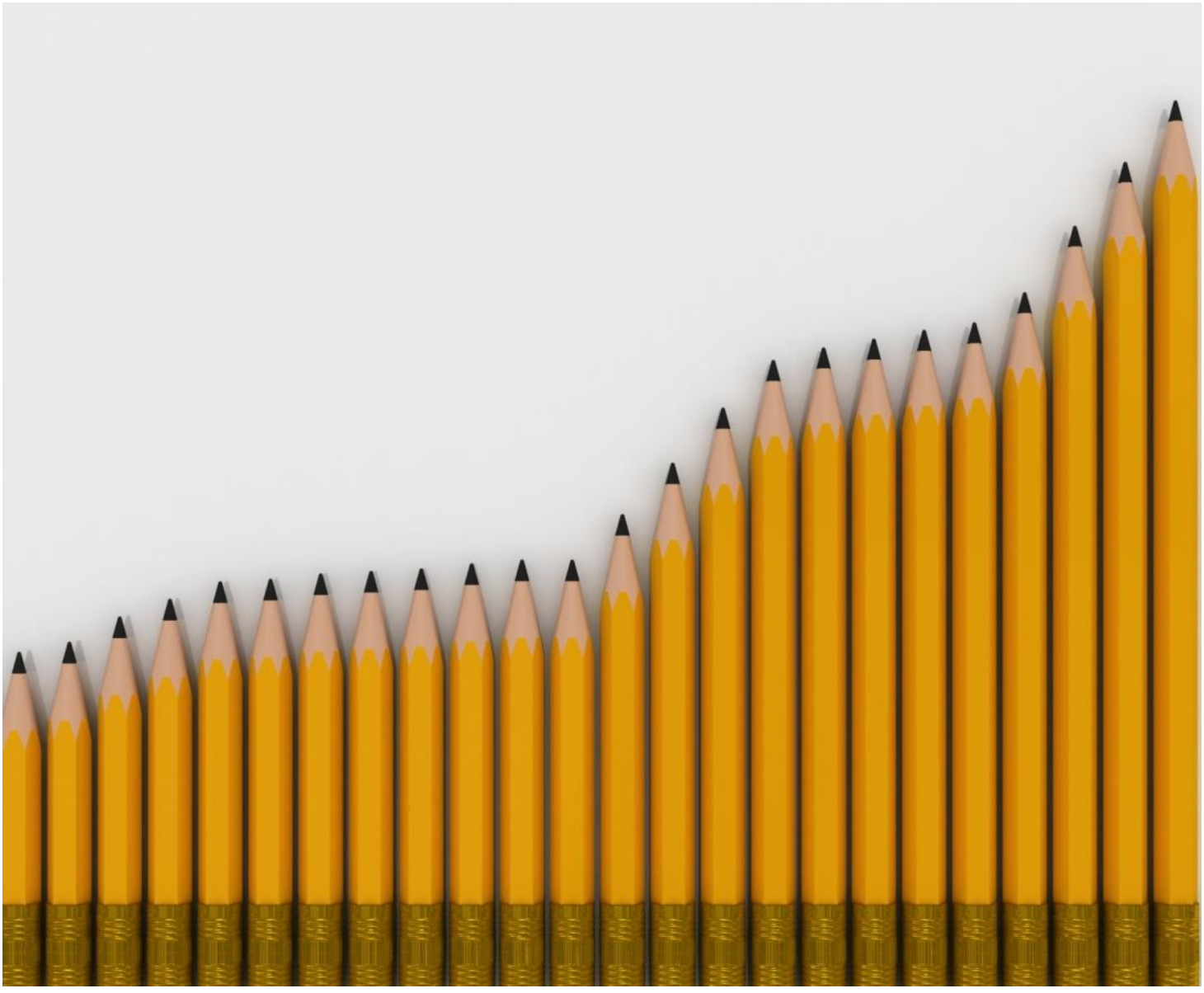
CONSULTANCY REPORT

NCVER

# Work integrated learning in STEM disciplines: employer perspectives

**Georgina Atkinson, Josie Misko and John Stanwick**

National Centre for Vocational Education Research



NCVER

# Work integrated learning in STEM disciplines: the employer perspective

Georgina Atkinson, Josie Misko and John Stanwick
National Centre for Vocational Education Research

27 August 2015

NATIONAL CENTRE FOR
VOCATIONAL EDUCATION RESEARCH

**CONSULTANCY REPORT**

# Contents

# Tables and figures

## Tables

# Acknowledgments

The National Centre for Vocational Education Research (NCVER) would like to thank the numerous people from businesses and organisations across Australia who took time from their busy schedules to participate in the interviews and focus groups.

Specifically, we would like to thank the following individuals and their organisations for assisting us in the organisation of focus groups and recruiting employer participants:

- Krystal Evans and Nicole Pitcher, BioMelbourne Network
- Cate Ballard, Australian Mathematical Sciences Institute
- Joanne Le Duc and Ben Samy, South Australian Department of State Development
- Colin Anstie, CBR Innovation Network
- Nick Minto, NSW Business Chambers
- Chris James, Minerals Council of Australia
- Katrina Lee Jones, Queensland Resources Council.

We would also like to thank the members of the Work Integrated Learning Industry Working Group, who provided valuable feedback on the draft and final reports.

Finally, we would like to acknowledge the support and assistance from Krisztian Baranyai and Roslyn Prinsley from the Office of the Chief Scientist and Daniel Edwards and the team from the Australian Council for Educational Research.

# Executive summary

Work integrated learning (WIL) is not a new concept and is typically utilised in some professions to enable students to acquire practical skills and experience through their engagement in real work tasks and workplaces. In this study we investigate the application of WIL to the occupations of university graduates from the science, technology, engineering and mathematics (STEM) disciplines. WIL is one part of a multi-layered approach to engagement by students with industry. The primary aim of this study is to look at the provision of WIL in STEM disciplines from the perspective of employers. This study provides qualitative insights into the reasons why employers do or do not offer WIL to STEM students; the value and benefits of WIL; the issues, constraints and barriers to WIL; and the effectiveness of employers' relationships with universities. A review of the relevant literature provided some preliminary insights into WIL for university students in general and for those undertaking STEM disciplines. The material informing the study was collected via a series of interviews and in-person focus groups.[1]

For the purposes of this project, work integrated learning covers a broad range of activities that link students with the workplace and employment experience. This report adopts the broad approach to defining WIL as set out by Coll and Zegwaard (2012) who argue that 'the diversity and proliferation of terms has become so wide that it may perhaps be better to focus on defining features of co-op/WIL programs (or whatever term one chooses to use), allowing these programs to be known under a variety of guises and be identified by their defining features' (2012, p.2). This report describes key features of the practice and programs of WIL, as explained by the employers who participated in the study.[2]

## Employer perspectives: key findings

### The extent and nature of WIL participation

Although employers make a variety of WIL experiences available to students, the key approaches used by the employers who participated in this study are those that require students to spend some time in the workplace, generally working on specific projects or on operational or production tasks. This approach gives these students the opportunity to undertake practical work and enables them to be embedded into work teams. The most common arrangements include:

- placements of varying lengths
- internships
- discrete projects, which may be undertaken at the workplace or on campus.

### Reasons for engagement and the benefits of engagement in WIL

Reasons for employers engaging in WIL include a mix of altruistic sentiments — fulfilling corporate citizenship obligations — and pragmatic considerations. Not surprisingly, the benefits of WIL accord with the reasons why employers engaged with WIL in the first place. The three most common benefits of WIL to employers are:

[1] The study also looked at the skills of STEM students and graduates. These findings are reported separately.

[2] The discussion refers to employers who participated in interviews and focus groups for this study, and the findings cannot be generalised to the broader business community. We acknowledge there may be some bias in the sample, as the majority of employers we spoke to had an interest in WIL, supported WIL and were particularly engaged in providing 'placement' WIL.

- the opportunity to identify and recruit talented students
- to access resources for getting jobs done
- the ability to fulfil corporate citizenship obligations, such as feeding the STEM pipeline, both for the specific company and the broader industry workforce, and providing practical learning opportunities for students.

Other benefits to hosting students include:

- the capacity to provide professional development opportunities for the staff who are responsible for supervising and mentoring the student
- the opportunity to learn about new technology or methods
- the 'fresh' outlook provided by students, in terms of new ideas and enthusiasm for learning.

In some cases WIL also provided access to a specific skill set. These benefits appear to be particularly relevant in STEM disciplines, where employers may be looking for niche expertise and experience.

Several STEM disciplines and industry groups were covered in the study. While the occasional discipline-specific issue arose, overall there were very few differences between the various groups. Where there are particular differences, it is usually where a discipline is associated more tightly with a specific industry. The agricultural industry in particular has an interest in developing its future STEM workforce, and this may also be related to the regional locations of much of the agriculture industry: it may be difficult to attract students and workers to these areas, areas which also may not be in close proximity to universities.

Generally, the differences pertain more to the size of the company or the type of work that the particular company undertakes. For example, in the biotechnology industry, research and development companies tend to prefer longer WIL experiences, to suit their cycles; whereas eight- to 12-week placements are more suited to the product development-type companies.

## Barriers to WIL engagement

The main barriers and constraints to employers taking up WIL are:

- lack of time to invest in the student
- lack of resources to fund WIL activities, including budget to cover student wages and for staff to be involved in supervision
- availability of suitable projects or work experience activities for the students.

Small to medium enterprises (SMEs) are particularly sensitive to these resources and time challenges. While the lack of resources limited the capacity of all employers to provide WIL, it also created particular challenges for SMEs and their capacity to learn about and set up, organise and run WIL in the first place.

## Interactions with universities

While employers value WIL as a corporate citizenship responsibility, WIL needs to fit in with their commercial realities, including accommodating the timeframes and forms that suit them.

In the main, most employers prefer relationships with universities that are not overly prescriptive or administratively burdensome. This requirement for flexibility in WIL rather than for tight prescription is mediated by the practical realities of having enough work to occupy their own employees, as well as

sufficient and suitable types of projects and activities for WIL students when they are requested. While employers tend to prefer flexibility in WIL arrangements, too much flexibility may be at odds with structured university programs and the course requirements for awarding graded credit for WIL activities. It is important therefore that flexibility meets the requirements of both employers and universities.

