree of discretion to decline or avoid unpaid, underpaid or otherwise less than ideal placements, than their contemporaries.

The overarching question guiding this research was to what extent do students' lived experiences of contemporary engineering WIL placements echo or contrast with the body of research on access and quality of WIL and WIL wellbeing?

Research on WIL wellbeing in universities, engineering-specific WIL placements and unpaid WIL was identified by means of a systematic literature review (SLR). The review informed our analysis of student engineers' narratives of their WIL placement experiences, giving insight into their perceptions of the ease or difficulty and means of access, degree of placement quality and environments conducive to students' developing engineering professional identity, contribution to or detraction from wellbeing, and institutional, community and industry support or lack thereof.

Project methodology

This mixed methods study was subject to an evolving methodology where the emphasis changed over time based on the data collected and analysed. Three components of the study were conducted in a parallel and cross-informing manner, with convergence of data occurring at the analysis phase.

Study design and approach to analysis

This study employed a mixed methods approach (Creswell & Plano-Clark, 2014) comprising:

- collection of institutional WIL placement data on paid/unpaid status, placement timing, and number of placement applications
- a SLR of the extant published research
- an online survey set up in Qualtrics®, including self-reported demographic data to allow researchers to identify participants from equity groups, a resilience scale and free response questions
- interviews with students about their internship experiences supplemented by interviews with university staff.

Ethics approvals were obtained at all four participating universities and amendments lodged when the approach was modified[2]. A reference group, established to provide advice on the project, and a reviewer appointed by the NCSEHE also contributed to this research in its final stages by providing feedback on the draft findings.

The *Findings and discussion* section of this report presents the analysis of the four study components. Deductive coding of qualitative data (Saldaña, 2013) generated through students' narratives was initially conducted in NVivo® using nodes and sub nodes from WIL-equity research (Grant-Smith et al., 2017) in terms of positive and negative impacts of unpaid WIL. The nodes were positive impacts of WIL (13 sub nodes) and negative impacts and/or stressors (15 sub nodes) (Lloyd, Male & Paull, 2018). An additional three nodes subsequently emerged from inductive analysis of the data that were processes for acquiring WIL (six sub nodes), coping and support mechanisms (five sub nodes), and an internship characteristic node (nine sub nodes) aligned with a framework for classifying unpaid WIL based on the degrees of participatory discretion and purpose of experience (Grant-Smith & McDonald, 2018). The staff narratives were coded inductively following analysis of the first seven student interviews (Lloyd, Male & Paull, 2018) and in parallel with analysis of further student interviews. The staff interview data nodes were remuneration; access; support; social and other capitals; barriers; recruitment and engagement.

Institutional data

Participants were recruited from four diverse Australian onshore higher education institutions as described by pseudonyms in Table 1 which shows the institutions' affiliations and equity group participation rates (per cent of total enrolment). Student recruitment methods at these universities included direct and indirect messaging via Faculty or School notification channels, social media and student societies' networks. Staff recruitment was by invitation from the researchers based on knowledge of their roles in relation to WIL placements.

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[2] Curtin HRE2017-0661; UWA RA/4/20/4064; Murdoch HREC 2017/249; UTS ETH18-2591.

Table 1. Participants' universities — Affiliations and 2017 equity group participation rates (National Centre for Student Equity in Higher Education, 2017)

University	Affiliation	Low SES	Regional	Remote	Disability	Indigenous	NESB
Cassia	Australian Technology Network (ATN)	15.99%	10.63%	1.67%	4.30%	1.23%	4.17%
Grevillea	Innovative Research Universities (IRU)	20.03%	8.67%	1.56%	10.41%	1.78%	3.34%
Mimosa	ATN	13.78%	2.94%	0.06%	3.85%	1.06%	5.39%
Wattle	Group of Eight (Go8)	8.99%	8.37%	1.62%	10.12%	1.35%	4.40%

SLR of engineering WIL placements

SLRs have been identified as suitable for the development of theory (Onwuegbuzie & Frels, 2016), despite a concern about the effectiveness of conducting integrated or traditional reviews in the face of a proliferation of published work and searchable databases (Briner & Denyer, 2012). SLRs are considered 'a means of identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or phenomenon of interest' (Bugden & Brereton, 2006, p. 1052). According to the authors, SLRs can provide an objective summary of available research evidence, develop clear protocols for reviewing background material to determine which studies are to be included, analyse their contribution to identify where they support or conflict with the proposed study, and adopt a systematic approach to assess and aggregate outcomes. In contrast to an expert review using *ad hoc* literature selection, a SLR is a methodologically rigorous review of research results (Kitchenham et al., 2009). The aim is 'not just to aggregate all existing evidence on a research question; it is also intended to support the development of evidence-based guidelines for practitioners' (p. 8).

This SLR was guided by the well-established and rigorous principles of the Preferred Reporting Items for Systematic Reviews (PRISMA) (Liberati et al., 2009). We also adapted Pickering and Byrne's (2014) quantitative approach, specifically, the use of spreadsheets to document original research studies, and tables and maps to summarise and evaluate the results and report the findings.

The objective of the SLR was to identify, source, tabulate, analyse and summarise English language empirical research studies reporting the perceptions and experiences of undergraduate student engineers in work placements that contributed towards their degree qualification that were published in scholarly journals and/or conference proceedings between 2007 and 2018. Quantitative, qualitative and mixed methods studies reported in international and Australian journal articles and conferences were included, in keeping with the increasing variability in research methods applied in the field.

Search terms were entered in multi-field format and combined with Boolean logic. Seven inclusion criteria (IC) were determined to identify relevant scholarly articles. Searches of the electronic databases Science Direct, Web of Science, Academic OneFile, Scopus, Informit (RMIT) and Google Scholar were undertaken between August and October 2018. Manual searches were conducted of the following journals: *Journal of Engineering Education*, *International Journal of Engineering Education*, *European Journal of Engineering Education*, *Australasian Journal of Engineering Education*, *Asia-Pacific Journal of Cooperative Education*, and *International Journal of Work-Integrated Learning*.

Retrieved studies were first screened for duplication, then by title and abstract, and finally as full text articles. Six exclusion criteria (EC) were determined during the screening process. A commencement date of 2007 was set, given the proliferation of WIL and related practices in the broader university sector (earlier articles were included if they were highly relevant). Only empirical articles were included in the SLR, however, literature review and conceptual papers were noted and recorded separately to inform the study. Given the focus of this report is on Australia, the location in which the research was undertaken was included for the purposes of establishing whether legal, local or cultural factors might influence the findings.

The initial search yielded 33,509 articles on learning through work experience, internships or placements in higher education. Results were screened by first eliminating articles published before 2007, those which were not full text or peer reviewed, non-WIL placement focused, and non-engineering-related disciplines. This yielded 407 articles, each of which were reviewed by title and abstract, yielding 80 articles. A full text review was undertaken of the 80 articles, and two additional EC were applied, which eliminated 30 articles. Fifty-six articles were entered into a single spreadsheet adapted from Pickering and Byrne (2014), that identified studies by location, participants, theoretical frameworks, topics, methods and approaches, data sets, findings, and issues identified for further research.

From the spreadsheet analysis, 20 articles were identified and summarised in this report according to the inclusion criteria (Agwa-Ejon & Pradhan, 2017; Amorim et al., 2012; Bovea & Gallardo, 2006; Burt et al., 2013; Doel, 2009; Guler & Mert, 2012; Jiang et al., 2015; Koppi et al., 2010; Lucas et al., 2009; Male et al., 2017; Male & MacNish, 2015; Mercader-Trejo et al., 2016; Ngonda et al., 2017; Raelin et al., 2014; Ralph et al., 2009; Ramdass, 2017; Ramirez et al., 2016; Sher & Sherratt, 2010; Tennant et al., 2018; Wandahl & Ussing, 2016).

Online survey

An online survey was considered appropriate to collect data from a wide range of near to graduating or recently graduated students who would be likely to have completed WIL placements associated with their degree (Sills & Song, 2002; Van Selm & Jankowski, 2006). The instrument was set up in Qualtrics® and comprised a mix of quantitative and qualitative questions in three parts.

1. Respondents' demography and engineering WIL placement experiences
2. Respondent resilience
3. An opportunity for respondents to elaborate on their experiences

First, demographic data were collected to allow researchers to identify participants' backgrounds, including age; gender identification; postcode of primary residence in Australia; country of residence before university if applicable; enrolled status (domestic, international or exchange student); enrolment load; employment and financial support status; language background (NESB or not); hours spent on activities outside study and work; whether illness; injury or disability or a life incident occurred whilst undertaking WIL; and caregiver responsibilities. These data were self-reported in the survey and some students chose not to disclose this information. Initial WIL placement data was collected on paid/unpaid status, timing of placement (during semester/vacation period), and number of WIL placements applied for.

Second, the Connor Davidson Resilience Scale[©3] was used in the survey, whereby respondents were asked to rate the relative truth or otherwise on a five-point Likert scale in response to 20 statements.

The final section of the survey included free response sections which sought elaboration on the experience of WIL placements and provided the opportunity for respondents to indicate the effect of these experiences on them.

Revision of the survey occurred following a pilot with student focus groups and feedback from the project reference group. Twenty students from four participating universities responded to the survey, of which, 14 were unique (non-interviewed respondents).

Interviews

Student interviews

Interviews were conducted with 16 students (or new graduates) in total. Three interviewees were from Wattle, six were from Cassia, one was from Grevillea, and six were from Mimosa. Initial interviewees were recruited directly via university messaging, social media and word-of-mouth recruiting. Later interviewees were recruited via the online survey which included an invitation to be interviewed about WIL experiences in engineering.

Student interviews sought details of the number and types of organisations in which participants undertook their engineering WIL placement and whether these were paid or unpaid. Where it was unpaid, students were asked about their views on the lack of payment and why they took up the position. They were then asked to talk about their experiences in each of their placements in relation to:

- things that went well or standout moments
- what they wished they had known before they took up the placement/s and what their university might have done to better prepare them
- how they used their degree content during WIL placement/s
- how they secured their engineering WIL placement/s, and whether they had avoided or chosen not to apply for particular advertised opportunities
- their support networks, and how or whether they relied on these during the placement/s
- their developing employability and self-efficacy
- the most important thing they learned during their placement/s
- whether placement experiences met their expectations
- elements the university or workplace could have done better
- whether they still had contact with the placement organisation/s
- whether they compared their experiences with peers
- how they managed their work and study commitments during the placement/s
- any other information they felt was important to the research to capture that which might not have been anticipated in the interview protocol development.

Staff interviews

As the project evolved, it became apparent that a broader perspective was needed and so a further round of interviews with university staff involved in engineering schools was

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[3] The Connor Davidson Resilience Scale (CD-RISC[©]) (Davidson & Connor, 2017) is reported to provide normative distributions of responses with mean scores varying with location and nature of sample e.g., lower for young adults and students. The CD-RISC[©] has been used as an indicator of wellbeing and career optimisation (Perera & Ganguly, 2018) including Australian samples (Tomyn & Weinberg, 2018).

conducted and thirteen staff members were interviewed (three staff were from Wattle; two from Cassia; three from Grevillea; and five from Mimosa). These included staff in program chair positions, those supporting students setting up WIL placements, student support staff and staff whose responsibility was for WIL more broadly in their university, not just engineering.

Staff interviewees were asked about their role in relation to WIL in engineering, their views on WIL placements and their relationship to the courses of study, and the responsibilities of students in finding their own WIL placements. They were also asked about the ease or difficulty for students in meeting the WIL requirements for their engineering degree, and the barriers any particular groups might or might not experience. Opinions of staff were sought on the subject of remuneration of WIL, benefits and drawbacks, and what they saw as beneficial changes to WIL practice in their university. They provided insight into student, university staff and industry host perceptions and experiences.

Research on WIL higher education and engineering

WIL, including placements, plays an important role in the development of employability competencies of graduates, notwithstanding debates including those particular to unpaid WIL, and is ingrained in engineering education. The three core terms emerging from the review of WIL research literature to frame this study were access, quality (learning, impact, and relatedness) and student wellbeing.

WIL strategies in higher education

Over the past decade, Australian universities have developed WIL programs in response to one of their greatest contemporary challenges, to provide education that responds to present and future needs to produce more employable and work-ready graduates (Reddan, 2016; Universities Australia, 2008). This means in addition to technical skills and disciplinary knowledge, university education will need to equip students for teamwork, critical thinking, problem-solving, networking, negotiating and managing complexity. To this end, in 2008 Universities Australia advocated for a national internship scheme to address the national skills shortage and improve student employability (Smith, 2012) and in 2015, a National Strategy on WIL in University Education (Australian Collaborative Education Network (ACEN), 2015) was published. Citing Patrick et al. (2009), the strategy views WIL as encompassing a range of strategies that 'integrate theory with the practice of work within a purposefully designed curriculum' (p. 1), bringing together work, learning and theory through collaborations between industry, universities and students.

WIL placement research

Underpinning these strategies is evidence suggesting that WIL placements contextualise student learning and increase their employability on graduation (Reddan, 2017). Higher education institutions and employers across a range of professional practice disciplines, such as engineering, teaching, nursing and the creative arts, overwhelmingly support WIL placements (Mason, Williams & Cranmer, 2009). Yet WIL requirements and practices vary widely across disciplines, as well as universities in Australia and internationally, in relation to host organisation, timing and duration, and remuneration. Respectively, organisations may be large multinational companies, small businesses, not-for-profits, university research centres; placement duration and timing may be constituted as part-time or full-time, short-term stints, 3 months (most typically over summer), 4 to 6 months, and even up to 20 months in some places (Pennaforte, 2016); and WIL placements may be paid, poorly-paid or unpaid, accessed through formal application processes or informal social networks (de Peuter, Cohen & Brophy, 2015).

Such heterogeneity makes it difficult for stakeholders to hold binaristic 'for' or 'against' views of WIL placements (de Peuter et al., 2015, p. 331). For example, some authors suggest that placement duration has a high correlation with perceived skills development and student satisfaction (Rampersad & Patel, 2014), yet others suggest that placement quality, rather than duration, is crucial for student learning and transition to the workforce (de Peuter et al., 2015).

Current debates on impacts of WIL placements

Much of the literature reporting the impacts of WIL placements frame these in terms of positive and negatives. Discussions of negative impacts focus on financial, personal and professional cost to students, employers and universities, while discussions of positive impacts focus on student benefits and satisfaction (D'Abate, Youndt & Wenzel, 2009). For

example, recent WIL research in education, nursing, health and social sciences found the most often cited benefits of WIL placement were 'the opportunity to apply knowledge and skills gained in a workplace context (30 per cent, n=157) and being exposed to the industry associated with their degree (25 per cent, n=132)' (Grant-Smith et al., 2017). Benefits include skills development, such as improved technical skills through practical application, 'soft' skills, such as communication, teamwork, self-efficacy (Reddan, 2016; C. Thompson, Bates & Bates, 2016; Varghese et al., 2012), and networking and career planning (Daniel & Daniel, 2015). To a lesser extent, benefits are also seen to accrue to employers, some of whom participate in WIL programs to recruit graduates (Male, King & Hargreaves, 2016); however, there is a perception that universities functioning as employment agencies for industry undermines the idea of the WIL placement as a learning opportunity (Rowe, 2015).