Flexibility in requirements is paramount if WIL is to benefit both students and employers. Universities should consider how best to collaborate with employers to decide on:

- the WIL commitments employers can reasonably provide
- the most suitable time to provide WIL
- the form of WIL that suits the needs of the employer, to take into account their particular requirements.

## Key findings from the literature

The findings from the discussions with employers in interviews and focus groups mainly support the findings from the review of the literature, especially in terms of the variety of WIL approaches available to students, the employer reasons and benefits for engaging with WIL and the constraints and issues employers face.

The review of the literature notes that WIL programs such as placements, industry projects and simulations are recognised approaches to providing students with the opportunity to gain and improve their employability and generic workplace skills. Widespread take-up of such programs varies between STEM disciplines, with WIL programs more widely used in engineering and information technology, and less so in general science areas. WIL in the science and mathematics disciplines does not figure prominently in the literature. This project confirms these findings and investigates some of the reasons for this.

The literature is quite clear about the barriers to employer participation in WIL, particularly that these are often contextually driven. Some of these barriers, especially for small companies, relate to:

- limited resources and time
- inadequate information about the specific roles of employers, students and universities in setting up and implementing WIL programs
- lack of clarity about objectives and outcomes.

The literature points to a range of strategies that may assist in overcoming the barriers and enhance employer engagement in WIL. Such strategies include:

- supporting employers by improving communication channels with universities to ensure better clarity around roles and expectations.
- promoting the benefits of WIL more widely to employers and industries, and recognising the need to customise promotional messages to specific business contexts
- giving employers an increased and more formal role in course design, delivery and assessment and/or inviting them to deliver lectures or to attend student presentations. These are also seen as ways to make connections between the workplace and the campus.

As the literature suggests and our findings confirm, two major challenges in improving employer engagement are convincing employers that WIL is worthwhile, then finding a balance between a desire to be more involved and having the available time and resources.

## Proposed 'value proposition'

Based on the interviews and our focus groups, we developed a 'value proposition' to encourage businesses to engage in WIL, which can be used as part of a broader communication strategy to promote WIL.

This value proposition is:

*WIL has been found to be of considerable benefit and value to employers in a number of ways:*

- *as a means of identifying and recruiting new staff and developing future talent for a company's workforce*
- *as a resource for undertaking value-added business-related projects*
- *as an opportunity to fulfil corporate citizen obligations and give back to the community*
- *as a way to help to increase the broader industry workforce*
- *as a source of fresh ideas for the organisation and a means to access new technologies or research*
- *as a means to develop and strengthen industry and university partnerships.*

## Overcoming the barriers to engaging in WIL – future strategies

Based on an analysis of the findings, a number of strategies have been proposed to increase employer engagement in WIL. Moreover, a number of additional strategies have been proposed specifically for small to medium enterprises, as they have particular constraints in relation to being able to accommodate students for WIL. These strategies have been developed with the aim of: providing some practical options for improving the communication of WIL: using university and industry networks to promote the benefit and value of WIL to employers: and using these intermediaries to facilitate WIL. More detail on the strategies can be found in the chapter 'Future strategies to engage employers in WIL'.

**Table 1 Future strategies**

| | |
|---|---|
| **Suggested strategies** | |
| 1) | Develop an online 'information portal' for use by government, employers, universities and students. The main aim of the portal is to link employers with students and university coordinators to facilitate student–employer 'matching' and to act as an information source on WIL and other forms of industry engagement with students. |
| 2) | Develop partnerships with intermediaries (particularly industry organisations and discipline-specific peak bodies) to facilitate WIL. Both government and universities could pursue these types of partnerships with intermediary bodies. |
| 3) | Develop a broader communication strategy, with a specific focus on articulating the 'value proposition' of WIL as well as guidelines on how to implement WIL. Strategies, such as the development of 'information packs', can be tailored to specific industries and disciplines. |
| **Additional strategies for SMEs** | |
| 1) | Development of information packs that include: outlining the 'value proposition', information sheets, guidelines outlining the roles and expectations of WIL, information on available funding or specific programs. These information packs could be developed and distributed in partnership with government, universities and intermediaries (such as university bodies and industry bodies). |
| 2) | University WIL coordinators to specifically provide information resources to SMEs and promote other activities. |
| 3) | Promotion of flexibility of models to fit the needs of SMEs and communicating to SMEs the variety of arrangements available. |

These strategies reiterate and build on those outlined in the recently released National Strategy on Work Integrated Learning in University Education, produced by Universities Australia, the Australian Chamber of Commerce and Industry, the Australian Industry Group, the Business Council of Australia and the Australian Collaborative Education Network on 11 March 2015.

# Introduction

The purpose of this project is to investigate, from the perspective of employers, the benefits, issues and barriers associated with work integrated learning for students undertaking STEM courses. Work integrated learning is seen as an important mechanism for improving the work skills of STEM graduates.

The main objectives of the overall project are to:

- determine the extent of and reasons why some employers engage with work integrated learning and, conversely, why other employers do not
- ascertain the benefits, constraints and barriers to employers engaging in work integrated learning
- distinguish possible solutions for overcoming the identified constraints and barriers
- examine the extent to which work integrated learning meets the needs of employers

What do we mean by work integrated learning? In this project a relatively broad definition is used and refers to a variety of different practices and programs which primarily link undergraduate students to the workplace and employment experience.

This report is structured as follows. A review of the literature is presented on the extent, nature, benefits and constraints of work integrated learning, with special reference to STEM. A brief description of the methodological approach used follows. The major part of the report provides a description and analysis of findings from the interviews that were conducted with employers that provide WIL experiences and those that do not. This covers a discussion of the nature of WIL placements, employers' motivations and expectations, roles and relationships with regard to WIL placements, benefits and constraints, and reasons for non-engagement.

This is followed by discussion on the focus group findings, examples of alternative models and future strategies to improve employer engagement in WIL. Dispersed throughout the report are case study examples of different companies, approaches and regions. Part one concludes with some final comments on work integrated learning.

# Literature review

This literature review aims to provide context to the study on employers' perspectives on work integrated learning. The review commences with a summary of WIL, including its purpose and definition, the different types of WIL, the extent to which is it undertaken in Australia, and which employers provide WIL. The benefits of WIL for students and employers are also considered. The review then examines employers' perspectives of WIL, including some of the issues and constraints in the provision of WIL, and partnerships with the universities. The review concludes with insights from the literature on strategies that can be implemented to enable organisations to offer WIL.

## What is work integrated learning?

Work integrated learning encapsulates a variety of different practices and programs which link undergraduate students with workplace and employment experience. These approaches aim to integrate the theory and the practice of work through a specifically designed curriculum (Patrick et al. 2008).

The aim of WIL is to develop students' employability skills and knowledge of the workplace. There is an underlying assumption that these skills cannot be learned in the classroom (Orrell 2011). The need for university graduates from all disciplines, including STEM, to be work-ready and have employability skills is well documented (West 2012; Business Council of Australia 2011; Patrick et al. 2008; Universities Australia 2008; Precision Consultancy & Business, Industry and Higher Education Collaboration Council 2007).

Government-driven agendas to address skills shortages and ensure that students have work-related experiences to improve their work-readiness have been key factors behind the increase of WIL programs in Australia (Orrell 2011; Patrick et al. 2008). However, there are calls to increase the number of students undertaking WIL, particularly students studying science, technology, engineering and mathematics disciplines. As discussed further below, WIL is less common among STEM disciplines (Office of the Chief Scientist 2013 Deloitte Access Economics 2014; PhillipsKPA 2014; Universities Australia et al. 2014; Australian Workplace Productivity Agency 2013).

## Definition and types of WIL

Orrell (2011) believes that WIL is a 'chameleon term' and is difficult to define. Different terms are used by some disciplines to explain a similar process, whereas other disciplines use the term 'WIL' to describe different programs. This report adopts a broad approach to defining WIL, based on the work of Coll and Zegwaard (2012), who argue 'that the diversity and proliferation of terms has become so wide that it may perhaps be better to focus on defining features of co-op/WIL programs (or whatever term one chooses to use), allowing these programs to be known under a variety of guises and be identified by their defining features' (2012, p.2). In adopting this approach, the report focuses on describing the key features of the practice and programs as were given by the employers who participated in the study.

Not all employers are familiar with the term WIL. In a recent study looking at WIL from employers' perspectives, PhillipsKPA (2014) found that less than half of employers were familiar with the term 'work-integrated learning'. Terms such as practicum, fieldwork, internships, cadetships, cooperative education and clinical placement are often used to describe different types of WIL programs, and most employers are more familiar with some specific types of WIL, particularly placements and internships.

WIL is structured in a variety of ways: from minimal engagement and ad hoc arrangements, through to WIL which is fully integrated into the degree and is an accredited component. Most WIL occurs during the upper level of an undergraduate degree and at the postgraduate level (Deloitte Access Economics 2014).

The PhillipsKPA (2014) survey results show that the most common types of WIL are those where students spend time in the workplace undertaking work related to their field. This includes work placements, internships, cadetships, practicums, clinical placements and fieldwork. However, the study is unclear about the definition of these types of WIL and how employers differentiate between them.

WIL programs can be 'external', where students go out into industry via placements, internships and field visits; or they can be 'internal', where industry comes to students via guest speakers, case studies, industry-linked projects and simulated and virtual experiences (Pilgrim & Koppi 2012). In other cases, WIL can be driven by the student's initiative rather than required by the university or sought out by the employer.

Some of the WIL models most commonly found in the STEM disciplines include placements, industry projects and simulation. These will be considered in greater detail below.

## Placements

Placements (including internships and cadetships and other types of WIL that require students to be placed with an employer for a period of time) immerse students into a workplace for a period of time. They can vary in length, from six- or 12-month industry placements, two- to three-month vacation placements, to 'taster' experiences of a few weeks. Placements can be full-time, part-time or casual and paid or unpaid. In some cases, students arrange their own placements with the employer and in other cases they are organised by the higher education institutions. Some placements are integrated into the curriculum and form part of the formal assessment. Placements are often seen as the 'ideal' form of work integrated learning, as students are in a position to contextualise their learning in a 'real work' environment. Much of the literature on WIL focuses on the placement model, whereby large numbers of students from single disciplines are assigned into 'one-on-one' placements with employers (Deloitte Access Economics 2014; Orrell 2011).

While placements are sometimes considered the most effective form of WIL, due to the fact that students are embedded into the workplace, the provision of placements can be challenging for a number of reasons. It can be difficult for both universities and students to find adequate placement opportunities and to maintain partnerships with employers who offer placement opportunity. Location can affect the availability of placements, as higher education institutions may not be conveniently located near the industries able to provide placements. Poor economic climate can also have an impact on the availability of placements. Placements can be costly, labour-intensive and time-consuming, as they require the establishment and development of industry partnerships to identify the numerous individual placement positions required (Deloitte Access Economics 2014; Smith et al. 2014).

## Industry projects

Industry-linked projects typically involve the various types of work undertaken in the workplace and usually include the development of a product. Industry projects are a common form of work integrated learning in information technology degrees in Australia (Pilgrim & Koppi 2012). While placements are often driven by higher education institutions and students, industry projects are often driven by employers, who identify potential project ideas and approach or present them to universities and students.

### Simulations

Simulations are reality-based experiential learning experiences which engage students in analysis and decision-making in 'real work' situations in an educational setting (Papadopoulos et al. 2011). Simulated work experiences are a popular approach (especially in information technology) when industry placements are not widely available (Pilgrim & Koppi 2012). However, simulation approaches should be used to complement real-life work experience rather than being used as an alternative. Simulations are most effective and beneficial to students when they are considered to be a realistic experience of the workplace and commercial environment (Ehiyazaryan 2010).

Having a range of work integrated learning models and approaches is ideal, as this provides the flexibility necessary for accommodating the priorities of the higher education institution and the available resources as well as varying levels of involvement from industry and different student motivations and capabilities (Pilgrim & Koppi 2012).

## The extent of WIL in Australia

As part of the Australasian Survey of Student Engagement, Radloff and Coates (2010) found that approximately 19% of students undertake WIL in the form of practicum, internship, fieldwork or clinical placement.

However, the extent of WIL being provided by employers in Australia is very unclear. The proportion of organisations in the PhillipsKPA (2014) study who engage in WIL is high (60%). However, their sampling strategy purposefully included organisations known to have engaged in WIL, meaning that the participation rate of 60% may not be an accurate reflection of the extent of WIL in Australian organisations. The authors suggest that the response rate to the survey indicates the level of interest and knowledge of WIL across a broader sample of organisations in different sectors, and the low proportion of responses from targeted employers may provide a more accurate view of participation in WIL in Australia.

The types of WIL provided by employers generally depend on the field and sector. Private sector organisations are more likely to offer internships, work placements and industry based-learning. Not surprisingly, clinical placements are more relevant in the health and medicine industries (PhillipsKPA 2014, p.28).

Over half of the employers in the PhillipsKPA study provided WIL for between one and six months and nearly 20% provided WIL for between six months and a year. Around 15% provided WIL for less than one month. Around 94% of respondents had offered WIL for more than one year and 66% had engaged students for more than five years. The median number of students each year for small businesses is two, five students for medium-sized businesses, and eight for large organisations with over 200 employees (PhillipsKPA 2014, pp.28—30).

Around 64% of employer respondents indicated that, typically, the student is not paid for the WIL (PhillipsKPA 2014). Stewart and Owens (2013) in a report for the Fair Work Ombudsman find that unpaid work experience is a growing feature of the Australian workforce. The authors suggest that a misconception exists, in that a person undertaking WIL is exempt from the *Fair Work Act 2009* and does not have to be paid. However, the exemptions only apply if the WIL is a requirement of the course (Stewart & Owens 2013). The PhillipsKPA study shows that nearly all employers who do not provide paid WIL believe that the WIL is a component of the course. The authors suggest that removing the threat of legal action following non-compliance as a consequence of this misconception may make WIL more attractive to employers (2014, p.29).

As PhillipsKPA (2014) and Stewart and Owens (2013) acknowledge, it is important that universities and industry partners ensure that WIL for students remains relevant and integrated, and that WIL for graduates is conducted professionally, ethically and legally.

The PhillipsKPA study finds in instances where students are paid that around two-thirds of WIL was remunerated comparably with a paid position. The remaining third of WIL experiences saw students paid through a stipend. The longer the duration of the WIL, the more likely the student is to be paid (2014, p.29).

## Which employers and industries provide WIL?

The PhillipsKPA study (2014) looks at the demographics of employers who provide WIL. The authors found that around two-thirds of employers were from metropolitan areas, whereas a quarter and one-tenth were from regional and rural/remote areas respectively. Large organisations are much more likely to participate in WIL than small- to medium-sized organisations, while organisations in the public and not-for-profit sectors are also more likely to provide WIL than private organisations (2014, p.22).

WIL is more likely to occur in some industries that others. Those industries that require a university degree as a prerequisite are more likely to be engaged in WIL than those industries that do not.

The PhillipsKPA study found that companies most likely to participate in WIL in Australia come from the health care and social assistance and education and training industries, which is not surprising, given the requirement of structured WIL in the form of clinical placements and teacher placements in these sectors. While only a small number of respondents came from the mining and public administration and safety industries, employers in these industries demonstrated high participation in WIL. Other industries with a participation rate of between 50% and 66% included agriculture, forestry and fishing; information, media and telecommunications; professional, scientific and technical services; retail trade; and manufacturing. Those industries with a less than 50% participation rate are typically industries that do not necessarily require a university degree, such as rental hiring and real estate services, and transport, postal and warehousing (2014, pp.34—7).

Companies in the administrative and support services, financial and insurance services and professional, scientific and technical services industry sectors have participation in WIL lower than that expected compared with their industry share (PhillipsKPA 2014, p.36). This is an important finding for this study, which focuses on WIL in STEM disciplines, particularly in disciplines where WIL is under-represented, such as mathematics and the sciences.

## WIL in STEM disciplines

In most cases WIL is optional, but in a number, particularly engineering degrees, some level of work experience and professional practice is a requirement for accreditation (Pilgrim & Koppi 2012; Mahalinga-Iyer et al. 2004). Engineering Australia recognises the value of the practical ‘hands on’ experience that professional practice can provide and recommends that undergraduates undertake a minimum of 12 weeks of WIL or other forms of professional practice before they are accredited (Engineering Australia 2008). In most cases, this occurs in the form of ‘work experience’ undertaken during vacation periods and generally this activity is not integrated into the curriculum. However, there are some examples of programs where there is greater integration between the academic and workplace learning and a move towards WIL for credit in some universities (Deloitte Access Economics 2014; Mahalinga-Iyer et al. 2004).

In recent years, the ICT industry has also considered introducing compulsory work integrated learning into ICT degrees (Pilgrim 2011). The ICT industry strongly supports work integrated learning as a method of improving interpersonal and communication skills, business awareness and problem-solving skills (Pilgrim 2011). However, there are concerns that placements may be too brief to meet the intended outcomes and that WIL needs to be developed cooperatively with industry to ensure it remains relevant and reflects the changing nature of the industry (Deloitte Access Economics 2014; Koppi et al. 2010).

A considerable body of literature examines and evaluates WIL in the engineering and information technology disciplines, indicating that WIL is more widespread in those disciplines, both in Australia and internationally, compared with the science and mathematics disciplines. In Australia, placements appear to be common in engineering degrees, and to a lesser extent in information technology degrees (Pilgrim & Koppi 2012; Papadopoulos et al. 2011; Koppi et al. 2010; Patrick et al. 2008).

Studies from the United Kingdom show that placements in STEM-focused sectors, especially in the sciences, are under-represented compared with other sectors, with the exception of the information technology and engineering sectors, which have a modest number of placements. Most placements available in STEM-related sectors are not scientific or technical internships; rather, they are non-technical internships, mainly in marketing and business development. Physical science, mathematics and biological science degrees appear to have much lower proportions of undergraduate students undertaking placements compared with other STEM disciplines (Mellors-Bourne 2011).

Perhaps part of the reason for the lower uptake of WIL in the sciences and mathematics can be attributed to a lack of opportunities for workplace interaction in highly structured and lecturer-driven science courses (Fraser & Deane 2002). It is also suggested that science courses provide fewer opportunities for students to reflect on their learning needs and skills development than other disciplines.

Where WIL is undertaken in science disciplines, the most common type of WIL appears to be the research-related placement, in which students are required to be located in a particular workplace to develop industry-related research experience. These can occur in biology and biochemistry, physics, chemistry, geography, mathematics and information technology (Papakonstantinou et al. 2013). For these types of programs to be successful, it is important that students are well matched with industry partners and their projects, to ensure that both parties have a meaningful experience (Papakonstantinou et al. 2013). Three examples of successful programs in the Australian context are Monash University's Student Industry Research Placement Program, Deakin University's Science and Technology Industry-based Learning Program and the Australian Mathematical Science Institute internship placement (Deloitte Access Economics 2014; Australian Workforce Productivity Agency 2013; Papakonstantinou et al. 2013).

# What are the benefits of WIL and the 'return on investment'?

## Benefits to students

The benefits of work integrated learning for students include increasing students' experience with employment and the workplace and improving their generic and employability skills, thereby making their learning more relevant to the workplace (Smith et al. 2014; Jackson 2013; Papadopoulos et al. 2011). The types of generic and employability skills that graduates require and are able to learn through work integrated learning include:

- communication skills
- teamwork skills

- problem-solving skills
- self-management skills
- technology skills
- lifelong learning skills
- initiative and entrepreneurial skills
- numeracy skills
- professional behaviour
- information literacy.

Industry groups such as the Australian Industry Group (AiG), the Australian Chamber of Commerce and Industry (ACCI) and the Business Council of Australia (BCA) call for greater improvement in these generic work-ready skills (Australian Workplace Productivity Agency 2013) among graduates and undergraduates, particularly communication and teamwork skills.

To be relevant, the generic skills such as those listed above should be contextualised and situated in the appropriate industry and professional workplace setting, and work integrated learning provides the opportunity for this to occur. WIL can also provide a student with knowledge about an occupation outside that taught at university (Papadopoulos et al. 2011).

Dressler and Keeling (2011) summarise the benefits to students into four main categories: academic benefits (for example, higher retention rates); personal benefits (for example, enhanced self-confidence); career benefits (for example, career planning); and work skill development benefits (for example, increased competence). Other benefits to students include introduction to a workplace and industry networks, which can lead to potential employment after graduation; clearer career progression; increased graduate salary; and an understanding of workplace culture (Australian Workplace Productivity Agency 2013).