A shift from the binary of placement positives (benefits) and negatives (costs) to the concept of placement quality, Drewery, Nevison, et al. (2016) argue, changes thinking about how WIL placements can be structured, undertaken, evaluated and sustained. This means moving from a focus on the accrual of individualised (student) outcomes to multilateral learning and knowledge sharing (O'Donovan, 2018) involving relationships between students, coworkers and supervisors, and academics, as well as integration of placement and study (Drewery, Nevison, et al., 2016). Yet there are not always enough WIL opportunities, let alone quality WIL opportunities, for students to learn, develop and grow. The idea of quality WIL placements is consistent with Dewey's proposition (cited Drewery, Nevison, et al., 2016, pp. 265–266), that all learning comes from experience but not all experiences are educative.

Quality WIL placements

Following an earlier study (Drewery, Pretti, & Pennaforte, 2015) exploring students' perceptions of 'quality' in WIL placements, Drewery, Nevison, et al. (2016, p. 267) identify learning, impact and relatedness as three dimensions of WIL quality. **Learning** is an important value proposition of placements. Most students rate WIL placements as being of high quality when they recognise they have gained personal and professional insight and knowledge through the workplace learning experience (O'Donovan, 2018). This suggests students are aware of their own development during placements and that they also consider how or whether the workplace contributes to this development. **Impact** is understood in the organisational behaviour literature as students' perception of having made a worthwhile and meaningful contribution to the host organisation during the placement. This suggests that students evaluate the extent of their contribution when assessing placement quality, which further suggests that WIL placements represent value for employers beyond a recruitment strategy. **Relatedness** refers to students' perception of a connection between their workplace experiences and personal goals, motivation, academic achievement and future career pathways. This suggests that WIL placements are rated by students as high quality when they perceive them to be deeply connected to their academic work, and may point to a link with wellbeing and placement performance (Drewery, Pretti & Barclay, 2016).

The concept of quality extends to debates about the timing and duration of WIL placements and industry policies and practices. In terms of the former, some authors suggest that timing affects quality but duration less so (Jiang, Lee & Golab, 2015), while others suggest the number of hours students complete is of particular importance to quality (Pennaforte, 2016). In terms of the latter, organisational policies and practices, resource commitment, evaluation systems, reward programs, mentoring, supervision and perceived level of genuine interest in students' learning affect perceptions of quality (Hardie, Almeida, & Ross, 2018).

A key narrative in the literature is that placement quality relies on strong academic-workplace relationships built over years of interaction (Kramer-Simpson, 2018) to facilitate collaboration and communication between the 'triple helix' (Rampersad, 2015) of university, industry and students, prior to, during, and post-placement. Interaction includes liaison

between academics and workplace supervisors to develop task completion guidelines that scaffold students' learning and professional development (Peach, Ruinard & Webb, 2014), and allow time for student adjustment and reflection (Cormier & Drewery, 2017; Lucas, Cooper, Ward & Cave, 2009). From the perspective of universities and employers, this means supporting students to do more than they could do by themselves, acknowledging their position as learners, providing room for decision making and mistakes, and allowing them to see the consequences of their actions (Peach et al., 2014, p. 98). For students, WIL placements are valuable where they have responsibilities entrusted to them, interact with professionals and practitioners, have opportunities to understand real-world applications of coursework, gain first-hand experience working on real projects, and learn about expectations in a professional setting (Nambisan, Alleman, Larson, & Grogg, 2014). Quality WIL placements, therefore, are those where such factors are in evidence, irrespective of whether they are paid or unpaid.

Unpaid work/WIL research

The intern economy debate

Unpaid placements are both an increasingly prevalent, highly visible feature of the contemporary global labour market and a site of contestation in Australia and internationally, irrespective of discipline or industry (Frenette, Dumford, Miller & Tepper, 2015; Lain et al., 2014). Referred to by the term quasi-employment (de Peuter et al., 2015), unpaid placements underpin the 'intern economy' (Frenette, 2013), the slogan for which, 'do what you love' (Tokumitsu, 2014), exhorts students to follow an (unpaid) pathway to paid work (O'Donovan, 2018). Yet unpaid placements are also a target of student activism (McAlpine, 2016), a topic of policy deliberation (Sivaraman, 2017; Stewart & Owens, 2013), and a subject of recent media coverage (Elliott, 2010; Schwartz, 2013; Tweedie & Ting, 2018).

On the surface, unpaid placements present an attractive option for students (Shade and Jocobsen, 2015). De Peuter, Cohen, and Brophy (2015) argue that unpaid placements 'make working for nothing look like fun … as a benign stepping-stone on a young person's path to gainful employment' (p. 330). Scholarly critiques in various industries however (Daniel & Daniel, 2013; Figiel, 2013; Frenette, 2013; Hope & Figiel, 2012; Shade & Jacobson, 2015; Siebert & Wilson, 2013), have recently emerged to criticise unpaid placements for, among other things, glamourising the experience while diminishing students' expectations of employers, contributing to financial pressures including student debt while excluding them from workplace entitlements and insurance, displacing paid employees, and rarely leading to paid work (de Peuter et al., 2015). The cumulative effects of unpaid WIL placements and internships identified through this critique are that they structure precarious work, particularly in the creative industries (M. Taylor, 2018), reinforce established social exclusions in the labour market (Allen, Quinn, Hollingworth & Rose, 2013; M. Taylor, 2018), devalue labour and depress wages, and increasingly see students paying employers for placements (Durack, 2013; C. Taylor, 2015).

These effects have widened debate about unpaid internships across disciplines, universities, political election campaigns (Price, 2016) and government policies (Sivaraman, 2017), as well as media and public commentary (Mirrlees, 2015; Stewart, 2016; D. Thompson, 2012a, 2012b) since the 2008 global financial crisis (Durack, 2013), making unpaid WIL placements highly relevant to this study.

Employability and access issues

The project, *Supporting graduate employability from generalist disciplines through employer and private institution collaboration*, found that the most important strategy to improve graduate employability is participation in well-managed work experience, internships, and placements (Kinash et al., 2015). Some authors posit employability as a developmental process that students learn prior to graduation (Bennett, 2018), while others suggest it is a

holistic attribute of work-readiness that nonetheless comprises tangible components that can be developed independently (Gedye & Beaumont, 2018). Linked to employability is the idea of career literacy, understood as 'the fundamental tool kit that enables intentional career development … a progressively acquired set of skills, knowledge, and attitudes that are related to the acquisition, understanding, and application of information needed to manage one's own career development' (Magnusson & Redekopp, 2011, pp. 175–176). Career literacy is a precursor to, or foundation of, career-self management (Chiaburu, Baker & Pitariu, 2006; Jung & Takeuchi, 2018).

Theoretical frameworks help unpack the complexity of employability. Some authors have taken a social capital theoretical approach (Jackson & Chapman, 2012; Small, Shacklock & Marchant, 2018) to frame employability as individuals' capacity for self-sufficiency and sustainable mobility in the labour market. For Small et al. (2018), the concept of employability moves beyond possession of knowledge and skills to knowing how to present them to employers as evidence of work-readiness (p. 150). The idea of social capital draws on Bourdieu's theory (cited Ingram, Friesen, & Ens, 2013, p. 196), of non-monetary but nonetheless valuable forms of capital that differentially affect people's mobility within society. Social capital has been defined as the accumulation of resources based on access to, inclusion and participation in social networks (Ingram, Friesen, & Ens, 2013, p. 196). Cultural capital has been defined as 'cultural goods, such as ongoing mental and physical dispositions and educational qualifications' (Samuelson & Litzler, 2016, p. 95). Social and cultural capital are mutually implicated furthermore, through informal networks (social capital) through which individuals learn about, understand and value the dominant organisational culture (cultural capital) afforded through everyday workplace interactions (Ingram et al., 2013, p. 196).

Accumulated or high social capital is a factor in students' accessing placements in creative disciplines affirming the key rule of internships of 'who you know matters' (de Peuter et al., 2015, p. 239). Institutional interventions to address inhibitors to accessing WIL placements have previously been identified as the provision of labour market information, development of job search skills and management of employability attitudes (Magnusson & Redekopp, 2011, p. 176). Yet access also requires students' investment in the necessary strategies that produce or enhance the cultural, economic and symbolic forms of capital valued in the employment market (Blackmore, Gribble, & Rahimi, 2017). This means knowing how to 'play the game' according to the more subtle rules and expectations around cultural dispositions and social fields.

Unpaid placements across all industries have a poor record as a route to paid work. One US survey shows, for example, that only 38.5 per cent of unpaid interns in for-profit businesses were offered paid employment (de Peuter et al., 2015); 'That's just one per cent better than graduates with no internship experience, 36 per cent of whom got job offers' (Adams, 2012). Yet unpaid placements are seen as becoming 'a necessary part of the doctrine of employability, an umbrella term used to describe the work of making oneself employable [which continues to] hide the more fundamental issues of elitism, inequality, bad-management, bullying and underfunding' (Hope & Figiel, 2015, p. 361). This doctrine, the authors argue, 'reflects, silences and reinforces systemic inequalities — a set of social mechanisms that differentially include and exclude populations along intersecting lines of age, class, gender, race, and status' (p. 331).

Allen et al. (2013) express concern for specifically 'which students are excluded' through higher education WIL placements. They argue that such placements operate as 'a key domain in which inequalities within both higher education and the graduate labour market are (re)produced and sustained' (p. 431) through normative evaluations of implicitly classed, raced and gendered 'ideal' workers. For example, exclusion along socioeconomic lines occurs when students who are unable to afford *not* to engage in paid work or have to forgo paid work and incur further debt in order to undertake what are often short-term, full-time

placements. In a recent United States (US) survey of over 10,000 arts school graduates, Frenette et al. (2015) found that 'women, Black, Hispanic/Latino, and first-generation college graduate arts alumni all appear to have held a disproportionate number of unpaid internships — which … are tied to significantly weaker career payoffs than paid internships' (pp. 8–9). According to (de Peuter et al., 2015), social divisions such as gender, race and ethnicity that structure entry into work is 'not only a problem of access, however. It is simultaneously a problem of representation' (p. 331) that has real implications for students and also their future careers. Human Resources managers, furthermore, often act as organisational gatekeepers, which affects their intentions and actions when hiring students in WIL placement positions and reinforces organisational homogeneity on organisational, occupational/job, and personal levels (Mackaway & Winchester-Seeto, 2018).

More women than men undertake unpaid internships (Attfield & Couture, 2014), despite the dissonance between the benefits that actually accrue for students and their often job- and career-related motivations for doing so. Women, furthermore, often work harder to become effective and flexible workers, while also often managing negative reactions from co-workers, through emotional labour. This concept was coined by Hochschild (1983) in organisational studies to describe the regulatory work women in service industries were required to do to manage feeling and expression for organisational goals. Engagement in emotional labour during WIL placements can negatively affect women students' wellbeing (Cormier & Drewery, 2017). Unpaid interns often cannot sue the organisation if they are sexually harassed because they are not covered under employee anti-discrimination laws (Grant, Bowman & Lipp, 2000; Schwartz, 2013).

Institutional racism constitutes obstacles for both new migrants and international students, albeit with visa issues further complicating the latter. Not all students seeking placements are young; some support partners or families, even though the prevailing assumption is that it is more acceptable for a young person to work for free (de Peuter et al., 2015).

Unpaid WIL and wellbeing

Seeking and applying for WIL placements is time consuming and stressful for students. Add to this the paucity of quality placements and factor in full-time study, paid work and family responsibilities, the pressure of seeking, applying for, being interviewed and risking rejection, engaging with and transitioning from the university to the workplace and back again, all of which take an enormous toll on students' wellbeing (Cormier & Drewery, 2017). The possibility of not being matched with a quality placement, or having to decline one because of clashes with other commitments, psychological and financial stress, social isolation, study/life imbalance, or exposure to exploitative or unlawful work practices affects student wellbeing (Gillet-Swan & Grant-Smith, 2018). In other words, the effects of negative WIL placements on student wellbeing persist through to exclusion from potential personal and career opportunities, while organisations miss out on realising the benefits of employing workers from diverse backgrounds (Mackaway & Winchester-Seeto, 2018).

Gillet-Swan and Grant-Smith (2018) argue that diversity in student populations presents a challenge for universities seeking to provide equitable access to quality WIL placements for all students. These include institutional duty of care while offering authentic learning experiences that also meet professional accreditation requirements, as well as ensuring that students' social and psychological needs are considered and addressed through adequate services. Yet such services are often limited in availability, duration and funding, while students often decline support because of perceived social stigma, which further negatively affect student wellbeing.

The distinction between paid and unpaid placements is often acknowledged as a key differentiator in WIL experiences (Coll & Zegwaard, 2012). Yet there is little evidence of this difference in patterns of supervisor ratings of students' work performance, the importance

attributed to benefits accrued and quality of the placement experience (Milne & Caldicott, 2016).

Legal and ethical grey areas

A review of unpaid work found that unpaid internships may fall into the 'most diverse, complex and legally ambiguous' category of elective productive work due to the nature of work undertaken and (perceived) higher degree of student discretion to participate in such work (Grant-Smith & McDonald, 2018).

The Fair Work Ombudsman (2018) provides five indicators on how to determine whether an employment relationship exists, and therefore whether the unpaid placement is likely to be unlawful. Rather than clarifying what does and does not constitute legally unpaid work experience however, these indicators position Australian WIL placements in a legal 'grey area' (Ashton, 2016; Cameron, 2017; Cameron, Freudenberg, Giddings & Klopper, 2018), similarly to other countries such as the US (Durack, 2013; Durrant, 2013; Hart, 2014; Klinger, 2016; Pryjmak, 2017; Tepper & Holt, 2015). In 2015, for example, an Australian media company was penalised $24,000 for underpaying two students by characterising them as volunteers for work performed and giving them only 'reimbursement-for-expenses' instead of wages (Fair Work Ombudsman, 2015). In another case in the US, two interns successfully sued Fox Searchlight Pictures for violating minimum wage and overtime laws (Durrant, 2013). Legal wins such as these, however, are the exception rather than the rule.

A number of ethical questions are raised about power imbalances between student and employer when a WIL placement description is linked with the term 'unpaid', according to Hennig and Rodricks (Unknown). Is taking on a student willing to work for free with little regulation a question of accepted cultural practice or calculated exploitation on behalf of the employer? What are the differences in benefits to student and employer and how are they measured and valued? What are the regulatory implications of employers exploiting students for profit by treating them as a 'means to an end'? Are unpaid WIL placements worth the effort and stress to the student, or are employers actually cultivating their capacities?