## Benefits to employers

While the benefits of WIL to students are well known in the literature, the benefits of WIL to employers and industry are not as widely discussed. As the table below shows, according to the PhillipsKPA (2014) study, the two most cited benefits of WIL to the employer organisations are ‘to give back to the industry/profession’ and ‘ability to recruit graduates in the future’.

**Table 2 Benefits of work integrated learning**

| *Identified benefits* | *Number of responses [480]* |
|---|---|
| To give back to the industry/profession | 81 |
| Ability to recruit graduates in the future | 79 |
| Access to new thinking and new ideas | 71 |
| Integration with the university sector and emerging research and practices | 67 |
| The ability to refresh the organisation | 61 |
| Improves corporate image and aligns with corporate responsibilities | 52 |
| To improve the organisation's skills and competitiveness | 47 |
| Access to additional funding and/or resource streams | 22 |
| I don't see any benefits of work integrated learning | 0 |

Source: PhillipsKPA (2014, p.41).

Giving back to the industry and/or profession and improving corporate image aligns with the concept of 'corporate responsibility'. While the PhillipsKPA study finds 'corporate responsibility' to be a significant benefit and motivator for employers, it is something that is not widely considered in other literature. As a key finding in this study, the concept of 'corporate responsibility' will be discussed in great depth later in the report.

The use of WIL as a possible 'recruitment' strategy is widely acknowledged in the literature to be a major benefit of WIL — as well as a key motivator for providing WIL in the first place. Employers' perspectives on WIL learning tend to revolve around access to potential employees and its having a positive impact on the organisation's productivity. WIL programs, particularly placements, provide employers with the opportunity to identify potential future employees, act as a feeder into graduate programs and are an opportunity to 'test' students prior to hiring them (Australian Workplace Productivity Agency 2013; Papadopoulos et al. 2011; Virolainen, Stenström & Kantola 2011; McEwen, Mason O'Connor & Williams 2010; Patrick et al. 2008). However, as Patrick et al. (2008) suggest, it important that employers treat WIL students as more than just potential employees and engage with them as developing professionals.

The other benefits to WIL that rated highly in the PhillipsKPA study (2014) include 'access to new thinking and new ideas', 'integration with the university sector and emerging research and practices', and 'ability to refresh the organisation'. New students with new ideas may lead to unanticipated innovation and bring in new information, ideas, studies, practices and methods in the field (Papadopoulos et al. 2011; Virolainen, Stenström & Kantola 2011). As such, WIL can also contribute to building a culture of learning within an organisation and establishing relationships that lead to collaboration with higher education institutions on other projects and opportunities (Papadopoulos et al. 2011).

Hosting students can also benefit other staff members as this may give them the opportunity to supervise a team member and support their own professional development (Virolainen, Stenström & Kantola 2011).

While organisations that provide WIL to students can generally see some of the benefits to their own organisations, those employers that do not provide WIL are more likely to be unsure of the benefits of WIL for the company. They are also less likely to agree that WIL offers any benefits to the organisation or the industry more broadly (PhillipsKPA 2014, p.43).

The benefits of WIL are largely intangible, which makes it difficult to measure, monetise and determine the return on investment. Bennett (2008), looking at the return on investment and undertaking a cost-benefit analysis of WIL for universities, finds that the benefits and value of WIL is difficult to measure, given the nature of the intangible benefits, such as the knowledge gained and skills acquired.

While the benefits of WIL to employers have been considered in the literature, research looking at measuring those benefits and identifying the return on investment is less available. As Bennett (2008) found with universities, measuring the intangible benefits is particularly difficult. For businesses, the intangible or difficult-to-measure benefits might include the 'corporate social responsibility', students' productivity, and the innovation and 'fresh ideas' brought by students. However, it might be more achievable to measure other benefits, such as the recruitment benefits and WIL students' transition into employment after study. Looking at the return on investment of WIL from the employer perspective would be a worthwhile future research project.

# The role and perceptions of employers and their partnerships with universities

## Partnerships with higher education institutions and the role of the employer

Traditionally, higher education institutions have been responsible for delivering education and training to students. But with the advent and increasing popularity of WIL programs, employers and industry are taking on some of the role of teaching students. Choy and Delahaye (2011) argue that higher education institutions need to recognise that academics are no longer the dominant players in providing a learning experience for students. Instead, they suggest that higher education institutions should pursue collaborative curriculum design and delivery alongside industry partners. Building effective WIL partnerships takes time and effort, something both parties need to accept and be prepared to work on if they want to achieve successful outcomes and effective employer engagement in WIL (Choy & Delahaye 2011; McEwen, Mason O'Connor & Williams 2010).

The extent and level of employer engagement in WIL can depend on a range of factors including: employer size, metropolitan/regional/rural location, workforce diversity, attitude and approach to student involvement in the workplace, and the culture and character of the different disciplines and industry sectors (McEwen, Mason O'Connor & Williams 2010).

The employer role in supporting WIL can include pre-work integrated learning activities, such as recruitment processes, as well as the WIL activities. Throughout the WIL experience, employer roles can include that of facilitator, supervisor, mentor and assessor (McEwen, Mason O'Connor & Williams 2010).

In regards to setting up WIL programs and activities, the PhillipsKPA (2014) study shows that over two-thirds of employers were approached by either the university (around 41%) or the student[3] (around 27%). Just under a quarter of employers contacted either the university or the student themselves. While these findings suggest that setting up the WIL is generally not driven by employers, the findings of this study show that, in some instances, employers are very proactive in setting up WIL. This will be discussed further in the report.

A number of studies show that feedback from employers indicates that they would like additional information about the WIL experience and support in facilitating WIL from higher education institutions (PhillipsKPA 2014; Peach, Larkin & Ruinard 2012; McEwen, Mason O'Connor & Williams 2010). The literature suggests that, to create better partnerships between higher education and employers, higher education institutions could improve their responsiveness to employers' needs and the level of support they required. While the majority of institutions provide some level of support for employers, this usually consists of web resources, a handbook, or briefing sessions.

One gap that exists in the literature relates to the role of third parties or intermediaries, such as industry associations and other organisations, and their role in facilitating WIL between employers, universities and students. While there are a few notable examples of intermediary organisations in the sciences, for example the Australian Mathematical Sciences Institute (AMSI) Intern and Undergraduate Research Opportunities Program (UROP), the role of these types of organisations more broadly is not widely researched.

Given the different approaches to WIL across different disciplines and industries, it is difficult to provide a 'one size fits all' approach to facilitating WIL. Despite the differing approaches and levels of engagement

[3] Most of Phillips KPA sample were education or clinical placements so this would bias the result.

of various industries and employers, PhillipsKPA suggests that there is a need to further involve employers in the facilitation process to ensure greater balance in responsibility between universities and employers (2014, p.26).

It is important for employers and industry partners, along with university staff, to be leaders in WIL. A recent study by Patrick et al. (2014) finds that leadership in WIL should be distributed, and communities of practice for WIL leaders are encouraged. The authors suggest that WIL leaders should encompass a range of WIL professional and academic practitioners in universities and staff and supervisors in industry and community partner organisations, at operational and strategic levels.

## Inhibitors and constraints to partnerships and participation in work integrated learning

When it comes to engaging in WIL, a number of sources find a range of employer-identified inhibitors and constraints (PhillipsKPA 2014; Peach, Larkin & Ruinard 2012; Papadopoulos et al. 2011; Virolainen, Stenström & Kantola 2011; McEwen, Mason O'Connor & Williams 2010; Patrick et al. 2008). These include:

- financial constraints and costs associated with hosting students
- questions of credibility and value of the program to both the employer and student
- lack of time or interest to invest in supervision and guidance of students
- lack of support for the student in the workforce
- lack of flexibility and responsiveness on the part of the higher education institution to accommodating employer needs and their business cycle
- the complex and confusing nature of higher education institution systems and their bureaucracy, which can be confusing for employers unfamiliar with the process
- lack of industry relevance and outdated curricula
- lack of a common language and understanding
- lack of consistent understanding of the work integrated learning experience, the different roles and expected outcomes across all parties (higher education institutions, employers and students), which can lead to poor experiences and damaged partnerships
- differing expectations about outcomes and benefits of work integrated learning, and how the outcomes and benefits might vary between different employers.

The extent to which these factors affect different employers varies. According to the PhillipsKPA study, the two largest barriers to employers are 'insufficient resources within my organisation' and 'supervision time', with around 60% of employers agreeing that these issues act as constraints to providing WIL. Around 40% of respondents also agreed that 'monetary cost/budget constraints', 'administration time', and 'a lack of space to accommodate a student' can be barriers to WIL (2014, p.44).

PhillipsKPA (2014) found that employers were less likely to agree that the following factors acted as a barrier to completing WIL:

- uncertainty over who to contact ('I don't know who to contact about WIL')
- occupational health and safety concerns
- negative prior experience
- lack of university students in the area

- perception that the organisation is too small ('my organisation is too small')
- limited information about WIL opportunities
- students with insufficient skills.

Depending on their size or type or other differentiating factors, employers can divided over whether some factors act as a barrier or not. For example, small businesses are slightly more likely to be concerned about students with insufficient skills. And, not surprisingly, small businesses were more likely to identify their small size and the burden of administrative time as barriers to providing WIL (PhillipsKPA 2014, p.46).

The length of time a business has been in operation also seems to have an impact on the extent to which an issue is a barrier to undertaking WIL. The longer a business has been in operation, the less likely they are to agree that certain issues act as a barrier to WIL: issues such as, administration time, concerns about the organisation being too small and students with insufficient skills. The PhillipsKPA authors suggest that some of the logistical barriers to providing WIL can be overcome with time, as organisations grow and develop processes and systems for accommodating WIL students (2014, p.46).

One barrier that seems to be consistent across organisations, regardless of size, location, sector, or length of time in operation, is the issue of monetary costs and budget concerns. As noted above, only around 40% of businesses indicated that monetary costs acted as a barrier. However, an equal number of employers disagreed, which suggests that financial implications are only a barrier to specific companies and not necessarily linked to a particular type of business (PhillipsKPA 2014).

The PhillipsKPA (2014) study also identified a number of barriers preventing organisations which had considered offering WIL from doing so. These barriers relate to resourcing issues or gaps in information and communication and include:

- limited information about WIL opportunities
- insufficient resources within the organisation
- uncertainty over who to contact about WIL
- administration time
- perception that the organisation is too small
- supervision time
- monetary cost/budget concerns.

Barriers relating to the lack of information about WIL and who to contact were much more prevalent for those organisations currently not offering WIL compared with those that do. This suggests that there is a lack of information about WIL available for those organisations not already providing it.

While the employers that do not provide WIL cited barriers such as time, cost and limited resources, other responses suggested that some employers had limited capacity for providing WIL for students. It wasn't that employers weren't interested in offering WIL, they simply felt that they did not have the capacity to do so.

In addition to the lack of information about WIL acting as a barrier for non-WIL employers, the PhillipsKPA study also found that many were unfamiliar with WIL, either as a term or concept, with this lack of awareness about WIL naturally acting as a constraint (2014, pp.31; 44—8).

McEwen, Mason O'Connor and Williams (2010) suggest that to overcome some of the barriers to employer engagement, the benefits to WIL must be clearly articulated in the language of 'business' and clearly supported by an evidence base.

# Enhancing employer engagement: employer perceptions and suggestions for good practice

## Aligning expectations and improving communication and support between employers and universities

It is evident that employers would like more clear communication from higher education institutions about the specific work integrated learning program. They would prefer information on:

- the expected role of the higher education institution
- the expected role of the employer, for example, whether mentoring or job shadowing is required
- student expectations of the work experience, as employers were concerned that students did not necessarily have realistic expectations about fitting into a workplace culture, working in teams and the type of work they would be doing
- contact people in higher education institution
- course objectives and placement outcomes
- assessment schedules as they relate to the placement
- timetables and course or module information where relevant to the work integrated learning experience
- students' capabilities and qualifications.

Employers indicated they would like information to be provided in a simple and concise format. They also wanted communication with the higher education institution to be more regular, systematic and formalised. And where issues arose, they preferred the communication and resolution to be timely and responsive (PhillipsKPA 2014; Peach, Larkin & Ruinard 2012; Virolainen, Stenström & Kantola 2011; McEwen, Mason O'Connor & Williams 2010).

Adequate information and an appropriate level of communication between the higher education institution and the employer are integral for establishing and maintaining a partnership between the two. It is suggested that the roles, requirements and expectations are documented in a 'learning contract' between all parties (Peach, Larkin & Ruinard 2012) or in a handbook which includes an explanation of the roles and responsibilities. These include the expectations of all parties; an outline of what the student will be taught and can expect to learn; what they will be working on, stating at the outset if there is a possibility of employment after graduation; checklists for students; information about the company; timeline of activities and assessments; and an appropriate contact list, which is kept up to date (Wallace, Murray & Overton 2009).

In the PhillipsKPA study (2014) around 80% of employers agreed that specific factors relating to university support and coordination of students could act as an enabler to their provision of WIL. These include: support from universities for engaging students; good personal links to a university; and university coordination of students. Over two-thirds of employers also supported more formalised agreements with universities.

While increased information, communication and support from universities are strongly required by employers, it is acknowledged in this review that this would impose additional costs, resource intensiveness and administrative burden to the universities (Australian Workplace Productivity Agency 2013). When it comes to financial and resource issues, employers and universities often share the same barriers to providing WIL (Patrick et al. 2014).

## Building relationships with universities, the broader industry and industry networks

In looking at leadership in WIL, Patrick et al. (2014) found that industry partner organisations can contribute to good leadership practice by collaborating with universities to develop good practice in WIL. The authors suggest that industry partner organisations:

- foster engagement with WIL university staff
- encourage and support staff to operate in learning contexts
- develop sustainable relationships with university WIL staff
- work collaboratively with university networks
- work collaboratively with university WIL partners to ensure mutually beneficial outcomes
- accommodate and be mindful of constraints and contexts
- mentor staff to operate in learning contexts.

In addition to developing meaningful partnerships with universities, employers and industry partners should be leaders in WIL and promote its use and uptake, not only in their own workplace, but also in the wider industry.

## Internal employer enablers

Other 'enablers' to offering WIL relate to the existing organisational processes and protocols and the availability of information and resources. They include established frameworks/protocols within the organisation; internal coordination/recruitment process; and clear and accessible information regarding WIL. While there was less agreement for these types of enablers than the university-related enablers, between 60% and 70% of employers still agreed that these enablers were important.

The enabler with the least amount of support from employers is a designated budget within the organisation to be set aside for WIL activities, with only 38% of respondents agreeing. This finding corresponds with some of the other concerns relating to the monetary and budget constraints to offering WIL.

These findings suggest that increasing the level of support from universities is likely to have the most impact on enabling organisations to participate in WIL (PhillipsKPA 2014, p.50).

The PhillipsKPA study shows that, in regard to the barriers and enablers to participation in WIL, the variation of views between organisations that do and do not provide WIL is significant. The authors suggest that encouraging different organisations to participate in WIL would require a tailored approach, one that takes account of the different factors and issues prohibiting and enabling WIL for different companies (2014, p.52).

## Increased employer engagement in the design and delivery of the course and assessment

Employers indicated that they wished to be more involved in the design and delivery of the course. This is not only to ensure that the WIL experience met their business needs, but that the course or project is up to date with what is happening in the particular industry.

Employers also indicated they would like greater involvement in the assessment and appraisals process, believing they were well positioned to provide feedback and encouragement to students, both formally and informally.

Workplace supervisors have the expertise and experience within the workplace, so therefore are well placed to observe and provide feedback on a student's performance. Most students value the opportunity to receive feedback from an expert in their field (Peach, Ruinard & Webb 2014). However, according to Peach, Ruinard and Webb (2014), some workplace supervisors may be reluctant to provide feedback on performance in the workplace. Reasons for this reluctance include:

- implications for the student—supervisor relationship
- clarification of the multiple roles of workplace supervisors
- time and resource constraints
- consequences of feedback.

To address some of these issues, Peach, Ruinard and Webb (2014) suggest that using less absolute terminology; increasing the frequency for the delivery of the feedback; using work or learning plans; and including student self-assessment and the participation of workplace supervisors in the feedback process could be further encouraged and the overall learning experience enhanced.

Other suggestions for increasing employer engagement include employers: debriefing students at the end of the placement; administering evaluation questionnaires: and attending class assessment sessions to hear students' experiences (McEwen, Mason O'Connor & Williams 2010; Wallace, Murray & Overton 2009).

## Formal mentoring role

Where a mentoring role did not already exist between employer and student, employers indicated they would like to be formal workplace mentors. Mentoring, and the role of mentoring, is considered integral to the development of skills, knowledge and dispositions during the internship, but it is important to introduce employers and students to mentoring and what can be expected prior to the commencement of the internship. While employers were keen to act as mentors, they also acknowledged that they may need training from higher education institutions to assist them to supervise and mentor students appropriately (Fifolt & Searby 2010; McEwen, Mason O'Connor & Williams 2010).

## Contributions to other types of WIL

Employers were also willing to contribute to other types of work integrated learning activities, such as providing preparation support for students prior to commencing placements, through presentations, inductions and workshops; wanting to be invited to university to give guest lectures to students; inviting academics to visit workplaces; and making contributions to interview skills and career search workshops (McEwen, Mason O'Connor & Williams 2010; Patrick et al. 2008).

## Increasing employers' awareness of benefits and 'buy in'

Industry partners and employers need to be aware of the benefits of WIL — not merely the benefits for the company but also for the student and more broadly (Papadopoulos et al. 2011). It has also been suggested

that senior management should be involved in and supportive of work integrated learning initiatives (Choy & Delahaye 2011; Papadopoulos et al. 2011).

## Summary

Work integrated learning programs, such as placements, industry projects and simulation, are recognised as providing students with the opportunity to gain employability and generic skills in a workplace setting — either 'real work' or simulated. From the employer's perspective, they get graduates that are more work-ready than might otherwise be the case.

It is clear from the literature that the widespread take-up of such programs varies between STEM disciplines, with work integrated learning programs more widely used in engineering and information technology than in general science areas. There is a lack of literature relating to work integrated learning in the science and mathematics disciplines. Looking forward to the findings from the current project, it will be interesting to ascertain whether this is in part due to a lack of interest from employers in taking up work integrated learning or whether other factors, such as lack of information on WIL are at play.

The literature on employers' roles and perceptions of work integrated learning indicates a range of barriers to participation in WIL. Some of these barriers relate to limited resources and time, affecting the availability of placements. Factors such as these tend to affect small businesses to a greater extent than they do large businesses. Other barriers relate to the relationship employers have with the higher education institution and with the students, especially a lack of understanding about the roles, expectations and outcomes of the WIL experience. However, the barriers to providing WIL are contextual to each organisation. Employers indicate a desire and make a number of suggestions for improving their communication with higher education institutions in order to gain a better understanding of the various roles and expectations.

It is also suggested that higher education institutions need to make employers and industries more aware of the benefits of WIL, their aim being to encourage their WIL engagement and 'buy in'. This includes communicating the benefits of WIL in terms of the language of business. Employers suggested they would like a greater and more formalised involvement in course design, delivery and assessment. They also want to be more involved in class-based WIL; for example, being invited to present lectures and attend student presentation sessions. Although employers have indicated they wanted to be more involved in work integrated learning, they have also identified time as a constraint. This suggests that a major challenge in improving employer engagement lies in finding a balance between a desire to be more involved and having the available time and resources to do so.

The other key enabler to increasing the uptake and prevalence of WIL is the involvement of industry partner organisations. These organisations can do a great deal of the work in terms of collaboration with universities. Once again however this may come at a resource cost.

There is a 'clash' between employers' acknowledgment that work experience is a desired attribute and the challenges inherent in overcoming the barriers associated with time, resources and workload to enable employers to provide more WIL opportunities. This is quite clearly confirmed by the findings of this study.

# Method

The material informing this study was mainly collected through in-depth interviews and focus groups with employers who do or do not engage with work integrated learning for students undertaking STEM studies at university.

As indicated in the literature review, a broad definition of WIL was used when developing the interview and focus group questions, shaping discussions with interview and focus group participants, and analysing data and preparing this report.