These questions extend to universities, whose formal involvement with placements are often required for legal reasons. Should universities benefit economically by charging tuition to a student working without pay to earn course credit (de Peuter et al., 2015), or in the case of engineering, to fulfil mandatory requirements? This complicates the institutional risk involved in designing programs in ignorance of what the law allows and failing to vet or adequately supervise WIL placements (Durack, 2013). WIL programs enable universities to address government policy, meet teaching and learning goals, and offer selling points to students, yet they also involve multiple university elements in risk management, which must be aligned to the broader organisational risk management strategy (Cameron, 2017). Universities therefore, risk being placed in compromising positions if they fail to provide inclusive experiences for all students, which has multiple consequences for disadvantaged and underrepresented groups of students (Mackaway & Winchester-Seeto, 2018).

WIL in engineering

WIL, including placements, plays an important role in the development of employability competencies of graduates (Male & King, 2014, 2019; Reddan & Rauchle, 2017; Smith, Ferns, Russell, & Cretchley, 2014) notwithstanding issues of debate as summarised in the preceding sections. Within the broader WIL and employability discourses there is limited and newly emerging engineering-explicit research, of which very little is focused on access. This was established by a SLR, resulting in 20 eligible studies, the process for which is outlined in the *Project methodology* section of this report. Much of this literature—a summary of which follows—frames WIL placements in binary terms as positive or negative impacts, seen respectively as benefits (primarily for students and occasionally for industry) or costs (for students, educational institutions and industry). For example, in their review of 87 articles

related to engineering internships, Ralph, Walker, and Wimmer (2009) found that 23 articles (26 per cent) reported only positive impacts, three (3.5 per cent) reported only negative impacts, and only three (3.5 per cent) reported both positive and negative impacts. The authors conclude that the strengths of engineering WIL placements far outweigh their weaknesses.

Positive impacts

In terms of positive impacts evidenced in the literature, student engineers report a high satisfaction level with engineering WIL placements (Guler & Mert, 2012; Jiang et al., 2015; Mercader-Trejo et al., 2016), and are aware of the strengths of placements, which are often framed as benefits. Benefits include developing or refining skills, attitudes and behaviours essential to improving employability (Guler & Mert, 2012; Koppi, Edwards, Sheard, Naghdy & Brookes, 2010; Tennant, Murray, Gilmour & Brown, 2018; Wandahl, Olsen & Ussing, 2011), improving professional competence and technical skills (Ralph et al., 2009), increased self-confidence, communication, problem-solving and multidisciplinary team working skills (Koppi et al., 2010; Ralph et al., 2009), improving perceived self-efficacy (Lucas et al., 2009; Raelin et al., 2014), increasing capacity for selecting, gaining a head start and persisting in chosen career directions (Lucas et al., 2009; Tennant et al., 2018), linking theoretical learning with practical applications in the real world (Guler & Mert, 2012; Ralph et al., 2009; Ramdass, 2017; Sher & Sherratt, 2010; Tennant et al., 2018; Wandahl et al., 2011), and being exposed to real-world ethical dilemmas and decision making as opposed to hypothetical classroom discussions (Burt et al., 2013). Overall, benefits contribute to students' employability.

Some studies suggest that although students often feel ill-prepared with little direction or knowledge about workplace practices or their future responsibilities on commencement, they quickly adapt, seeing such difficulties as important for their learning process and experience (Amorim, Pimentel, & João Rosa, 2012). Other studies suggest that students see significant improvements from the first to subsequent placements, including better performance evaluations by employers as they become more familiar with work environments and expectations (Jiang et al., 2015; Mercader-Trejo et al., 2016). Students rate senior placements as their best in relation to performance and leadership, although they also often rate their first employer the highest (Jiang et al., 2015). Junior students, however, report being less satisfied with their first placement the longer it takes to secure after degree commencement (Jiang et al., 2015).

WIL placements are seen by students to enhance university learning through an awareness of its relevance in the workplace gained through the experience, which in turn, provides a framework for better learning (Koppi et al., 2010; Sher & Sherratt, 2010). For some students, completing academic tasks associated with reflection during the WIL placement, such as log books and journals, assists their personal and professional growth while generating an accurate record of activities that also contribute to assessment and future job applications (Doel, 2009). In this sense, students see placements as fundamental for the transition to professional engineering, facilitating familiarisation with and integration into the organisational work environment. This was mostly attributed to having to adapt and communicate with a new group of practitioners from the shop floor to management (Amorim et al., 2012), and gaining experience in the labour market (Bovea & Gallardo, 2006).

Negative impacts

Negative experiences in WIL placements may be attributed to students, host organisations and educational institutions alike. Studies report students' lack of motivation for the WIL process, poor treatment in the workplace, failure to complete work experience portfolios, or socialisation issues caused by personal conflicts (Ralph et al., 2009; Ramdass, 2017). A comparative study of student engineers in the US (alternating co-op periods) and the United Kingdom (UK) (year-long sandwich periods) looked at the reasons why students choose to

take up optional placements or not (Ramirez et al., 2016). The authors found that those students choosing not to do a placement in the UK perceived it would distract from the degree (44 per cent), prolong time to completion (29 per cent), mean sacrificing paid part-time work (29 per cent), or result in a loss of social interactions. US students perceived the greatest cost of doing a placement to be disconnecting with peers, missing on-campus opportunities, prolonging time to graduation; and being out of kilter with scheduled classes. One exception was that students saw placements helping them in decision making and, overall, felt the benefits outweighed the negatives.

Difficulties in securing a 12-week placement were reported by a large number of students in an Australian study (Sher & Sherratt, 2010), while others reported struggling to adapt to the challenges of work, maintain a balance between university and work requirements, and cope with the requirements and expectations of the workplace. In similar studies, students attribute these struggles to a lack of an induction in the workplace (Tennant et al., 2018), lack of a clear direction, structure or defined project at placement commencement (Amorim et al., 2012; Ramdass, 2017), and not enough information provided by universities prior to commencement, which means students do not know what they will be doing during the placement (Guler & Mert, 2012; Wandahl & Ussing, 2016).

There were mixed results in literature reporting the impact of placement duration on students. Some studies found that learning corresponds with time spent (Wandahl & Ussing, 2016), while others found that more than half students want the placement to be longer (Guler & Mert, 2012; Tennant et al., 2018), although this would also prolong time to graduation (Guler & Mert, 2012; Ralph et al., 2009). Extended work terms at the same employer were found not to increase student satisfaction, while junior students were less satisfied with their positions when starting their first placement later, rather than earlier, in the course (Jiang et al., 2015). Higher retention rates were associated with more students completing placements (Raelin et al., 2014), although students were reported as becoming disillusioned or disgruntled upon returning to university post-placement (Ralph et al., 2009). A Canadian study found that senior students are more successful in securing WIL placements abroad than junior students (Jiang et al., 2015), while a South African study found that approximately 25 per cent of students do not graduate because of the lack of placements (Ramdass, 2017).

There were a number of contradictions in relation to negative impacts of WIL placements attributed to host organisations. Placements were seen as more successful when students had skills to test, and when authentic tasks were provided to meet and also stretch their capabilities (Lucas et al., 2009). Yet some students reported wanting more varied experience in different areas of the organisation (Tennant et al., 2018), or being assigned to non-engineering tasks, such as business, science and education, attributed to a perceived lack of good engineering placements (Ralph et al., 2009; Wandahl et al., 2011). In contrast, one study found that there were no significant differences between the evaluations of non-engineering students hired for engineering positions and vice versa (Jiang et al., 2015). Students reported lacking confidence in decision-making processes, yet also being pressured to make quick decisions (Amorim et al., 2012). Some studies reported students having encountered a lack of professionalism in their interactions with practitioners (Ralph et al., 2009), while others found it difficult to communicate and negotiate with practitioners attributed to their perceived resistance to change (Amorim et al., 2012).

Mentoring

The relationship between students' learning and workplace mentoring was investigated in three studies. Amorim et al. (2012) highlight the importance of the supervisor's role in facilitating the development of students' technical and soft skills, as well as situated technical knowhow and professional networking, although Ralph et al. (2009) suggest that students often receive inadequate mentorship. In a South African study investigating the mentor-

protégé relationship and the learning environment in mechanical engineering placements, Ngonda, Shaw, and Kloot (2017) found that most mentoring was 'ad hoc and not aligned with a particular mentorship approach' (p. 181). The authors identified a contrast in perceptions of mentor-protégé directionality. On the one hand, students' evaluation of workplace mentoring effectiveness can be clouded and moderated by their preplacement expectations and conceptions of good mentoring as unidirectional. Students expect mentors to coach their integration into the workplace, support their learning efforts, facilitate meaningful engagement in authentic work tasks, and teach industry specific knowledge and strategies for tackling work challenges. Yet the study also found the mentor-protégé relationship to be multidirectional when students exercise personal agency through active management of their relationship with their mentor and moderation of their own behaviour, work ethics, and proactiveness.

Negative impacts of WIL placements attributed to educational institutions focus on lack of resources. Degree programs are seen as already demanding, with staff having increasingly less time and greater enrolments and responsibilities. WIL placement programs are time intensive and need to be well-resourced, yet there is a lack of dedicated personnel and time to manage increasingly complex legal and logistical WIL processes (Agwa-Ejon & Pradhan, 2017; Lucas et al., 2009; Ramdass, 2017).

Information exchange and coordination

A number of studies reported problems with information exchange and lack of coordination within the 'triple helix' of student, organisation and university (Rampersad, 2015). Some students were concerned about the lack of university assistance and lecturer visits during the placement period, which was attributed to the lack of appropriate placements, a shortfall of full support from university and industry (Wandahl et al., 2011). Others advocated for a greater degree of coordination and collaboration between tutor, supervisor and student to increase student learning and future collaboration, a clear work plan, guidelines and objectives at placement commencement (Bovea & Gallardo, 2006; Guler & Mert, 2012; Mercader-Trejo et al., 2016; Wandahl & Ussing, 2016). Studies reported students having difficulties obtaining information on WIL and finding placements and wanting better support from universities (Sher & Sherratt, 2010; Tennant et al., 2018). This includes performance feedback during placement and on completion, with opportunities for student reflection and adjustment (Lucas et al., 2009).

Access and equity

The review found there is a paucity of studies investigating access and equity in engineering WIL practice, with only four studies addressing gender or students from low SES locations. Two Australian studies of university students' experiences of gendered cultures in engineering workplaces found that male and female students report experiences consistent with masculine cultures. Furthermore, women report having attention drawn to their gender, receiving requests and being assigned tasks and roles based on gender (Male, Gardner, Figueroa, & Bennett, 2017), and stereotyping and marginalisation in the workplace (Male & MacNish, 2015). Although not specifically focused on gender, a US study found the relationship between WIL placements and academic self-efficacy and achievement played a critical role in retention for both male and female students, although contextual support for women is critical in all time periods (Raelin et al., 2014). A UK study reporting on the relationship between students' perceived self-efficacy and entrepreneurialism (Lucas et al., 2009) noted that respondents were mostly male, with a father who owns a business. The study however, draws on largely outdated research and gender theories.

In terms of students from low SES locations, a Spanish study reported that only 20 per cent of engineering placements were paid, although some students received grants or travel allowance (Bovea & Gallardo, 2006). The authors recommend that organisations be provided incentives to offer remunerated placements.

Evidence indicates that traditional engineering WIL placements may be declining in favour of flexible arrangements including part-time placements concurrent with study, increasingly secured by fee-for-service payment to agents (Tweedie & Ting, 2018), undertaken offshore or in countries of origin for non-domestic students (Ingram et al., 2013), increasingly unpaid and/or underpaid (Tripp, 2015), and challenging to secure with inequitable access to quality placements (Allen et al., 2013).

Summary

To conclude this review, there is a tendency to frame engineering WIL placements in binary either/or terms of positive impacts (benefits) or negative impacts (costs). This is the case for much of the WIL placement research literature, which oversimplifies and reinforces often polarised strengths and drawbacks of current practices. In contrast, reframing engineering WIL placements in terms of access, quality and wellbeing, as this research does, opens possibilities for rethinking, designing, implementing and evaluating equitable WIL practices. On a final note, research into the host organisation's perspective of WIL placements is largely absent from the research on access and equity (Mackaway & Winchester-Seeto, 2018; Winchester-Seeto, Rowe & Mackaway, 2016), which presents opportunities for future investigation in terms of risks related to inequitable access to quality placements.

Findings: Engineering WIL placements landscape

This study found institutional engineering WIL practices had elements of commonality, such as student responsibility and completion requirements, and diversity, including assessment and experience inclusions. Institutional data collection on WIL placements was not uniformly gathered, reported or disseminated. The landscape of engineering WIL placements is not binary (paid/unpaid) with underpaid and unpaid placements common.

Institutional contexts

Cassia University

Cassia University's Bachelor of Engineering (Honours) graduation requirements include 480 (weighted) hours of 'Exposure to Professional Engineering Practice (work experience)' accrued as a combination of technical and non-technical activities. Satisfactory completion includes assessment of students' log of hours and reflections on 'professional engineering practice observed and experienced' (referencing EA's suggested exposure to professional practice activities). Cassia University documentation states that WIL hours were historically obtained through work experience in an engineering workplace over summer vacations but acknowledges contemporary challenges in finding these experiences and opportunities for students to obtain experiences may be many and varied.

A few academics per engineering discipline assess students' logbooks and reflections to ascertain if at least 240 hours were engineering work (where students use engineering skills to make decisions). The weighted-hours are calculated with a matrix of factors depending upon the workplace and type of work. Further, maximum contributions for each type of work and work environment are set. Cassia University has industry-sponsored capstone research projects. A very limited amount of the project hours may be claimable such as meeting hours at the industry sponsor's workplace.

Grevillea University

Grevillea University's Bachelor of Engineering (Honours) or two-year Master of Engineering require 450 hours of WIL with at least 300 hours accrued in approved industry experience viz. an international engineering-aide project for a recognised non-governmental organisation (NGO) or not-for-profit organisation (NFP or NPO), paid or unpaid industry experience, or capstone project undertaken within an industry setting. Grevillea University guidelines state that the International Association for the Exchange of Students for Technical Experience (IAESTE) paid international work placement/traineeship is accepted in the approved industry hours.

Students are assessed (Ungraded Pass/Fail) by an academic on the basis of their logbook, reflections and engagement in the subject's three-hour induction. The logbook must indicate which EA Stage 1 Competencies (Engineers Australia, 2017) from the Professional and Personal Attributes are evidenced in the related reflections. A further 150 hours may be accrued from engineering-related activities which have weighting factors and capped maximum contribution to the hours (similar to Cassia University). For instance, attending engineering-related events have a 5:1 ratio and cap of 50 hours.