Participants were provided with the following explanation of WIL as background to the interviews and focus groups:

> Work integrated learning (WIL) includes a variety of different practices and programs which link undergraduate students with the workplace and employment experience. The aim of work integrated learning is to develop students' employability skills and knowledge of the workplace. Common types of WIL include placements, internships and field visits. Other types of WIL include industry-linked projects, simulated and virtual experiences, industry guest speakers, and case studies.

This broad approach was used to prompt discussion on the different varieties of WIL as well as elicit information on employers' wider interaction with universities and students. University stakeholders tend to have a reasonably defined understanding of the types of activities that WIL encompasses. However, the employers in this study have a range of different interactions with students and universities, from the more typical WIL experiences such as placements and work-based projects, to less formal approaches such as guest lecturing and casual student employment. While some of the latter activities may not be classed strictly as WIL, they are still very important in filling out the broader picture of employer engagement with STEM students. Additionally, some of the activities that are not WIL, according to the definition, for example, guest lectures, may facilitate more formal engagement in the future. Consequently, they are still referred to in our findings.

A total of 74 interviews were conducted for the study. This comprised 64 interviews with employers who provide work integrated learning opportunities and ten interviews with employers who do not. Focus groups were conducted in Melbourne, Adelaide, Horsham, Sydney and Canberra.

Employer participants in the study who provided WIL experiences represented enterprises from industries employing STEM workers and providing WIL for students from STEM disciplines across the country (bar the Northern Territory). The majority (almost two-thirds) were from small and medium enterprises. Nevertheless there was substantial representation of employers from large companies (see table 3).

**Table 3 Employer participants by organisational size for employers providing WIL**

| | *No of enterprises* | *%* |
|---|---|---|
| Small enterprises | 18 | 28 |
| Medium enterprises | 21 | 33 |
| Large enterprises | 25 | 39 |

Source: Employer interviews for this study.

Due to the over-representation of engineering firms in our sample, it is not surprising that information on employer experiences with student engineers figure prominently in our findings and analysis. Where 22 firms in our study provided WIL for engineering students, about half this number provided WIL for the

agricultural science-related studies. There were also quite a few employers providing WIL in information communications and technology (ICT) and mathematics. Much smaller groups of employers provided WIL for students undertaking studies in physics, chemistry and biology. One company provided training for surveying students, another three for geoscience students and another for marine science students (see table 4).

**Table 4 Employer participants by discipline area of the WIL student**

| **Discipline** | | |
|---|---|---|
| | *No of enterprises (64)* | *%* |
| Engineering | 22 | 34 |
| Agriculture-related disciplines | 11 | 17 |
| Information and communications technology | 6 | 9 |
| Mathematics | 6 | 9 |
| Biology, biomedical, medical health | 6 | 9 |
| Chemistry | 3 | 5 |
| Physics | 3 | 5 |
| Cross-discipline | 2 | 3 |
| Geoscience, geophysics, marine science | 4 | 6 |
| Surveying | 1 | 2 |

Source: Employer interviews for this study.

There were also ten SME employers who did not provide WIL experiences for students, and most were small companies. They produced goods and services requiring skills developed in information technology, mathematics, engineering, agriculture and chemistry areas. The overwhelming majority of companies operated in metropolitan areas. In appendix A we provide more detail about the state locations of employers, their industry sector, discipline area and organisational size.

The analysis of the interviews used a 'bottom up' approach; that is, the themes emerged from the findings of the interviews rather than being imposed onto the interview results. A simple coding structure based on categories of responses was developed to accomplish this. This approach helps to gives a more detailed and richer understanding of what employers say in conversations and enables a better understanding of the perspectives of employers. However, the approach also brings with it some limitations: those related to employers not always providing sufficient detail in responses to interview questions.

In terms of methodology it needs to be noted that throughout the report paraphrased employer quotes are used to illustrate key findings and to provide contextual information, especially for different disciplines. The quotes are categorised by discipline type, that is, the primary discipline/s of the WIL students rather than the industry of the employer. A separate discussion on industry sector is included later in the report. It is also important to note that many of the employers in our study were employers who had participated in the survey of employers commissioned by the Office of the Chief Scientist and who had indicated their willingness to provide more information in a follow-up study. It should also be noted that the findings cannot be generalised to the broader business community. We acknowledge there may be some bias in the sample, as the majority of employers we spoke to had an interest in WIL, supported WIL and were particularly engaged in providing 'placement' WIL.

It has been difficult to draw generalisations about WIL for different disciplines. This is because of the small sample size overall, as well as the small numbers of enterprises providing WIL for different

disciplines. It is also due to the idiosyncratic nature of many of the enterprises and their products and services.

# The uptake and nature of WIL placements

The employers in this study report considerable experience with WIL, with the majority having been involved in providing placements for many years and some for over a hundred years. There is little difference in this by employer size or the main discipline area covered by the employer.

As table 5 shows, nearly 60% of employers have been providing WIL for fewer than ten years, with just under a quarter providing WIL for fewer than five. This differs from the PhillipsKPA (2014) study, which shows that 66% of employers had engaged students for more than five years.

**Table 5 Number of years employers have been providing WIL**

| Number of years | *Number of employers providing WIL [64]* | *%* |
|---|---|---|
| 0–5 years | 15 | 23 |
| 6–10 years | 23 | 36 |
| 11–20 years | 12 | 19 |
| 21+ years | 7 | 11 |
| Unsure | 7 | 11 |

Source: Employer interviews.

As table 6 shows, many of the enterprises have only small numbers of students undertaking work integrated learning at any given time — often only one or two students. About 30% of the employers reported having one or two students currently undertaking WIL. Another quarter reported having six or more students. Not surprisingly, large employers were most likely to have higher numbers of students, with three of these reporting upwards of 100 students.

Typically, it is only larger organisations that have the capacity to take on multiple students or to offer a structured program. In addition, these are to be found more often in the areas of engineering and information technology, where there may tend to be some more formal requirement. In absolute terms, the largest intake overall in our sample of interviewees (apart from one large government organisation, which takes on hundreds of students each year) was 150 students in the engineering area, followed by 30 students, also in the engineering area, and 30 in an organisation that covers multiple disciplines. These findings support findings from the literature, which indicate that WIL is more likely to occur in engineering than in other STEM disciplines.

In looking at information on the number of students currently in WIL programs we find that over a third of the employers did not have students currently undertaking WIL with their organisations at the time of interview (see table 6). This is understandable as end-of-university-year vacations (when the majority of placements tend to occur) were a few months away when most interviews were conducted. Where organisations were currently providing WIL to students, 43% were hosting one to five students.

**Table 6 Number of students currently undertaking WIL**

| Number of students | *Number of employers providing WIL[64]* | *%* |
|---|---|---|
| 1–2 students | 19 | 30 |
| 3–5 students | 8 | 13 |
| 6–10 students | 2 | 3 |
| 10–20 students | 5 | 8 |
| 21–100 students | 5 | 8 |
| 100+ students | 3 | 5 |
| No students currently | 22 | 34 |

Source: Employer interviews.

Employers were also asked to report the number of students who had undertaken WIL with their enterprises in the past. In table 7 we show that over a quarter of organisations provided WIL to one to ten students in the past, and around 14% provided WIL to 11 to 20 students. Just over a quarter of organisations provided WIL to 21 students or more. Nearly a third of respondents were not sure of the number of students to whom the organisation had provided WIL in the past. In some cases this was because the respondent had not been in the company long enough to know the answer, the organisation had been providing WIL for so long and to so many students the respondent could not remember, or there was inadequate record-keeping of the number of students.

**Table 7 Number of students who have undertaken WIL in the past (in total)**

| Number of students | *Number of employers providing WIL [64]* | *%* |
|---|---|---|
| 1–10 students | 18 | 28 |
| 11–20 students | 9 | 14 |
| 21–50 students | 5 | 8 |
| 51–100 students | 5 | 8 |
| 100+ students | 7 | 11 |
| Respondent unsure | 20 | 31 |

Source: Employer interviews.

## Different forms of WIL

Employers and employer representative organisations identified a number of different types of WIL programs. As will be seen later, in some cases these arrangements are organised in cooperation with universities but in many cases they are employer-driven. These include:

- internships, cadetships and scholarships (including those aimed at Indigenous students)
- student placements, typically during summer vacation
- work-based projects, which may or may not include 'on the job experience'
- short (that is, one to two weeks) 'taster' programs
- ad hoc arrangements (for example, when student is available).

From the employer perspective, the main type of WIL is 'on site' WIL such as placements, internships and work-based projects, where the student spends time at the company, and casual working arrangements. In table 8, the classification 'projects' includes project-based WIL that is undertaken

on campus, or more commonly in this study, at the workplace. These may or may not be formally arranged by universities or may or may not be accredited. Work-based or industry-based projects, where students were based on campus and not in the workplace, were less common among the employers in this study. These findings align with the PhillipsKPA (2014) study, which shows that employers are more familiar with the idea of placements and internships than they are with the other types of WIL and the broader term itself.

The literature on employer's interactions in WIL, which is often focused on placements and other types of 'on the job' work experience, is a reflection of employers' greater involvement in these types of WIL compared with other types of WIL, such as simulation and guest lecturer positions.

In the vast majority of cases, WIL is a 'once off' experience, with the exception of the internships that require multiple placements, or where there are ad hoc casual working relationships between students and employers (noting that this form of workplace engagement is not WIL), where students may return each summer holiday to work for an eight- to 12-week period. The key types of WIL programs are reported in table 8.

**Table 8 Types of WIL programs offered by employers**

| **Program type** | *Number of employers responding (62)* | *% of employers*[a] |
|---|---|---|
| Placement | 43 | 69 |
| Internships | 19 | 31 |
| Projects[b] | 17 | 27 |
| Scholarship | 10 | 16 |
| Various casual work opportunities | 10 | 16 |
| Cadetship | 2 | 3 |
| Traineeship | 2 | 3 |
| Field trips | 1 | 2 |

Notes: (a) This column represents the proportion of employers providing different forms of WIL, with some employers providing multiple forms of WIL and so multiple responses; hence, the proportions sum to more than 100%.

(b) 'Projects' refer to instances of formal 'industry-linked projects' as well as instances where employers take on students to undertake a specific project in their work experience. It can include projects that are undertaken on campus, or more commonly in this study, at the workplace.