Mimosa University

Mimosa University has multiple accredited pathways to professional engineering: Bachelor of Engineering (Honours) Diploma of Professional Engineering (default for domestic students), Bachelor of Engineering (Honours) for international students and students of five-

year combined degrees, and Master of Professional Engineering. The Bachelor of Engineering (Honours) and Master of Professional Engineering completion requirements include a zero-credit subject undertaken concurrently with a 12-week engineering WIL placement, and pre- and post-placement credit-bearing preparation and reflection subjects respectively.

The Bachelor of Engineering (Honours) Diploma of Professional Engineering completion requirements include a credit-bearing engineering WIL cooperative program of 48 weeks of approved WIL placements typically undertaken over two cycles — around the end of second year and fourth year. Each cycle consists of a six-month WIL placement along with an engineering practice preparation subject, professional experience (credit-bearing) concurrent with a WIL subject, and post-placement engineering practice reflection subject. Each subject has learning outcomes related to the development of personal and professional attributes linked to EA Stage 1 Competencies (Engineers Australia, 2017). Mimosa University students are assessed by an academic (multiple academics assess, with moderation by the subject coordinator) on multiple reflections, online module completions and reflective reports.

Like Grevillea University, Mimosa University explicitly includes experiences with the IEASTE. Mimosa University has industry-sponsored student (capstone) research projects which do not count towards the Diploma internship hours but may arise from students' WIL placements.

Wattle University

Wattle University's Master of Professional Engineering graduation requirements include undertaking 450 WIL hours and satisfactory completion of a reflective report or portfolios assessed by an academic. Multiple academics assess one or more WIL placement reports and determine satisfactory completion based on students' demonstration of being proactive by contacting and liaising with employers to organise work experience, performing satisfactorily as assessed by an employer, developing an understanding of future roles as a professional engineer, reflecting on work experiences and articulating professional benefits with reference to EA Stage 1 competencies (Engineers Australia, 2017), and preparing a clear and concise portfolio or report in English. A minimum of 300 hours of technical, engineering discipline-specific WIL and 150 hours of educational or service tasks is required.

Wattle University has industry-sponsored capstone research projects. The full amount of the project hours is claimable if the capstone project includes a placement similar to Grevillea University. Non-placement extra-curricular workshops using interaction with remote or simulated sites or equipment, and face-to-face or electronic interaction with real or simulated practitioners may be claimed.

Student participants' demographic data

Remoteness

Five classes of remoteness are defined in Australia from an objective measure using the Accessibility and Remoteness Index of Australia (ARIA)[4] (Hugo Centre for Migration and Population Research, 2018). Participant remoteness, where provided, is shown in Table 2.

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[4] Additional information on how the ARIA+ Methodology is found here https://www.adelaide.edu.au/hugo-centre/services/aria. This supersedes previous (prior to 2011) measures used in classifying Equity Group status defined by MCEETYA, the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA).

Table 2. Participants by remoteness area category

Remoteness Area Category	Remoteness Area Name	Participants
0	Major Cities of Australia	7 interviewees and 7 unique survey respondents
1	Inner Regional Australia	4 interviewees
2	Outer Regional Australia	
3	Remote Australia	2 survey respondents
4	Very Remote Australia	
5	Migratory Offshore Shipping	

Socioeconomic status (SES)

'The low socioeconomic status (low SES) postcode measure is based on the students' postcode of permanent home residence, with the SES value derived from the Australian Bureau of Statistics' Socio-Economic Indexes for Areas (SEIFA) Index of Education and Occupation for postal areas' (Australian Government, 2018b). While acknowledging that the concept of low SES is not straightforward, participants' home residence postcodes were evaluated using the SEIFA decile data (Australian Bureau of Statistics, 2008). Respondents' home residences spanned all deciles of the Index of Education and Occupation, hence it is inferred that participants reflected a range of SES including low SES.

Gender, cultural or linguistic background (CALD/NESB) and ages

Five interviewees identified as women, while only two other unique survey participants identified as women. Three interviewees were CALD/NESB, and four unique survey participants were international students. Interview participants ranged from a minimum age of 21 years to a maximum of 30 years, with the average age 24.4 years. Survey participants were aged 19 to 26 years.

Students' resilience scale scores

Resilience scores ranged from 67/100 to 96/100, representing the lowest to highest quartiles (see the *Findings and discussion* section *Project findings and discussion: WIL wellbeing* for resilience indicators reported in the interviews).

Placement remuneration and hosts

Participant reported data

Almost 40 diverse, first-hand experiences of engineering WIL placements and one graduate role were described in student interviews and the online survey (see Table 3 — italicised data indicating survey responses).

One was a '**paid for**' WIL placement with a humanitarian agency and one had undeclared remuneration in the survey. No placements were paid for via agents or brokers.

Twenty placements (and a graduate role) were **paid** and were of varying duration from 12 weeks[5] (15 placements) up to four months (one placement), six months (three placements), and 18 months (one placement). One of the paid placements and the graduate role were

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[5] Students reported duration most commonly as 12 weeks, occasionally as three months or in terms of hours e.g., 460 to 480 hours.

described as unsatisfactory, and the students left earlier than intended. Paid placements occurred in varying company sizes[6]; 13 hosts were large enterprises.

Nine placements were **unpaid**. These were of varying duration, ranging from three weeks through to 12 weeks (three placements); four, five and six months (four placements). Two placements were reported as part-time for some or all of the required hours. Unpaid placements occurred in varying company sizes[6]; five hosts were large enterprises.

Professionals Australia recommend a sliding pay scale depending upon undergraduate experience; such as 90 per cent of graduate salary for a 12-week industrial placement, or 50 per cent if the student has completed first year only. Based on the *2017 Professional Engineer Employment and Remuneration Report* (Professionals Australia, 2018), pay for a senior student engineer on a placement is approximately $26 per hour. This rate was used as one of the benchmarks for assessing whether a (senior) placement was underpaid. Other benchmarks included students' perceptions and/or calculation of underpayment due to excessive unpaid overtime, or payment of a 'completion bonus' which corresponded to far less than recommended remuneration. Six placements of between three and six months' duration were **underpaid**. One such placement was cut short by the student after one month of the intended six months. The underpaid placements occurred in two large enterprises, two in small enterprises, one in a government agency and one in an undeclared business.

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[6] Company size was based on ASIC definition viz. a large proprietary company being one with consolidated revenue in excess of A$25 million and more than 50 employees; a small proprietary company is one with consolidated revenue less than A$25 million and fewer than 50 employees at the end of the financial year (https://asic.gov.au/regulatory-resources/financial-reporting-and-audit/preparers-of-financial-reports/are-you-a-large-or-small-proprietary-company/)

OECD data and definitions (https://data.oecd.org/entrepreneur/enterprises-by-business-size.htm) were then used to help identify small and medium businesses: small and medium-sized enterprises (SMEs) employ fewer than 250 people. SMEs are further subdivided into micro enterprises (fewer than 10 employees), small enterprises (10 to 49 employees), and medium-sized enterprises (50 to 249 employees). Large enterprises employ 250 or more people.

Table 3. Student participants' WIL placements

Placement Remuneration	Duration	Host Enterprise Company Listing or Ownership	Host Enterprise Size	Host Enterprise Annual Revenue[4]	Type of Engineering Enterprise
Not declared[1]	12 weeks				
Paid for place	4 weeks overseas	not-for-profit organisation			humanitarian
Paid	12 weeks	ASX listed	Large	43 Billion US	petroleum
Paid	12 weeks DIDO[2]	not listed-private Aust. owned	Large	7 Billion US	mining
Paid	12 weeks	ASX listed	Large	4 Billion AUD	oil and gas
Paid	12 weeks	Global employee owned	Large	2 Billion AUD	consulting
Paid	12 weeks	Public / Government	Large	Not applicable	transport
Paid	12 weeks	Global	Large	12 Billion AUD	mining
Paid	12 weeks	Global	Large but small new branch	10 M AUD estimated	consulting
Paid	12 weeks	University research centre		70 M AUD	research
Paid	12 weeks 2-1 rotation FIFO[3]	ASX listed	Large	900 M AUD	mining
Paid	12 weeks FIFO[3]	ASX listed	Large	2 Billion AUD	construction
Paid	18 months, intended 12 and extended by an extra 6	Global	Large	24 Billion	power
Paid	12 weeks plus ongoing part time	not listed- Aust. owned	Large	1 Billion	consulting
Paid	4 months plus ongoing part time work in semester	not listed-private Aust. owned	SME-Micro	Not public	consulting
Paid	6 months	Global	Large	16 Billion Euro	consulting
Paid	6 months	unknown	Large	100-500 M AUD estimated	manufacturing
Paid	480 hours intended — 8 weeks part time, left early	not listed- Aust. owned	SME — Small	15 M AUD	consulting
Paid[1]	*12 weeks*	*Not specified*			
Paid[1]	*12 weeks*	*Not specified*			
Paid[1]	*12 weeks*	*Not specified*			
Paid[1]	*12 weeks*	*Not specified*			
Paid - graduate role	Ongoing FIFO[3], left after 6 months	Not specified			construction

Placement Remuneration	Duration	Host Enterprise Company Listing or Ownership	Host Enterprise Size	Host Enterprise Annual Revenue[4]	Type of Engineering Enterprise
Underpaid (unpaid plus small travel allowance below ATO recommended)	6 months intended- some FIFO[3], left early after 1 month	not listed- private Aust. owned		Not public	consulting
Underpaid[6] ($13 / hour)	6 months Overseas	Not specified			manufacturing
Perceived Underpaid[5]	6 months	not listed- private	SME - Small	Not public	consulting
Perceived Underpaid (unpaid overtime)	6 months plus Ongoing 3 days/week	Public Government	Large	Not applicable	research
Underpaid (only a completion bonus)	12 weeks	ASX	Large		consulting
Un/underpaid (Paid only if work was invoiced)	480 hours	not listed- Aust. owned	SME- Micro	Unknown	electronics
Unpaid[1]	*'some of it' e.g. less than 480 hours*	*Not specified*			
Unpaid[1]	*'all of it' e.g. 12 weeks*	*Not specified*			
Unpaid	12 weeks during semester part time 2 days/week	not listed- Aust. owned	Large	300 M AUD	consulting
Unpaid	5 months	not listed- Aust. owned	Large	19 M AUD	manufacturing
Unpaid	6 months	Public Government	Large		consulting
Unpaid	6 months but 25 hr/week	university research centre		not public	research
Unpaid	6 weeks — 2 sessions of 3 weeks	Global	Large	79 Billion US	Consulting
Unpaid	8 hours a week for total 460 hours	ASX listed	Large	12.6 Billion AUD	construction
Unpaid	Unclear	not listed- Aust. owned	Unknown	Unknown	manufacturing

Notes:

1. Italicised are survey respondents' data.
2. DIDO — drive in, drive out.
3. FIFO — fly in, fly out.
4. Revenue information extracted from annual reports where possible or publicly available information such as (financial) news articles. Estimated values are extracted from glassdoor.com.au.
5. Underpaid was perception of applicant who calculated hourly rate including (unpaid) overtime in hours worked.
6. Underpaid is description given by participant with the clarification that local interns would be paid less.

Institutional and staff-reported data

Data analysis was hindered by the lack of consistency and completeness of the data across institutions due to lack of clarity or systematic processes around what data should be collected and disseminated, by whom, and for what purposes. The nature of WIL placement practices in some institutions hampered the completeness of data, for example, students self-sourcing placements, post placement reflections and reporting not including

remuneration, lack of student engagement (or requirement to be engaged) in institutional practices, such as inductions and pre-approvals for placements, and multiple staff or agencies engaged in placement management. This was further compounded by lack of staff resources and a changing compliance landscape around the needs of insuring, assuring, monitoring and reporting on placements. Staff perceptions of the frequency of paid placements were sometimes 'rose tinted' with quantitative data indicating lower frequencies of paid placements that staff perceived.

Data collection at Mimosa University was centralised and showed the frequency of payment for placements varied by duration, discipline, course type and seniority of the student. A high percentage of students obtained paid six-month duration WIL placements when they were near to completion (senior students) and around two thirds of students were paid for their first WIL placements (junior students). For 12-week duration WIL placements more than one third were paid which is comparable with other institutions with equivalent duration WIL placements. Data collection on remuneration was less systematic at other institutions however the frequency of paid WIL placements could be estimated from data gathered and recorded by WIL staff through their interactions with students and hosts. Staff recounted boom economy times with burgeoning payments to attract interns, in contrast to post-boom years and present day; the states' economic climates and downturn in mining activity (in Western Australia) affected the frequency of paid placements and the associated rise of under-paid placements by the hosts' use of stipends, cadetships, bursaries or completion bonuses. This phenomenon was not limited to Western Australia. Increasing competition for fewer placements and acceptance or promotion of unpaid WIL was perceived as contributing to the current landscape of unpaid and underpaid placements.

> *I think for the most part, most of the time in this day and age, it's unpaid. In the past, it used to be paid, during the mining boom. But now it's not. I mean, I wouldn't be able to say proportion and percentages, but I think for the most part, it's unpaid (Laurel, staff).*

> *So now that most of the industries don't pay, I actually like it, this is my personal view, because then the students are not going into competition with each other or choosing a company merely because of the money that it pays not because of the type of the project and the learning side of it. In that regard I think I like it, but there is a question mark for me, and I don't know, and the question mark is that whether or not the companies are taking advantage of this (Nerida, staff).*

> *From what I understand, before I started in this role three and a half years ago, the majority of work experience opportunities were paid. With the downturn in the economy, that fell off and in fact I've had companies phoning me up saying, "oh we're not offering work experience this year, we can't pay the students …" Now, it is definitely on the increase, paid work experience, it's definitely improving, there are more opportunities that are being paid. And out of those 500 students that I saw last year, just to give you an idea, 125 of them were in paid work experience (Gabrielle, staff).*

> *It's increasingly unpaid. The thing is that we're only getting better statistics on it now. Because what used to happen was, they used to declare it as paid, but it wasn't paid appropriately, it was actually a stipend they were getting, they weren't getting a proper wage (Jacqueline, staff).*

> *I would say about fifty-fifty, gut-feel. It used to be a lot more getting paid. I've been doing this job for nine years now, I've seen when the boom was on and pretty much, yeah, our students could get employment at the drop of a hat, and then I saw the bust go and students were struggling. I think we've kind of*

reached middle ground now, where there's still students getting paid, there's still paid positions out there, but there's a lot more kind of unpaid positions kind of sneaking in, and I think they came in when the bust was on, when everyone was desperate to find work, that unpaid was the only option (Caroline, staff).

Back in the day, which is a long while ago, all the internships were paid. There may have been one or two that weren't, but they were special cases where the student might have gone and volunteered overseas or done something, some other sort of work. But these days, the last I saw it was something like about half of the first internship and 20 to 30 per cent of the second internship weren't being paid. That's partly, I believe, because … the number of students needing internships has been made worse by other universities taking it more seriously, has increased even though we're down to about 60 per cent of our undergraduate students doing a full internship program. The numbers have increased, and yet if you look at the number of … engineering vacancies, this is for graduates … that's actually as low as it's ever been since 2006. So what we're seeing is I think less probable opportunities, more students looking for them. That's one component. The other component is I think some people have worked out they can take advantage and actually exploit our students, and there are some really obvious examples of that (Declan, staff).

Impact of completion requirements

Non completion of WIL placements impacted students' ability to complete their engineering studies (and graduate) or significantly delayed their graduation, e.g., 75 students from 2015 to 2017 at one institution had completed courses apart from the placement requirement and had failed to graduate as a result. At another institution, in one semester of 2017, almost 90 students across two schools of engineering (approximately 5 to 10 per cent of the schools' cohorts) did not meet graduation requirements related to placements hours. The institution did not follow up with students to determine cause, e.g., failure to submit documentation or failure to source a placement(s).

While some staff report it is unusual for students not to graduate because they could not access placements, these perceptions may be 'rose tinted' as shown by quantified institutional data.

I had people who yeah, had finished their course work and hadn't got vac work and didn't know what was going to happen, they were just sort of hanging out in no man's land for a while (Laurel, staff).

Strategies to combat non-completions were evident. Staff as well as students reported knowing students who had transferred to other degrees (or universities) because they were unable to access placements.

They have to transfer out of the diploma if they don't do the internship … we know some of them go to double degrees and is that because it's easier than getting an internship (Beverley, staff).

The final option is adding business to your degree so you don't have to do an internship. And the number of people that I know who are doing that in their third year suggests to me that they didn't really want to do business, but they can't find an internship, so what do they do? (Ramed, student).

Two institutions stated their practice was to issue a statement of completion to enable students to seek 'graduate' employment and use the first months of 'graduate' employment as the WIL hours. Additionally, unpaid WIL placements with industry hosts or internal hosts (at the institutions) were actively sought by staff or provided to alleviate the risk of non-graduation.

These students are desperate, they won't be able to graduate if they don't get this experience. So rather offer them unpaid work experience and then they get the work experience and be able to graduate and earn money at the end of the day, than not graduate (Gabrielle, staff).

We do a summer consultancy for international students to give them an opportunity, and these are the students that have to get something because they're getting almost to the end of their degree and it's becoming desperate (Jacqueline, staff).

Student-led initiatives were also evident. For example, a student described working with a global company to develop a 'charitable' (unpaid) WIL program that would take on international students. The rationale for unpaid placements is seemingly at odds with the company's reported net profit after tax of A$23.5m (2016).

It's providing opportunities for Work Integrated Learning for people that can't get it under normal circumstances … I'm helping write a program at the moment with [identifier removed] that's unpaid—it has to be unpaid because they can't afford to pay students, but they want to help—and there's a lot of international students that need that, so it's a win-win and they're very happy to be doing that work (Tess, student).

While unusual, exploitative practices were mentioned a number of times by different staff and students, and typically in relation to international students of CALD. An instance where a large cohort had to sign confidentiality agreements while working unpaid at a well-known company was described.

They were all international students, and they did not understand what that meant. And so they gave me limited information on what was going on and it wasn't until I lined up a few of those red flags that all of a sudden I realised the big picture, which was a massive picture, was unfolding. And once I explained to them that what you have signed is really not what you think you have signed, you can talk to me, it's ok, let's have real conversations now about what's going on (Jacqueline, staff).

Summary

Engineering studies at all four institutions have completion requirements including minimum engagement in engineering practice and reflection on that engagement with linkage to Engineers Australia Stage 1 Competencies (Engineers Australia, 2017) and/or accreditation guidelines' Exposure to Professional Practice commentary (Bradley, 2008). Variances exist across programs including assessment, inclusions, exclusions, weighting factors, and durations. All institutions provided student support services at school, faculty and/or university levels however it was the students' responsibility to proactively access placements and support. Completion requirements impact students' graduation, program and placement discretion. The landscape of engineering WIL placements is not binary (paid/unpaid) with underpaid and unpaid placements common across all engineering placements.

Findings and discussion: Access, quality and wellbeing in engineering WIL placements

Structured by three concepts emerging from the WIL literature review: access, quality and wellbeing, this section identifies and discusses the research findings. It reports on staff and student perceptions of ease or difficulty of access; degree of placement quality; contribution or detraction from wellbeing; institutional, community and industry support, or lack thereof; and students' development of engineering professional identity.

Project findings and discussion: Access

All of the students interviewed had been able to access WIL placements with varying degrees of ease. University staff involved in WIL were able to provide a broader perspective, particularly relating to those students who had not been able to obtain WIL placements, or not been able to access a quality WIL placement in a timely manner. Access to WIL placements is influenced by student, host (employer) and university staff perceptions of students' capitals. Students with perceived high capital were positioned favourably to access quality WIL placements and the opportunities this afforded for employability development and network building. In contrast, students with lower capitals were less-favorably positioned to access placements and were perceived by staff as being difficult to reach and support, positioning them as further disadvantaged from the lack of capital and employability building opportunities of WIL placements. Here, the idea of perception is critical, due to the assumptions employers, university staff and sometimes students themselves make about the level of students' capital. These assumptions privilege certain kinds of students and discriminate against others, often on the basis of the intersections of equity statuses, as is the case for NESB/CALD and women, and often international students. The following findings illustrate this through reference to perceived capitals.

Social capital: 'It's not what you know, it's who you know'

Having high accumulated social capital (Ingram et al., 2013; Small et al., 2018) perennially advantages students in gaining access to and mobility across WIL placements throughout engineering degree programs. Such students are often actively involved in university life and commonly access placements through their familial, social and professional networks (de Peuter et al., 2015). Access gained through these networks is self-perpetuating because early WIL placement opportunities often lead to subsequent placements (Amorim et al., 2012). In this study, student narratives were redolent of their social networks, which varied across contacts afforded through friends; peers; family; sporting; worship or leisure activities, which were already connected to engineers or engineering workplaces. These networks were leveraged to source WIL placements, in particular, their first placement which was seen as a crucial employability and network building opportunity. Staff reflected that students with high social capital were able to build and tap into networks with ease, which often afforded them multiple options, even if they were not high academic achievers, and helped perpetuate advantage.

> *It was a friend's dad's company, so that's how I got that. I still applied and had an interview and everything … but it was pretty much like I already had the job (Carol, student).*

> *I did not get these positions through the general application processes. Had acted on a tip from a friend to get my WIL placement (Student, survey participant).*

My Aunty is an associate of that company, so I kind of had an in (Ramed, student).

Typically, you will have an Anglo-Saxon male who says, I'm going to get an internship, it's all set up before they've done anything because they know people who know people. So their social capital works for them (Lachlan, staff).

They generally have an engineer within their family … They know the marketplace quite well … they've just got that charisma, which means they are employable … they will fly throughout their degree, because they can always use that placement to leverage onto something else through those contacts (Jacqueline, staff).

Hosts' hiring practices which relied on word-of-mouth recommendations or dissemination of opportunities, also privilege students with social connections that afford them access to interviews and/or facilitate good interview performances, positioning these students as an organisational cultural fit (Mackaway & Winchester-Seeto, 2018).

Companies are asking their previous vac students, 'hey, we don't want to recruit and go through a hundred and twenty interviews, so can you just tell a couple of people who might be interested to come along and do a placement next year …' it's about getting students to meet the right people, which can be quite difficult when they're not that social (William, staff).

It was more like, "you've been referred by Max. Max wouldn't have referred anyone, but you know, give us a look at the work you've done and we'll see if we're impressed by your coding skills, etcetera'. And they were, said 'yeah, you seem good enough" (Ewen, student).

Staff interviewees were wary about attributing students' difficulties with access to equity status, possibly because of the unknown or undeclared nature of status or stigma of socioeconomic disadvantage, language barriers, or being from non-traditional backgrounds, such as first-in-family or mature age students with families to support (de Peuter et al., 2015). Yet these students were portrayed as having to 'work a bit harder', needing more support, at risk of being further 'left behind', lacking 'ease of access', retaining 'family commitments' and part-time work, being more reluctant to seek help, or less aware of 'potential of connections' than their more advantaged peers. Some equity students' social networks, whilst affording access to WIL, were delivering less advantage due to the workplace offering limited quality owing to lack of engineering activity or networking with engineers.

So we have a lot of people at [identifier removed] who are first-in-family, compared with other metropolitan universities, and also I think we have a higher low SES than our main competitors here, [identifier removed] excepted … a lot of these people are kids of aspirational tradespeople, who see this as an extension of the trade rather than a profession that's different from it. So we've got a lot of people who go and do their work experience with their dad's construction company. They don't really have a lot of contact with engineers other than the consulting engineers who do the drawings for the building or whatever. And the possibilities for them are limited (Declan, staff).

He'd come with a low SES background, so he wouldn't be your well-connected person and he seemed to struggle much more than others … with that sense of being forward, putting themselves out there, having that sense of self-belief and selling themselves … I think that's got a lot to do with where they were brought up … [they] don't have a sense of rite of passage and ease of access and taken for granted sense of place in the world. They have to work a bit harder (Laurel, staff).

Access for WINTA

Women are ambiguously positioned for access to WIL placements. Although continuing to represent a minority in the engineering profession, contemporary Equal Employment Opportunity (EEO) organisational requirements and strategies for increasing workplace diversity make women student engineers attractive to employers. Women are perceived to be positioned advantageously to access WIL placements and their success may be dismissed by being attributed to EEO regulations, rather than their ability.

> *A lot of the multi-nationals have to have a proportion that are women, so therefore they're more likely to say, "have you got a woman, I need women … to meet, those equalities, for government accreditation" (Jacqueline, staff).*

> *The female students we have will typically outperform the male students in almost every area, academically and in terms of finding placements … male applicants who don't get [jobs] tend to write it off and say, "well you know, they didn't give it to me because I'm not female", which is nonsense nine times out of ten (William, staff).*

Once in WIL placements, even high-achieving women student engineers with accumulated social capital experience gender-based assumptions about their cultural fit, capabilities and roles in the masculine cultures of engineering workplaces, which may limit their development opportunities.

> *They genuinely think you're a cleaner … they wouldn't ask you to do cleaning, but they'll come to chat to you and they're like, "you're obviously a cleaner doing an induction". Like, they're not trying to be rude; they just actually think that (Carol, student).*

> *A student that was at a mechanical organisation really wanted to go on the floor, hands-on, very into it, she was promised that … [instead she did] almost a reception accounting role … She approached the supervisors and said, "this is what's going on, you know, part of my internship shouldn't just be answering the phone or helping the accounts girl, I should actually be out there on the floor" … they felt she was playing the woman card and [she felt] that they were holding her back because she was a woman … I think it was more convenient for them. This role needed to be filled. She just happened to be a girl, it was easier for them to put her there because that needed to be dealt with and that worked well for them, but then again, saying that, if she was a boy, would they actually have done that? (Jacqueline, staff).*

Access for Students of Diversity

Students experiencing mental health challenges were identified by some staff as facing barriers to access, often because they were not easily identified and/or do not always seek support from university support services. For some of these students, accessing WIL placements can represent an insurmountable hurdle, or if they do gain access, expose them to challenges in the workplace not faced by other students.

> *Students that are having a bit of anxiety around the process … they're the ones that withdraw, they're the ones we don't have contact with, they're the ones that don't respond … put them out on market and they fall, they don't want that confrontational situation, they don't want to be interviewed, their communication skills aren't great, they tend not to believe in themselves (Jacqueline, staff).*

> *A supervisor called us up and said that they're having a problem with an intern that wasn't part of the team. They didn't feel that he was pulling the weight that the other interns were and that he was isolating himself from the team … he*

actually really didn't understand what was expected of him … it took me to talk to him to understand what the situation was to be able to explain back to them … we need to change the way we sort of talk here, because the mentor was not teaching as such, and he really needed a teacher at that stage … he was really keen, he wanted to stay and he wanted to have it work, there was just that gap, he was a very different student from what they'd ever taken before, because often they took a very particular type of student that sort of fitted into their mould … Just a different kettle of fish in the way he thought and the way he perceived people's opinion and what they were saying to him (Jacqueline, staff).

International students often experience barriers to access through employer and university assumptions or perceptions about their accumulated capitals and degree of English language proficiency (Ingram et al., 2013). Some staff positioned these students as problematic due to language barriers, a lack of understanding about their responsibility for accessing placements, and a sense among students that placements in Australia are not accessible to them, all of which make access seem overwhelming. International students were perceived by some staff as having an 'exclusionary' focus on study which limited their extracurricular engagement or diminished their awareness of communication about placements or a devaluing of their connections' potential which meant that they did not tap into their social networks, including peers, to access on-shore WIL placements.

We've got students who don't come forward, students who think it's too hard or it's insurmountable, students with English language problems and communication problems (Jacqueline, staff).

I was talking to a student … and he was saying, I don't know people from the big end of town and I don't have connections and things like that. And then we started talking about the connections he did have, and so … there were resources there that were available to him that might work quite well for him (Lachlan, staff).

In summary, access to WIL placements is facilitated by high accumulated capitals. This means students from diverse backgrounds and equity groups are faced with having to work harder to gain placements as well as experiencing a reduced pool of options. Alongside this, while some women students more readily find WIL placements, they face gendered assumptions in the workplace.

Access is not a matter of 'luck'

Some student interviewees perceived that gaining access to the 'right' placement was a matter of being 'lucky' or 'blessed'. This was often ascertained by comparing their experiences with peers.

I was lucky that I got that because mostly companies advertise internships quite early … and I had applied to absolutely everything last year, my second last year, and I heard back from none. This position opened up like a month before the end of the year in November … so it was very last-minute, and I applied and I got an interview and I got it straight away (Miriam, student).

At first glance, Miriam's experience appears to be associated with locus of control, that is, the degree to which fate or the individual determines what happens to them, but as analysis progressed it became apparent that successful access to placements was achieved by students with high social capital and the tool kit enabling 'intentional career development … a progressively acquired set of skills, knowledge, and attitudes that are related to the acquisition, understanding, and application of information needed to manage one's own career development' (Magnusson & Redekopp, 2011, pp. 175–176). Many of the interviewed students exhibited these early on in their study and were able to access opportunities not

available to others, such as unadvertised positions, by knowing where to look, who to talk to, what to say, and when and how to do this.

> *I've always constantly looked at other internships, not necessarily looking for them like, oh, I need an internship now, more as looking at, ok what other companies are out there, what other options do you have … it's just looking as if you were a senior manager, just to see the companies, and then you go into the company website and see if they offer a student role or internship or cadetship (Brad, student).*

> *It's more the person to person, like meeting the right people in the right context and being able to say, "Hey, this is like all this cool stuff I do outside of uni," and I think that usually draws them — like I think it would be really hard to go to a networking event being like, "My course weighted average is 85, give me a job" (Max, student).*

> *I think it's very important for undergraduates and recent graduates to focus strongly on the things they CAN do. Rather than comparing yourself to an experienced engineer and going "I don't have experience in X or Y or Z", focus on the tasks you've completed at university and how the skills you have learnt could be applied in the real-world application. I know it's easier said than done but getting into this train of thought early helps a lot later in your career (Student, survey participant).*

For some students, the capacity to deploy capitals to access WIL placements (Ralph et al., 2009; Ramdass, 2017) appeared to develop later in the degree, regardless of their academic achievement or advantaged[7] position as a woman, positioning them at a distinct disadvantage to those 'in the know'.