Source: Employer interviews.

A third of the companies reported various combinations of working experiences, with ten companies indicating the provision of casual work for students as an instance of workplace learning (but not WIL). That said, there were very few cases where students were not paid for their time in companies. This contrasts with the findings of the PhillipsKPA study, which shows that nearly two-thirds of employers do not pay the students. Looking into this more deeply, we find some employers paid the student a relevant wage, whereas other employers paid the student a small stipend.

The overwhelming majority of employers engaged WIL students in operational tasks or to provide assistance to individual staff or teams undertaking these tasks (table 9). In addition, students were engaged in learning from supervisors and colleagues through shadowing and mentorship activities. Substantial numbers of employers made arrangements for students to be involved in client projects. Very few employers contrived for tasks to be done for the purposes of keeping them busy. In companies requiring security clearances (defence organisations) students were often involved in assisting and shadowing their supervisors.

**Table 9 Types of WIL experiences offered by employers**

| Types of tasks being undertaken by students | *No. of employers responding (63)* | *% of employers [(a)]* |
|---|---|---|
| Students are expected to undertake operational tasks, including support tasks | 50 | 79 |
| Students work on client projects and course projects | 23 | 37 |
| Students are expected to start by observing and shadowing | 16 | 25 |
| Students work with a mentor or supervisor | 15 | 24 |
| Other (including contrived tasks) | 2 | 3 |

Notes: (a) This column represents the proportion of employers providing different types experiences, with some employers providing multiple types of experiences and so multiple responses; hence the proportions sum to more than 100%.

Source: Employer interviews.

As the literature also indicates, our findings suggest that WIL undertaken in the sciences often, though not always, involves students at the undergraduate, honours and PhD levels undertaking research projects. These research projects may or may not have a requirement for the student to spend time in the workplace.

## Student placements

The most common type of arrangements (seen mainly among small and medium-sized businesses)[4] is what is often called a student placement. Placements immerse students into a workplace for a period of time. They can vary in length, from six- or 12-month industry placements, to two- to three-month vacation placements, to 'taster' experiences of a few weeks. In this study, most placements were eight to 12 weeks in length. In terms of discipline area, over half of the firms that mentioned student placements were in the area of engineering (and some of these firms also offered internships).The other firms with this type of arrangement were in the areas of information and communications technology, agriculture, maths, biology and surveying.

Universities had a variable amount of input into setting up these interactions. Often the universities were a conduit for the firm's advertisements. In a few cases, the universities appeared to play no role at all and the placement was entirely organised by the company, or the student initiated the contact. These findings contrast with the PhillipsKPA (2014) study, which shows that around 40% of employers had been approached by universities to set up WIL.

> **Mathematics:** The university plays no role in the process. Students are expected to approach (the company) through calling or send out expressions of interest. They are then selected based on their skills and their performance on the interview. (Medium-sized company)

However, there were a few instances where the university played a more active role. In a couple of instances (in the engineering discipline) the university had a coordinating office, which would contact the employer regarding placements.

> **Engineering:** [University] has an office that that contacts employers to set up placements for students. [The company] were contacted by that office and provided with three or four resumes that might be fitting the company's needs. (Medium-sized company)

In other instances, the university would assist in the pre-vetting of resumes and other processes.

[4]Small business constituted a smaller proportion of the overall sample.

> **Agricultural science:** The lecturer and or school advertise the projects, do the initial matching, organise the OH&S, insurance and legal requirements. (Medium-sized company)

There were also a couple of instances where someone within the company had adjunct lecturer status and used this as a way of informing students of the availability of placements. Overall, there did not seem to any distinct patterns to arrangements by organisation size and discipline.

Typically, the placements occur over the summer period when there is a break in studies (although this may not be practical for all organisations), although there are some variations whereby the placements have taken place during the semester. There are some variations in length as well. The summer vacation placements would be typically about 12 weeks in length. However, during the semester there would be different arrangements, as in the case below:

> **Surveying:** Short placements are undertaken as block placements of 1-2 weeks. Long placements are usually done as regular days per week during the regular semester or semester break. (Small-sized company)

As an extra benefit to the student, some of these placements eventually led to employment in the company. Additionally, one engineering company used the vacation program as a screen for their graduate program, which commenced the following year.

For many of the students, the placement is a requirement of the course, particularly for the engineering students.

> **Engineering:** This is linked to their university program in which they are expected to do twelve weeks of compulsory industry experience. (Small-sized company)

The type of work undertaken is often an actual work-related project in the firm, although some firms offer more opportunities, such as some internal training and exposure to the broader organisations. Some placements also involve observing and shadowing at the start of the placement.

> **Physics:** The company developed a small program based on projects. Students who showed the capacity or who were quicker at picking up things were given broader instructions. Those that were a bit slower would be given a more structured program (step-by-step instructions). (Small-sized company)

One engineering firm had from time to time developed 'contrived simulations' to help the student with their placement. Overall, though, there was a degree of similarity about these placements.

## Internships

In table 8 we find that just under third of the companies in this study reported offering WIL students internships or a variation thereof, such as traineeships, scholarships or cadetships. For the purposes of discussion here they will be referred to as internships. What distinguishes these arrangements from the more common student placements discussed below is their more formal arrangement from the employers' perspective. That is, often companies have a more formal approach to selecting interns and running the program, as opposed to placements, which tend to be more ad hoc. For example a number of companies ran annual internship intakes, which were often centrally coordinated.

In some cases, but certainly not all, the internship may be a course requirement (particularly in areas such as engineering and information technology) and generally the intern is paid.

The organisations offering internships and the like tended to be medium or large organisations (predominantly large) with the resources and capability for arranging internships. Only one of the small

organisations interviewed had this type of work integrated learning arrangement and this presumably related to its capability to support it. In terms of discipline area, a variety took part in these types of arrangements, including engineering, information and communications technology, mathematics (including finance), chemistry, agriculture, physics and science organisations with cross-disciplinary arrangements.

In most cases, the internships occurred with and without interactions with universities. Limited or no interaction with the universities was more likely to occur in larger companies who had their own independent recruitment process and structured WIL programs. Only a small number of interviewees indicated that the internship was a course requirement and that there were formal reporting requirements to the university. These were generally in the areas of agriculture and engineering.

> **Agricultural science:** All internships are project based and the projects are assessed as part of the student's coursework. (Medium-sized company)

More commonly, universities were used as a conduit for advertising the internship and universities assisted with this to greater or lesser degrees. A few interviewees mentioned that the internship takes place as a normal recruitment process (that is, the student applies and is interviewed for the position). For four of the interviewees with internships there was no interaction with the university at all.

> **Chemistry:** The internship program was run through standard recruitment processes, so students would submit an application and were interviewed before selection. (Large-sized company)
>
> **Mathematics:** There is no role. It is not tied up with a university. (Large-sized company)

The actual arrangements for the internships varied by company. Some were as short as 12 weeks, while others lasted for a year. Some were undertaken in blocks of time, while others might be one or two days a week in conjunction with study. Many are undertaken during summer vacation. Hence, the intensity of these arrangements was quite variable. In one large engineering organisation, there was a 12-month placement following the three years of the degree. This was funded via a scholarship arrangement formally set up between the organisation, university and student and involved a selection process. In addition, a large public sector organisation with engineering internships offered two internships, one during the second year of the course and one during the final year of the course. Both internships involved working on a project. The internships were part of the course requirement of the university.

> **Engineering:** They are required to do two by six month placements as part of their study — at a junior level where their first placement is in year 2 and their second placement is in their final year. (Medium-sized public sector organisation)

In another company, a medium-sized company in the area of agriculture, the internship comprised two three-month placements. The first internship was more of an introduction to laboratory methods and the second a distinct project. The sequence of tasks was described as shadowing, observation and operational tasks, followed by project work.

Typically internships involve a distinct project. Very few of the internships did not have an actual discrete project on which the student needed to work but the students would receive supervision and mentoring for the projects that they worked on. However, most internships also involve other components of work. Indeed, many of the interviewees said that the interns are 'treated as an employee'. This means involvement in some of the day-to-day activities of the organisation.

> **Engineering:** Students are treated as any new employee. (Large-sized company)

Typically, there would also be some induction period for the intern, whereby they would learn about the organisation and receive occupational health and safety training. Some internships also involved observation and shadowing.

**Mathematics:** There is shadowing and working as a staff member. It includes induction programs, knowledge sessions and access to the company wide knowledge based system.

(Medium-sized company)

Some interviewees also mentioned the opportunities for training.

**ICT:** The intern has access to internal training and development programs that are available to all.

(Large-sized company)

## Work-based projects

Our findings suggest that most of the WIL experience was based on site at the employer. However, there were a couple of instances where students did on work-based or industry-based projects which were not based in the workplace. These projects were negotiated between the students, the university and the employer and were largely undertaken on campus. The study did not uncover whether employers prefer these types of WIL as most of the project-based WIL examples from our interviews were located with the employer. Given that industry-based projects are a common type if WIL, it is surprising that more instances did not arise in this study.

**Box 1: Industry case study 1 — industry-linked project**

**ABC Research (research services)**

Based in a capital city, ABC Research is a small company which provides consultancy services in meteorological studies and pollution and noise assessments. The company also manufactures and supplies meteorological instruments. The company offers industry projects to fourth year engineering students. They would be interested in taking students in other disciplines, such as geoscience, mathematics and physics. However, they find that, unlike engineering students who are required to do some work experience as part of their course, the other disciplines do not and therefore the students aren't as interested in undertaking WIL.

The company has been offering WIL for about eight years, but has only had four industry projects, as it can be a challenge finding students who are studying in the specific areas required for the projects. The projects involving one student are usually 'once-off' and typically go for eight months, with project deliverables realised in August. The project is the equivalent of two subjects, typically 25% of the student's time. The student does their work on the project on campus, but has regular contact with staff from the company. Initial meetings are set up between the student and the company to help to define the problem and the scope of the project. A few follow-up meetings are also organised to see how the student is going with the project. The company provides technical supervision to the student but they do not pay the student.