> *I left looking for jobs and internships quite late because I wasn't in that mindset of looking as soon as possible, I wasn't really aware of that on internetwork, so the first year of engineering you usually get out there and look for jobs and meet people. I wasn't in that mindset, I wanted to do my work, I wanted to do well, I wanted to get good marks (Miriam, student).*

> *Do they know where those opportunities are advertised, are the students aware that many vacation positions are advertised in March for the following summer? They get to September and say, they would like a vacation position, and they're all filled. So it's a timing issue and an awareness issue, early in their program (Edward, staff).*

To facilitate access, universities (including all those from which participants were recruited) offer various forms of institutional support. Some universities employ dedicated placement staff whose roles may include disseminating information about placement opportunities, monitoring employers to reduce possibilities for exploiting students, providing one-on-one support for students prior to, during or even post-placements and organising networking events to bring potential employers on campus (Ralph et al., 2009; Wandahl et al., 2011).

> *They just post advertisements somewhere, different kinds of jobs, different kinds of internships. They actually help us to get the hours before we graduate … There's someone, I forget her name, she helped, I send my resumé to her and she checked all my resumé and she helped me to pass it to them, and the company contacted us directly afterwards (Roland, student).*

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[7] Acc*ess for WINTA* discusses the perceived advantage in fuller context.

Our careers office holds events where the companies come on campus and they have booths and then they advertise for their vacation employment and the opportunities for that particular year and then the students actually go and talk to their representatives and become aware of the opportunities (Nerinda, staff).

Yet there was evidence that not all students partook or responded to the events in ways the staff would anticipate or expect in order to gain the maximum benefit. In addition to institutional or staff-led events, students proactively organised their own and a number of student-led initiatives including networking events and career service events were described.

We managed to get around 16 biomedical engineering slash related to biomedical engineering companies to turn up … we knew our capacities were limited, because we're a new society, we're actually very limited in finances. And we targeted towards companies that we knew gave internships (Verity, student).

Institutional support was most often available in the form of university careers services, which offered activities and personalised support, for example, in resumé preparation. While many students used these services, staff perceptions varied as to why many others did not. Some attributed this to students' lack of awareness of its importance. Other staff attributed this to some students' tendencies to view their capital as unattractive to potential employers.

The [identifier deleted] Careers Centre and Leadership Centre run workshops every week, do seminars in the tuition-free period. Basically, one's helping you with your leadership skills and there's one of them helping you with your employability, like professional skills, building resumés, building networking and stuff like that (Max, student).

They write off things that they've done as not being worthy of putting on a resumé. Whereas you say to them, "no, no, no, if you've done that, that shows leadership, that shows teamwork, that shows good communication skills, good planning, good project management. Put that down and articulate that in a way that addresses that selection criteria, even though you haven't worked in an engineering firm before" (Edward, staff).

Overall, there was a sense that the students who most needed the institutional support were the ones that were most difficult to reach. This runs a risk; students most in need of support in finding a quality placement are likely to compromise on placement quality and be further disadvantaged.

I think that that's one of our problems is that the best jobs attract the best students and the others get what they can, and yet they're probably the ones that need that reinforcement, or that need to see a future beyond. And that's partly our responsibility as academics … they only need a moderately good job and guidance because most places will have opportunities, it's just a matter of finding them. Some of them have less than others, but if we can help them find them — I just wish we could get all of them to pay (Declan, staff).

We've got lots of support mechanisms there, and the majority reach out. Then you get the ones that don't … they tend to be the ones that go all the way through until the very end and it becomes quite hard (Jacqueline, staff).

For students with high capital that put them 'in the know', the development of a professional resumé that gives them an edge over other job seekers was interwoven with an understanding of the importance of professional skill development and real-world insights, which is reflected in other studies (Guler & Mert, 2012; Koppi et al., 2010; Tennant et al., 2018; Wandahl et al., 2011). For students who had taken a strategic approach to seeking WIL placements, their understanding of how to leverage their existing skills beyond the 'real-world engineering skills/practice' was used to access placements as reported in other

literature (Doel, 2009; Grant-Smith et al., 2017; Guler & Mert, 2012; Ralph et al., 2009; Ramdass, 2017; Sher & Sherratt, 2010; Tennant et al., 2018; Wandahl et al., 2011).

> *I've had a lot of experience doing extracurricular stuff talking to people … teaching young people how to debate, how to be diplomatic, communication skills, leadership skills, things like that. So obviously those kinds of skills are things that I'm well across, and I've always found the prospect of doing an interview to be a lot less daunting than all the application that goes up to it (Ramed, student).*

The issues discussed present a challenge for universities in building students' employability through improved institutional practices, resources and services, particularly in early identification of those in need of such support. Yet WIL placement practices vary widely across universities in Australia, and across programs within universities. As previously discussed, the larger the university, the more students to be accommodated, and the tighter the administrative processes associated with finding placements (Sher & Sherratt, 2010).

Complicating access: Discretion to undertake unpaid or underpaid WIL placements

Debates in the literature about remuneration for WIL placements are often presented as simplistic 'for' or 'against' unpaid positions (de Peuter et al., 2015). Yet staff and student narratives acknowledge the complexities of remuneration in WIL placements, which shifts the focus from a for/against binary to consideration of the full spectrum of well-paid, poorly paid, barely paid, unpaid, and paying for, the latter evidenced through one student reporting having committed personal funds to access a humanitarian placement overseas. The issue of remuneration is further complicated by variations in the duration (short- or long-term) and status of employment (part-time, full-time, and over-time), which can reduce an ostensibly attractive placement to less than minimum wage.

> *My contract was for 40 hours a week, but I was doing 50, 55 sometimes, so you know, it almost works out to be about 13 dollars an hour. When you look at it that way, yeah not so good (Ramed, student).*

The issue of remuneration becomes even more difficult for students at either end of their degree program, with some accepting unpaid WIL for their first or junior placement (Jiang et al., 2015), often in the absence of paid options (Ramdass, 2017).

> *I think there's definitely students that are taking unpaid because they don't think they're going to get any other opportunity (Caroline, staff).*

Similarly, students nearing the end of their degree program with hours to complete before they could graduate were often forced to take unpaid positions.

> *If I didn't get that job, I start to panic, like I just want to do hours anywhere, just so I can graduate. Especially for me, because I'm six years at uni and then I'm thinking, I can't graduate just because I don't have hours (Miriam, student).*

> *It is my last year of my studies and need to have 480 hours, less opportunity at the time, need to take any opportunity that come (Survey participant).*

> *It is quite hard to find internships. So eventually, when I did find something, and it was during the uni semester, I figured it would be probably best just to take the semester off and do it, because if I didn't, and if at the end of the course if I couldn't find something, basically I couldn't graduate (Joe, student).*

Other students were willing to accept unpaid placements because of the perceived benefits beyond remuneration, which they could leverage later on.

I undertook unpaid work initially to get my foot in the door in terms of gaining experience. Any experience at a young stage in the university degree sets you apart from the majority who wait till the penultimate year to even start looking for relevant work. The second stint of unpaid work was again to build my resumé, but more so for the experience as well. It was in an engineering firm and I was working on analytical things to do with the government and water security, quite different and interesting to other work I had done. It was also working directly below a business development manager who was very influential and a great mentor to learn from (Student, survey response).

Still other students were willing to engage in paid work additional to placement hours to cover living expenses because of the perceived value of 'special' learning experiences, or in the hope of increasing their chances in securing paid work in the long term.

I'm getting the experience by directly working for the business development manager as well; so it's not just like I was doing admin work, I was answering directly to one of the higher-up people, so it was a well sought after position… Then from that I had quite a secure resumé for when I was actually applying to the formal 12-week paid programs (Tess, student).

In contrast, some students had little choice but to take on unpaid placements in the absence of paid alternatives and institutional requirements to complete placements.

The biomedical engineering industry in Australia and Sydney … either comprises start-ups or places that are very opportunistic because they know that people will take unpaid internships. And the reason why I took it was a. because I knew the stats, and b. first internship, gotta learn something, blah blah. There's also the credit cap that [university] imposes on us for the first internship, where they'll lock us out from continuing our studies if we don't do our first internship (Verity, student).

Like Verity, students had firm views on the issue of placement remuneration, seeing unpaid work as unfair, exploitative or financially unviable.

My thing with unpaid internships is kind of twofold. The first is … If I'm adding value to a company for free, I don't see a reason why at the end of it, they would decide to start paying me when they can just get another intern and just continue that cycle … The other thing is as well, it's like 40 hours a week, that's a lot of time. I used to get, like, when I was doing full-time study, youth allowance, but the internship program when I was doing it, was no credit points, so Centrelink wouldn't pay you. If you were doing 40 hours a week, unpaid, you would have no money basically unless you picked up a weekend job on the side (Ramed, student).

It's not really financially viable and even if it was like a really, really good unpaid internship that would give me really good experience … I don't know, I don't really have that option to work unpaid over the summer (Hannah, student).

At the other end of the remuneration spectrum, some interviewees reported students paying for placements through independent brokers or committing their own funds to cover travel and living expenses while working unpaid in not-for-profit organisation.

We even have students that now are trying to pay for internships … there are certain companies that will offer like, you pay them money and they'll find you an internship (Caroline, staff).

Students such as Joe, Thomas and Verity, with family or government financial support often disregard remuneration in evaluating placement quality (Milne & Caldicott, 2016). This

affords them the discretion to accept unpaid placements, unlike students who are unable to because of financial or family responsibilities (Lloyd, Male and Paull, 2018).

Facilitators and barriers to access

Institutional WIL placement support varies across universities and even disciplines. Staff reported good university practices, such as extending the exposure to professional practice categories to professional experience in non-engineering roles, allowing credit-bearing industry project units to contribute to required hours, and staff using their industry contacts to source quality WIL placements for students.

> *We added in professional institutions, like technical presentations and site tours and all of these sorts of things that they can use to add up to the hours (William, staff).*

> *There are two avenues within our program that students can meet the requirements of those 480 hours. One way is in their final year they have to do a unit, a final year thesis, which is a full semester load's worth of credit points. So if they complete their final year thesis with an industry partner or in industry as a placement, effectively as a project, they can use that for their final year project and those hours can also be counted as 480 hours spent in industry (Edward, staff).*

Exacerbating university requirements, staff reported some students struggled to find placements partly because of the multiple channels through which companies promoted them, including social networks that are often exclusionary.

> *Some companies come to academics, and then academics will encourage students to give them CVs or recommend students … a lot of companies go to Careers, a lot of them go to staff in the faculty and they get sent to various places (Rose, staff).*

> *You can talk to someone, and you're like, "how did you get this job?" "Oh, a friend of a friend told me this company was opening up internship roles", and you can actually search that role but unless you specifically know which website to go to, where to go and where to click, you will never find it (Edward, staff).*

On the whole, staff agreed (as shown by other research) that a key barrier to access was the scarcity of human and other resources in cash-strapped universities (Sher & Sherratt, 2010), and the practice of requiring students to find their own placements.

> *With the resources that we have it's just not within our capacity. I know it's something we're always pushing for, to get someone in that will be able to assist them find places (Caroline, staff).*

Changing government regulations (Fair Work Ombudsman, 2018) and compliance protocols impacting the complex legal and financial risks around placement status, remuneration, conditions and insurance (Ashton, 2016; Cameron, 2017; Cameron et al., 2018) were seen by staff as hindering access.

> *These changes are about compliance, so we need to make them … but at the same time I'm getting the message from above that this is a shifting field, we're trying to … work out university-wide what we're doing about Work Integrated Learning (Rose, staff).*

> *For insurance reasons, they've said we will not advertise anything that is associated with a stipend, it's either paid or it is unpaid. But what I would like to know is, what is a company declaring as unpaid? Are they declaring the award wage appropriate paid? Or is it an unpaid, is it considered a paid position*

> *because they're getting x amount, which really isn't that much? It wouldn't even equal an ordinary amount (Jacqueline, staff).*

In the absence of consistency and exemplars, universities were committing scarce resources to manage regulatory, compliance and risk processes.

> *I've noticed it locally and I've seen that the Government does the same thing. They came out with this is how it should be, and you need to comply, and you need to have this in place, but then there are no models (Marilyn, staff).*

Exclusionary practices in industry extended to traditional summer 'vacation' work that limited access for students with other paid jobs and/or family commitments (Mackaway & Winchester-Seeto, 2018), the use of highly competitive paid placements as a graduate recruitment strategy, the promotion of placements through word of mouth, and the proliferation of unpaid or exploitative experiences that took advantage of students' need to complete hours.

> *We've got a whole lot of organisations that are large, multi-national organisations, HR designs the internship experience for them. HR do summer programs, they do a 12-week placement. So a lot of our students … can't apply for those because it's only a 12-week placement in a particular time of year (Jacqueline, staff).*

> *Many of our cohort at this university have non-traditional entry points … if they've already got part-time work which they're using to support themselves, to stop that for 12 weeks across the summer to pick up a fulltime engineering paid vacation work creates huge problems for them (Edward, staff).*

Industry practices often limit international students' access to WIL placements in Australia, because of misconceptions about visa regulations, or assumptions about students' accumulated capitals based on English language proficiency as previously discussed in this report and in the literature (Lucas et al., 2009).

> *I don't think the marketplace knows that you can take an international student and you can extend their visa at the end. I think that's their barrier, the marketplace doesn't know enough about them to see them as a good resource (Jacqueline, staff).*

> *They'd have to worry about visas, most of the time students want to go back home anyway afterwards, so they put in all the resources to train the students to get them up to scratch and then they'd go home afterwards. So they weren't even interested in looking at the international students (Gabrielle, staff).*

Summary

The findings show that access to WIL placements is often inequitably mediated by the levels of students' extant capitals upon degree commencement that hinder or abet opportunities, which may or may not be augmented by institutional strategies, resources and support services that are exacerbated by government regulations, and problematic industry practices. The challenge for universities and employers is to resource services and systems that identify and support all students to equitably access WIL placements.

Project findings and discussion: Quality

Once access has been achieved, the three interconnected dimensions of quality WIL placements identified through the literature review—learning, impact and relatedness (Drewery, Nevison, et al., 2016)—emerged in data analysis, after initial coding with the binary themes of positive (benefits) and negative (costs) effects (Grant-Smith et al., 2017). Learning, impact and relatedness reflect the core ideas in student and staff narratives that

are most closely linked to good or poor institutional and employer practices, once access to placements has been achieved. This analysis enables consideration of how WIL placement quality is facilitated or hindered by such practices, rather than by students' perceived extant capitals. These three dimensions provide the structure for the following discussion of good or poor workplace practices that facilitate or hinder learning, impact and relatedness, which may be more detrimental to students from equity groups or those otherwise at risk.

Learning

Placements are seen by most students as facilitating opportunities for learning (O'Donovan, 2018). Quality WIL placements were recognised by interviewees as those through which students gained personal and professional insight and know-how in addition to technical skills and knowledge through exposure to and engagement in particular workplace practices. This supports the idea that students are aware of their developing employability and how WIL placements contribute, or not, to this development (Drewery, Pretti, et al., 2016; O'Donovan, 2018). This section first discusses WIL placement practices that facilitate or hinder students' learning, growth and employability, then how such practices may more strongly affect WINTA and students of diversity.

Workplace practices that facilitate or hinder learning

Students reported expecting to learn on the job. These expectations were fulfilled in quality placements marked by practices providing tasks and activities suitably balanced between student skill level and challenge, adequate resources, inductions, good supervision involving formative feedback and positive reinforcement, mentors, and the opportunity to work on meaningful, real-life projects. Students were aware of how placements facilitated or hindered their development of technical and personal skills, an awareness that extended to employability and professional identity development through quality experiences that required flexibility, risk taking and leadership.

Of tasks and activities assigned to students, those identified by students as hindering learning were the tasks reported as being too menial or boring, too difficult, too restrictive, too focused in one area, or not providing meaningful engagement in real-life engineering projects, consistent with other studies (Ralph et al., 2009; Wandahl et al., 2011).

> *Perhaps the project the student was given was too much, perhaps it expected a student who had two or three years' industry experience and it wasn't pitched right (Edward, staff).*

> *I've heard like, big aeronautics companies who take interns in, you're not allowed to touch the plane, because the minute you touch it, they have to reset the whole thing. So you might be in an industry where they want to chuck you into every single thing, but if it's an industry like, where there's a lot of issues, we can't put you into certain situations, here's the theory of it (Ewen, student).*

Conversely, tasks that stretched students' capabilities without demanding performance beyond their skill and knowledge level were reported as being conducive to learning, consistent with findings by Lucas et al. (2009).

> *Yeah, I really enjoyed that. I got put in the urban design team, so compared to, like, some people would just be on one project just doing one thing all the time, but I did like, I got to work on close to 50 different projects, all different sizes, doing tenders, tender reviews, and even a little bit of design, like carparks and stuff like that. So, I thoroughly enjoyed having a little taste of a lot of different areas. So, it just helps you decide what you do really enjoy and what you don't enjoy as much (Carol, student).*

Many students described good- or poor-quality placements that respectively facilitated or hindered learning on the basis of resources and support that were adequate, lacking or absent, in the form of induction (Tennant et al., 2018) or supervisors with varying degrees of accessibility who were well- or ill-equipped to mentor (Ralph et al., 2009).

> *I didn't have the knowledge, but I was able to pick it up because of really good mentors, because of the workplace, and because of access to really good resources … If you throw anyone in the deep end, they're going to learn regardless, but if it's not structured to be a learning experience, necessarily it's going to become exploitative (Ramed, student).*

> *There was no mentor, no-one, not a buddy. There was nothing like that, actually, no. I relied on people that I met at work at a senior level, I became friends with one of the project managers. And it was through him that I channelled a lot of frustrations … But there was no buddy or someone looking after you (Peter, student).*

The absence of a clear pedagogical structure on commencement, as found in Ngonda et al. (2017), often continued throughout the WIL placement. This was often experienced by students as being left alone or having little time with supervisors who did not provide direction or feedback on their learning.

> *With my manager, because he had to take leave, he wasn't there nearly half the time, it was just me on my own (Miriam, student).*

In some cases, poor quality placements were perceived by staff and students as exploitative or even abusive (Drewery, Pretti, et al., 2016; O'Donovan, 2018), especially if they were unpaid. This poses potential risks for vulnerable students or those with less discretion to leave or decline less than ideal WIL placements.

> *We know that some of them are thoroughly exploitative and people are just getting cheap labour, they're getting people to do things that really aren't related to their study (Lachlan, staff).*

A lack of resources, and in particular, of suitable supervisory staff (Ramdass, 2017), coupled with heightened time or budget imperatives could, and did, lead to stress on students.

> *I'd be at my computer or whatever, and they would hire a new engineer, they might not have enough monitors to go around and so I would lose a monitor and they would get it … with [my next placement], even PPE, personal protective equipment, like the steel-capped boots, the high vis, the hard hats, stuff like that, they basically give you their American Express and say, go across the road and get the best shoes you can, don't spare any expense, get what you need to be comfortable on site, we don't mind. The laptop that they've got for me, and I'm just an intern, is quite a good laptop and it's mine, nobody takes it from me (Ramed, student).*

> *Being a contractor and on a site, and on a big site too, is that they are under a lot of pressure to deliver, deliver, deliver, deliver and to deliver to such a high quality as well, that I don't think they had the time to actually nurture their grads (Miriam, student).*

Other students observed work cultures of long hours and overtime, but reported they were not expected to take on this norm.

> *The work culture there is pretty intense … at the time was quite long hours overtime, but it wasn't really I guess, expected of me (Hannah, student).*

I never got asked to stay back. There were quite a few times when we did stay back though. It was just, it was never asked of you to stay back, if was just kind of, you did. If there was something you needed to get done you stayed back to finish it, especially if you were close to getting it finished … so for example, if I started at nine and stayed back until six, then the next day we could leave at four, so it was compensated (Brad, student).

Employer assumptions about WINTA and students of diversity

There is a risk that WIL employers make assumptions about students and their capabilities based on background (socioeconomic, educational or experiential); or gendered; cultural; linguistic; or age preconceptions. Such assumptions may pigeonhole WINTA and students of diversity into less than ideal tasks or roles that are experienced by such students as poor quality WIL placements.

I was literally by myself. I was the only female in the whole office (Carol, student).

I have no tradie experience, I don't know anyone who's been a tradie or fits into that kind of role … it's just like a very different way of like, communicating with people and yeah, just a bit, not really my kind of style as a working environment … I think also the thing that was quite conflicting a little bit was the, even though I've worked mostly in the office, yeah it's just, there's no other females working in that kind of role, not that that's a reason why you shouldn't start, but it just makes me feel a little bit uncomfortable, like I don't really belong all the time, yeah (Hannah, student).

Some women student interviewees reported having to deal with co-workers' assumptions, based on gender or culture/religion, about their capabilities or expectations (de Peuter et al., 2015; Frenette et al., 2015), and emotional labour (Hochschild, 1983), with one reporting differences between the broader company culture and that of her small team.

I'm a Muslim, so I wear my head scarf. It was weird, I knew that, I didn't want to think there would be a problem for me being onsite, because I don't think they've ever had anyone with a head scarf onsite, but it did take some time getting used to, like the stares … people like, name calling … I didn't think much of it at the time … I just ignored it, to be honest … and at the end you just fit in and it didn't matter to me because I felt I fit in so good with the team and I was happy with what I was doing … the superintendent was very, very accommodating. They even asked me if I wanted to pray onsite and they even had prayer rooms onsite for people who wanted to pray … we will get no one to use the ladies' bathroom anymore, it will just be yours … if I was a dude, they would just be a lot more relaxed at work in a way, they'd feel a lot more free in the way that they talk (Miriam, student).

Not all women students, however, reported feeling isolated or uncomfortable, and although some were aware of gender-based assumptions from work colleagues, they dismissed such behaviour as being common to masculine engineering cultures (Hatmaker, 2013; Male & MacNish, 2015; Powell, Bagilhole, & Dainty, 2009).

For me it wasn't an issue, but I think for some other females it could be … Like, people just assume you're the cleaner or, you know, just make remarks. They just act differently because they're not used to seeing females. Sexist sort of remarks, but then you get the other side who are overly nice … just any treatment, whether it's positive or negative would make some people feel a bit uncomfortable … I could deal with it because I guess I've grown up around a lot of males, I've got like a lot of male friends, play footy … It was the sort of older

ones who had probably been driving trucks for 50 years and who had never seen, like, it was just ingrained in what they see is normal (Carol, student).

In summary, supervisors' or co-workers' preconceptions, or worse, intentional discrimination and exploitation limited the likelihood of students' learning as did workplace cultures which were not inclusive or sufficiently diverse to support learning.

Impact

Impact refers to when students perceive they have made a worthwhile and meaningful contribution to the organisation. This suggests that students evaluate the extent of their contribution when assessing placement quality, which further suggests that WIL placements represent value for employers beyond a recruitment strategy.

Student contribution to organisations

For students, impact was most often associated with being given authentic tasks and responsibility for delivering tangible outcomes in engineering workplaces.

I was given two projects to work on my own, which was great. I had to start doing my own research, talking to people, see what the issue was, and try and come up with solutions to the issues … I think in the scale of the projects the reliability team had, they were minor projects, but to me they were quite significant, because they had an impact to the company. It was real work, it's not just, this is not going to go anywhere, regardless. So it felt real (Peter, student).

It was cool working on a project which now I can see, working on a tender which now … [is] running, and yeah, it was a bit of an accomplishment and … it's nice to see how your work is actually translated into an actual situation (Hannah, student).

There were a few projects I worked on. One was basically a feasibility study for a micro-grid … and essentially all the work on that, it started out that I was going to do it initially and then they were going to step in, but of course they were very busy and they saw that the work I was doing, they were happy with it, so they kind of just let me keep doing more and more workload until eventually I finished it (Joe, student).

Quality WIL placements were further described by students as where they developed professionalism, an understanding of workplace culture, or for some students experiencing their first job, an understanding of a workplace (Wandahl & Ussing, 2016). These experiences differentiated placements from university projects/assessments and/or other types of work because of technical challenges and constraints, multiple stakeholder engagement, economic imperative or opportunities for impact.

I'd go into a meeting with him, you'd talk about the work and then he'd go off and explain some monetary concept to do with share markets and how businesses think and "this is a block of money and this is…"; so he would explain wider concepts and that's more what I got out of … how businesses work and how, say contracting companies work, compared to an operator, in terms of they're selling a product, this is what they're trying to achieve; so it was a very educational experience from this particular manager (Tess, student).

When I did my engineering internship, it's serious! That's people's jobs, you've got to have a lot of attention to detail, for example my placement projects, I was proposing changing to their maintenance specials and maintenance programs. If I didn't get that right, it could cost the company a lot of money (Peter, student).

A recurring theme was celebration of success and completion of engineering project milestones.

> *It was basically very important that we get a certain number of sites switched on and working and so forth by a certain date … what that entailed was a large portion of the team working in shifts to deliver that … it just felt like a big moving effort with a lot of people with the same goal trying to get something done. And it was just like a really good team to work with at the time, and it culminated in us achieving the milestone, it was all good, it was great and we could celebrate (Ramed, student).*

Unrewarded impact

Although some students tolerated being unpaid, this was often begrudgingly, especially if they perceived their work was impactful. Tolerance was attributed to a range of drivers including the imperative to graduate or need to develop employability, strategic decision-making for career planning and progression, or affordance for impact, such as working internationally with a not-for-profit organisation.

> *I didn't mind that it was unpaid, especially initially, but I guess when you're working in a job and you feel like you're doing … very valuable work for them, which all the interns at this place do, because they're effectively, you know, pretty similar to graduate engineers, you do kind of feel like a bit like that you should be getting compensated, even if it's just a little bit (Joe, student).*

Some interviewees perceived unpaid WIL placements as undervaluing students' impact.

> *I think it's important that we recognise the value our students are contributing … these students are a year before graduation, so they've got some skills to share … and I'm worried with the trend across the whole sector … what message are we sending about … the value of our students … there can be a devaluing (Marilyn, staff).*

> *I don't think it's fair where this Work Integrated Learning, unpaid work, is going … you can see the impact that you've had on these companies (Peter, student).*

Unpaid placements forced some students to relinquish or reduce paid work; the survey data had a mode 11–20 hours per week as typical paid working hours during semester when not undertaking WIL. For those who had social and familial support, this reduction in paid work was less onerous than for self-supporting students who juggled both unpaid internships and paid work with an average of 10 hours per week paid work in addition to WIL full-time hours. One interviewee reported it was necessary to sell their business to fund their WIL placement, another reported the cost incurred for an international WIL placement was around $6,000, and a number reported taking unpaid leave from their usual paid part-time job(s).

> *My WIL replacement* [sic] *my part-time job, I took leave without pay for the period of my WIL (Student, survey participant).*

Some students were sufficiently financially supported by parents and family, partners, scholarships or Centrelink that they could make discretionary choices around accepting unpaid WIL with little detrimental effect on their wellbeing. Survey data showed almost half of survey participants having insufficient financial support to be able to relinquish paid work while undertaking placements and study; students reported working between ten and thirty hours per week in up to four different jobs, with most working two part-time jobs concurrently with study. The pressure to 'add-on' unpaid placement hours to satisfy graduation requirements combined with the potential for employers to see students as free or low-cost labour could be exploitative, and may negatively affect students' financial and personal wellbeing (Gillet-Swan & Grant-Smith, 2018).

Often they see it as an opportunity to get an unpaid student in to do something they really should be paying someone to do … The potential is there for great learning opportunities, the potential is also there for students to complete the hours requirement, but to complete it doing very low level tasks … it has the potential to be … exploitative (Edward, staff).

They rang me because the student pulled out of the internship at the last minute and he was quite cross that he'd gone to all this effort to get the student an internship and the student then pulled out, and then when I pushed him hard enough, he wasn't paying the student, the student had left for a paid internship (Caroline, staff).

In summary, quality WIL placements were seen by students as those that offered opportunities for impact, regardless of remuneration, although the lack thereof increased pressure on students with little choice but to concurrently undertake paid work and study, and had the potential to be exploitative.

Relatedness

Relatedness refers to the perception of a connection between students' WIL placement experiences and personal goals, motivation, academic achievement and future career pathways (Drewery, Pretti, et al., 2016). Characteristics of quality WIL placements providing relatedness were links to academic study, resumé building and employability development.

Links to academic work

Participants described opportunities to apply technical knowledge learned at university or, conversely, opportunities to fill-in gaps in their academic repertoires through WIL placements. These points are value propositions of quality expressed by participants that aligns with current research (Grant-Smith et al., 2017; Guler & Mert, 2012; Koppi et al., 2010; Tennant et al., 2018; Wandahl et al., 2011). Many students spoke of their resilience in tackling new challenges in placements, attributed to a strong theoretical understanding of engineering processes enculturated at university, and the provision of opportunities to 'think like an engineer', which increased the potential for impact.

With my degree, I think it was very relevant what I did. That … project that I did, I actually had my lectures printed out because the lectures we did at uni for one unit, we got taught how to calculate flow rates from particular instruments and I used those formulas in my project (Miriam, student).

Having the ability to think like an engineer is helpful … the ability to algorithmically think through things and map it out as a flowchart so you understand what you're doing, that kind of thing's really helpful in my job currently. And also, the content that I've learned in those more software-based subjects has meant that I can … automate my job and some of the other people's jobs, I can just be helpful to people around the team (Ramed, student).

Being able to apply knowledge and skills learned in quality WIL placements positively enhanced the university learning experience for some students, helping with subjects, choice of electives or major, and informing their engineering studies viz. direct links to capstone projects (Koppi et al., 2010; Ralph et al., 2009). Students with multiple engineering WIL placements described their experiences as enhancing their understanding of subjects and concepts, and the links between curricula and workplace learning (Wandahl & Ussing, 2016).

Doing that project … that's actually the basis for what I'm doing for my engineering thesis now … using that micro-grid system but doing that in mining

> *… And so if I hadn't have done that project, I would never have come up with the idea to do this (Joe, student).*

Some students felt university activities prepared them for workplace organisation, communication and team work, while quality WIL placements taught them the importance of these skills for employability (Koppi et al., 2010; Ralph et al., 2009).

> *We were able to work with a team and we get to know different teams … What happen is, we make a group, but we still have to pair with different groups to do a project (Roland, student).*

> *Having exposure to what an engineering job entails on a day-to-day basis, yeah, I think that's very valuable. And understanding what are the most important skills in the job, so definitely from that I realised that interpersonal skills are very important, teamwork skills, also very important, communication, very important (Joe, student).*

Developing autonomy in the WIL placement by working on a real project or sub-element of a real project was held in high regard by participants because of perceived impact, similarly to other studies exploring the development of professional identity (Jackson, 2017; Okay-Somerville & Scholarios, 2017).

> *I got to a stage where I was doing that several times a day, no one else needed to supervise … I knew what I was doing, so I just popped them through … being given ownership of something like that and compiling it into a report of the benefits, like the prospective cost savings for them over time, why they should do it, why they shouldn't do it and so on and so forth, was really positive for me (Ramed, student).*

Sharing experiences with friends and peers gave students a measure by which to judge their own WIL placement experiences and helped them define their future career pathways and the role of future placements in that journey. In addition to technical content or roles, students were developing criteria related to cultural fit to select their next placement such as Hannah's WIL experiences influencing her to seek a more professional placement culture with more challenging work than her first placement.

> *At the moment I'm looking for a different internship over this summer, to get some experience in a different type of role … One of my friends who's a year older, she's worked at [company], so that's obviously a much bigger company but a much more structured internship program … hearing about her experiences definitely made me want to do an internship in a more structured way (Hannah, student).*

Resumé building, employability and career pathways

Students' evolving understanding of the importance of a professional resumé and networks that would provide an edge over other job seekers was interwoven with gaining real-world insights that developed employability and guided career pathways (Guler & Mert, 2012; Koppi et al., 2010; Tennant et al., 2018; Wandahl et al., 2011).

> *You just get skills, connections, experiences to put on your resumé. It's a lot more attractive to someone if you've already done a year of work in relevant fields to hire them, you know, rather than to just come straight out of uni (Thomas, student).*

> *The good thing about working in the hospital is that you get exposure to a lot of different areas and you get a lot of interactions with various stakeholders throughout the whole medical industry, and you get to interact with a lot of medical devices. So I could turn up to a resumé interview and be like, I actually*

know your machines already, I know what flaws happen, I know this, this and this (Verity, student).

This was an underground mine, so they want students to get a real understanding of what happens, what the operators do, before they come into the office. That's why I spent a few swings down with the operators, then got to actually have a look at what the engineers do. But then it was through this that I realised, that wasn't for me. On my last swing there I asked my supervisor, see if he could put me with the machine maintenance team, I thought that was a bit more interesting than the actual mine design. It was after this, I'm going to do mechanical engineering (Peter, student).

It was apparent that students who had taken a strategic approach to seeking WIL placements had a good understanding of how their developing professional skills and networks could contribute to graduate employment (Doel, 2009; Grant-Smith et al., 2017; Guler & Mert, 2012; Ralph et al., 2009; Ramdass, 2017; Sher & Sherratt, 2010; Tennant et al., 2018; Wandahl et al., 2011).

Challenges around poor quality WIL placements

While remuneration is not necessarily linked to students' evaluation of quality in WIL placements, unpaid and underpaid placements pose a potential risk to all stakeholders because of the ambiguity around students' employment status (Cameron, 2017) and the legalities of 'reimbursement-for-expenses' in place of fair payment (Fair Work Ombudsman, 2015). The data show contradictions in interpretations of the law, creating confusion for staff and employers alike.

I've had phone calls from companies that contact me asking how much to pay students, how much can they not pay students, kind of asking me what to pay them (Jacqueline, staff).

Small companies, we often get feedback around insurance, well how are they insured? If we take them on, we can't afford to do all this extra stuff, whereas if it's unpaid the university can cover insurance (Marilyn, staff).

A lot of our students have paid placements, do we need a legal agreement with the company when the student is an employee of the company? Like do we need some extra thing or is their workplace agreement the agreement, and we're allowing students, then, to claim those hours? … if we make that whole process so complicated, people won't employ our students … And any sort of legal agreement with someone like [identifier deleted] has to go right up to the top, and if that's an agreement for one year, what is the timeline in getting all of that so five students can do vacation work? … [it's] causing us great grief with TEQSA compliance (Marilyn, staff).

Some students experience negative WIL placements, sometimes regardless of remuneration, while others were relayed through conversations with peers. Some students chose to leave these environments, although not all had the discretion to do so, because of insufficient hours or lack of prior experiences against which to benchmark the placement. Poor WIL placements were attributed to lack of meaningful work, being allocated non-engineering work or exploitation (Ralph et al., 2009; Wandahl et al., 2011).

There just wasn't huge amount of work for me to do. I mean, if I was worried about my hours, I would have stayed, but I wasn't (Carol, student).

It was decent paid, but … It wasn't very engineering-based, it was more like, oh, paperwork, reception, take calls, stuff like that (Verity, student).

*He treated us more like tradies, like free labour tradies more than anything …
The guy was just abusing the power of interns, because you're not covered
under fair trade, you're not technically an employee, some weird rule or
legislation about that … I didn't see myself learning there, so I just left (Ewen,
student).*

Carol and Ewen had flexibility and support to leave their poor-quality placements, but not all
students have the discretion to leave, for the reasons outlined in the *Findings and
discussion: Access* section of this report, making them more vulnerable to exploitation.

Summary

The data show that quality WIL placements are those that support learning through
adequate resourcing, good mentoring and the provision of authentic and challenging tasks,
providing opportunities for learning, impact and relatedness. For WINTA and international
students, traditional masculinist or exploitative workplace cultures may detract from
placement quality. The challenge is for employers and universities to create environments
and systems to support all students in accessing quality WIL placements that generate
genuine learning opportunities without detracting from student wellbeing.

Project findings and discussion: WIL wellbeing

The data show that WIL wellbeing was facilitated by access to quality placements that
contributed to, and importantly, did not detract from students' financial, physical, social and
psychological health. Students and staff alike identified specific stressors and their
consequences, similarly to other studies (Cormier & Drewery, 2017). These included being
overly tired and/or anxious due to juggling multiple commitments, depleted savings from
undertaking unpaid or underpaid placements, reduced social contact with family and friends,
or prolonged time to graduation. Overall, the pressure of having to log a certain number of
hours as a requirement for graduation may force students to take on poor quality
placements, as described in the previous section, which reduce employability development
and create more stress, further detracting from wellbeing. Students most at risk from such
stressors are those that for reasons outlined in the Findings and Discussion: Access section
of this report, are rendered more vulnerable through low capitals (Mackaway & Winchester-
Seeto, 2018), which may be perpetuated throughout placement experiences.

Stressors detracting from WIL wellbeing

WIL placement application processes and the pressures of self-sourcing access (Sher &
Sherratt, 2010), combined with financial pressures forcing students to juggle unpaid or
underpaid WIL placements with paid work, study, and family commitments were reported as
most commonly detracting from physical and psychological health. This was often
exacerbated by shift, FIFO or DIDO work (Cormier & Drewery, 2017).

*The only problem is that [the internship] wasn't paid very much. So when I was
there, I was doing two subjects at uni, working three days at [placement
organisation] and doing two to three days as a sales person to make rent (Ewen,
student).*

*I did find it a bit difficult, the whole being away for two weeks, one of those weeks
being night shift. I was really tired. I put on weight. I wasn't sleeping, it was just
all a bit much (Peter, student).*

*Students who are on an unpaid internship, they're renting an apartment, they
need to cover the cost of living, they have to work a second job, they're trying to
get through their academic load as well and they're just getting crushed …
they're under so much pressure (Robert, staff).*

Over-commitment, uncertainty and having to negotiate paid work or WIL placement work negatively affected students' psychological and financial health, and sometimes academic performance (Koppi et al., 2010; Sher & Sherratt, 2010).

> *I wish I knew how hard it was to work on top of full-time work … Monday, I was just working, Tuesday, I'd work but then I'd also head to my client's place to tutor … it was also very stressful in terms of like, I'd be working 46 hours a week and in reality all I got paid was what I got paid for tutoring, so the equivalent is that I got paid two or five dollars an hour, max (Verity, student).*

> *I sold the business … so I was unemployed for my two months. Financially, was OK. And also, because I didn't know my long-term prospects within [identifier deleted], whether they were interested in anything more than the vacation spot, I'd agreed to do three months cover at someone else's bar, hedging my employment bets (Damien, student).*

> *I was juggling with different units and with work. I failed because I didn't really focus on that one unit (Roland, student).*

Stressors were exacerbated for students with low accumulated capitals or family commitments.

> *If you are from a low SES group or if you are a person with more caregiving activities, which female students often have or an Indigenous person, then the unpaid internship can be a study break, like you can't do it, you're going to have to give up … it breaks people (Lachlan, staff).*

Undervaluing or not acknowledging students' knowledge, skills and contributions to the host organisation during WIL placements negatively affected students' psychological wellbeing, particularly longer-term unpaid placements or those seen to be exploitative.

> *Definitely some been taken advantage of. I've had them come back from the end of placements or in the middle of placements just kind of lost (Caroline, staff).*

Persevering Anyway

Students persevered with placements that detracted from their wellbeing for a number of reasons including concerns about prolonging time to graduation (Guler & Mert, 2012; Ralph et al., 2009), because they saw the placements as valuable learning opportunities that would contribute to employability, or because the juggling was relatively short in duration.

> *I just thought it was going to be a very valuable, I would graduate with a full year of experience, as opposed to a few weeks. The downside to that is I had to put uni on hold, I had to go part-time for a period of time. That was quite challenging … I could have stopped uni, done my internship and then gone back full-time, but I didn't want to delay uni so much … it was definitely not the easiest year, trying to balance full-time work and studies. I was quite tired all the time. I found myself a bit cranky (Peter, student).*

> *When I started that [identifier deleted] internship, because it was around Christmas time as well, I was working seven days straight … so I did night-fill at Woolies after work … I did that straight from the office to work. And then on the weekend, I worked retail at Myer as a casual, Christmas casual, and then I got hired on … I added it up once because I thought I was crazy, I was working more than 80 hours a week … yeah, but if it was unpaid, uni was my priority, like the unpaid job is priority over my part-time job (Miriam, student).*

> *I thought "okay it's a once in an opportunity lifetime, I'll just work hard for two months", and it was the hardest two months of my life. I'm not kidding when I say*

that. I was doing four units in engineering, working two and a half days a week sometimes, plus working however many hours in my part-time job … Plus playing sports, plus having a boyfriend at the time. It was the worst time of my life, but it was so worth it to get that experience (Tess, student).

For some students, the connection between study and paid work outside WIL placements afforded some flexibility to negotiate placement hours around paid work or vice versa, which reduced both financial and psychological stress, but relied on high accumulation of capitals to negotiate both commitments as well as new work.

I'm a casual at [identifier deleted], so it kind of fluctuates … the internship was pretty flexible. Like if I didn't show up one day, I'd just send them a quick text message saying that I'm not showing up … it kind of just worked … they were accommodating because I'm one of the better people that work there, at least I think, and that's what the managers think. I'm an electrical expert, so it's not hard to do what I'm doing there (Thomas, student).

Some students reported that they were willing to persevere because they saw the placement as a good experience (Amorim et al., 2012), which often led to further work.

For my first three years I was working, I had a cleaning job, and then … much of the last two years was just doing tutoring. So, I was very fortunate to get one tutoring job, and then another, and then another, and that took me right through fourth and fifth year … I didn't have to worry about having unpaid and paid work (Jack, student).

Still, other students had parental support, which meant they could take on unpaid placements in the knowledge the experience would enhance employability.

I have a lot of friends in this course, and a lot of their internships aren't as, you know, they don't really do a lot of the technical work, they do more of the organisational, maybe a bit of fold work, design, maybe a bit of excel spreadsheeting, but … I was doing artificial intelligence, I was programming in python, I was doing a, you know, technical stuff, which not a lot of people get to do. So I figured in the long run, putting that on my resumé is going to be more beneficial to me than maybe $15,000 or $20,000 for half a year's work (Thomas, student).

Having high capitals meant having options. For example, one student self-funded a not-for-profit engineering placement because he perceived it would enhance his leadership skills.

A lot of unique opportunities come up because of their ability to be unpaid … There's lots of costs with travelling overseas and it's unpaid … with flights, accommodation and program, cost was probably about $6,000 … I ran the site that I was on, I had seven students under me. So I got to put that in my resumé (Max, student).

Industry application processes for WIL placements were also seen as detrimental to wellbeing. Described by students as 'time-consuming', 'tedious', 'frustrating', 'boring', 'daunting', 'stressful', accessing placements often involved multiple unsuccessful applications with no feedback, video interviews and testing centres. These processes increased demands on students' time and contributed to reduced emotional wellbeing and resilience (Cormier & Drewery, 2017; Sher & Sherratt, 2010).

The HR process … is a very long, tedious and hard process. It takes a lot of time out of study and makes most people behind or struggle with study during the application phase (Tess, student).

There would have been hundreds of other students at the exact same time as me trying to get internships … I received a couple of rejections and then the rest, I just didn't hear back from them at all (Ramed, student).

Summary

The data show that WIL wellbeing is negatively affected by a range of stressors including time, commitment and financial pressures, which may be offset by opportunities for learning and impact for some students, although not all. The implications are that unless students have accrued capitals, options for accessing quality WIL placements are limited, which risks detracting from wellbeing on multiple levels. The challenge for universities is to develop WIL policies which de-intensify the pressure for students to accrue hours and realign the focus on nurturing career maturity, while also identifying and supporting students who face added stressors or have less discretion to refuse poor quality WIL placements.

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