Projects are placed on a university website, and the student identifies a project in which they are interested and contacts the company. Students are then matched with a supervisor and a company. The university organises these project opportunities, but the company does not think they do this well. For example, the website is not maintained and employers may post a project, receive interest from a student and start the project, but then the project is not taken off the website and new projects aren't posted. Also, the university contacts do not get in touch with the company to discuss other potential project ideas. Throughout the project the interaction with the university is minimal and there is a lack of feedback from the university during and after the project, and no recognition or thanks to the employers. The company is aware that universities are under pressure and have a lot of competing priorities such as teaching and research, but they are concerned that there is no commitment from the university to make WIL more broadly available, not just in engineering disciplines, but in other STEM disciplines. The company would like to see greater interaction between the university and industry, suggesting guest lecture visits and industry roundtables hosted by the university. While they haven't had any issues with intellectual property, it is something they are mindful of as universities often want ownership of the work.

Despite the issues with the university, the company has had good experiences with students and successful projects with fourth year engineers. Some of the benefits to the company include being able to access students' knowledge because they are more familiar with modern technology. Taking on students is a way of tapping into the expertise at universities.

Also the projects are low-cost and low-impact and are a great way of getting a 'problem' solved. In one case the company has gone on to offer other work to a student who did excellent work for them.

## Other types of work integrated learning or industry engagement

- scholarships which may require project or field trip component
- field trips
- guest lectures
- casual work
- simulation activities.

These other types of arrangements were less commonly reported by employers but are nevertheless worth mentioning. Examples of these include a couple of smaller companies that would take on students during holidays (although not as a placement) to give them some experience and some assistance with their assignments, noting that this is not WIL.

> **Chemistry/engineering:** International students completed an assignment about exploring new export markets. Although this was an assignment they had completed for university it was also to inform the operations of the company. They had a real situation and a practical placement. (Small-sized company)

A couple of other organisations in the agriculture area provide 'tasters' for students in the nature of field trips to give them an indication of what is involved in agricultural work.

> **Agricultural science:** We host field trips for university students. Once or twice a year they come up and have a look around the factory site and a field officer will take them out to look at the growing operations. (Medium-sized company)

There was also a handful of firms (mixture of disciplines and sizes) who provide more in the nature of 'ad hoc' arrangements, for example, a project when it is available, or casual summer work. These arrangements by their nature, with the exception of agricultural field trips, are less formal in nature.

Very few respondents indicated that they went to universities to give guest lectures or to speak to students at career days. In cases where employers were more involved in university activities, as a guest or adjunct lecturer, or presentations at other events, it was often because there was an existing relationship with the university. Often the relationship was due to research project partnerships between organisations (and/or the broader industry) and the universities, and they appeared to be more common in agricultural science and in the biotechnology disciplines.

No employers in this study indicated that they were involved in 'simulation' types of WIL, as this is something typically provided by the university not employers.

The relatively low uptake of 'non-placement' types of engagement suggests that employers are perhaps not familiar with these, or else they do not necessarily consider these other forms of industry engagement to be examples of WIL. This may not be surprising if placement-type WIL is considered to be the most effective type of WIL, with students, embedded in the workplace, as some of the literature suggests.

## Structure of WIL programs

Employers had various arrangements for scheduling when students attended WIL programs. In the main, arrangements were offered in blocks of weeks during summer vacations or throughout the year, with nearly three-quarters of employers providing WIL in blocks of weeks, during vacations or at other times of the year. In addition, employers customised arrangements on an individual basis with different students, or employed students in casual jobs. Around 18% of employers provided WIL on a weekly or day-release basis, and according to project needs (see table 10).

**Table 10 Timing of WIL (and other types) arrangements**

| **Number of students** | | |
|---|---|---|
| | *Number of employers responding [62]* | *%[a]* |
| Summer vacations | 29 | 47 |
| Blocks of weeks at different times throughout the year[b] | 17 | 27 |
| Ad hoc or varies | 9 | 15 |
| Casual work | 9 | 15 |
| Weekly | 5 | 8 |
| Day release | 3 | 5 |
| According to project needs | 3 | 5 |

Notes: (a) This column represents the proportion of employers providing WIL with different timing, with some employers providing multiple arrangements and multiple responses; hence, the proportions sum to more than 100%.
(b) It was not clear whether this also included blocks of weeks during vacations.

Source: Employer interviews for this study.

In table 11, we provide a breakdown of the length of time students spend in workplaces by different WIL arrangements. The most common arrangement is the eight- to 12-week placement in summer vacation. Around 30% of organisations provided multiple types of WIL programs of varying lengths. These usually included shorter and mid-length placements, along with other types of non-WIL arrangements, such as scholarships (with a project or 'on the job' component) and casual work arrangements.

**Table 11 Length of WIL experience by business size (%)**

| | **Small** | **Medium** | **Large** | **Total** |
|---|---|---|---|---|
| Multiple WIL lengths | 17 | 38 | 32 | 30 |
| Short, 1–2 weeks | 6 | 0 | 4 | 3 |
| 3–8 weeks | 11 | 5 | 4 | 6 |
| 8–12 weeks (usually summer) | 33 | 43 | 36 | 38 |
| 3–6 months (usually semester-based) | 22 | 14 | 4 | 13 |
| 6–12 months (usually project-based or internship) | 6 | 0 | 16 | 8 |
| Flexible arrangement | 0 | 0 | 4 | 2 |
| Casual work | 6 | 0 | 0 | 2 |
| Total | 100 | 100 | 100 | 100 |
| Total number of employers | 18 | 21 | 25 | 64 |

Source: Employer interviews.

Table 11 also indicates that the most prevalent length of WIL experience across all three organisation sizes is eight to 12 weeks. Medium and large organisations are (unsurprisingly) more likely to offer WIL experiences of varying lengths. Larger organisations were more likely than small to medium organisations to offer six- to 12-month internships.

Although classifying the length of WIL time slightly differently, the PhillipsKPA (2014, p.28) study similarly found that most employers provided WIL for between one and six months, with smaller proportions of employers providing WIL for less than one month or more than six months.

**Box 2: Industry case study 2 — internships**

**XYZ Technology (Information Technology)**

A large multinational ICT company, XYZ Technology predominantly employs software developers, electrical engineers and designers.

Work integrated learning programs have been offered to Australian and New Zealand university undergraduates and graduates for the last six years. Their key reasons for providing WIL is to stock the pipeline of home-grown talent, help prevent the brain drain overseas, and have graduates act as advocates for XYZ and the industry in general. These factors, along with the ability to provide feedback to universities on curriculum content, are also considered to be the main benefits of the program. Around 30% of current staff have come from the internship programs.

In the main there are two types of internships: one for students in their final year of studies and another for students in their first or second year of study. The former comprises a 12-week paid placement, with the intern embedded into a software engineering team and working on a specific project. The second type of internship (the STEP early stage) comprises a ten-week paid placement, in which the intern is embedded into a project team but is buddied with another intern for mutual support. The STEP program was instituted in a bid to attract more women to the industry. Females generally drop out of their university programs, which are the key pipelines to jobs in the industry in the first year or so and it has been difficult to recruit women in the past. The opportunity to experience WIL early in their studies gives them the support they require to stay with their studies. When female interns enter the program they have access to a female engineering mentor to help them integrate into the company.

The company also aims through this program to attract Indigenous Australians but very few Indigenous Australians are found undertaking university studies in these fields.

XYZ Technology believes in investing heavily in the internship program and works directly with the university through on-campus visits to recruit both graduates and interns. A team of engineers accompanies the human resources officer to universities to promote the internship program. Once the interns are in the workplace a dedicated officer will look after them to ensure that their stay is a good one.

Students will apply for the internship online and if their application is successful will undergo a selection process, which is conducted by the hiring committee (initially by telephone). There is a two-step interview process, in which applicants are asked about work-related issues as well as questions that would assess them for cultural fit.

The interns come from a wide variety of ICT-related areas: software engineering, computer science, electrical engineering, pure mathematics, physics, and computational theory. The common thread is that the studies involve the 'ability to write code'. Teams that would like to host interns must make a really good pitch for their projects to attract an intern. The intern will help build a feature of a product. The bulk of students undertake their work experience in blocks of weeks over the summer break. During their WIL experience they will undergo a mid-term assessment and an exit interview. Any feedback of the student's work that is shared with the university has to be reviewed internally by the company before being shared

A key aspect of the XYZ approach is that they are not interested in providing work experience dictated by the university and they would rather have a program that is more employer-driven. This is because much of the product building is of a commercially sensitive nature and the company does not want this shared with the university. Interns are expected to develop their skills and confidence in problem-solving by experiencing how problems are actually solved in the workplace and specifically at the XYZ company. Interns are also expected to develop self-management skills and communication skills by witnessing how communication works in the organisation and how they can develop their confidence in putting their ideas forward and supporting these by a good argument. They are also exposed to situations where a fail-safe product on a big scale and for a global audience is designed. These abilities will make them much better equipped to deal with challenging problems in a real-world situation.

Interns who come to the company come to help build products so they need to have good coding skills. However, the company is not only interested in interns' further developing their coding skills; it is also interested in students who have good computational thinking skills, that is, those who can tackle 'a curly problem' and devise multiple solutions. The company is also identifying a pool of talent for future recruitment and relies on the internship program to help them do this. In fact the company would not have been able to grow from a small company of 11 engineers to over 500 engineers in eight years without the internship program. Today the company stands at around 1000 employees. It believes in the motto 'find them and build them — the rest we can teach them'.

# Employer motivations and expectations

Employers had a range of motivations for providing WIL opportunities in the first place (summarised in table 12). Along with the benefits of WIL, these motivations have been worked into a 'value proposition'. The first of these (reported by about 60% of employers) could be referred to as accessing a talent pool to screen students for future employment:

> **Mathematics:** Placements have been a great source for recruiting in the past, and this has really eased the time/effort burden on the company. (Medium-sized company)

This aligns strongly to the literature, which shows that using WIL as a recruitment strategy is one of the main motivators for employers to offer WIL (PhillipsKPA 2014; Australian Workplace Productivity Agency 2013; Papadopoulos et al. 2011; Virolainen, Stenström & Kantola 2011; McEwen, Mason O'Connor & Williams 2010; Patrick et al. 2008).

The second most commonly reported reason for providing WIL (identified by 44% of employers) was that it helped employers fulfil what they saw as their obligations for corporate or community citizenship, including their responsibility to help students in their particular regions:

> **Agricultural science:** The main reason is the sense of community and stewardship of the agricultural industry in Tasmania. Want to encourage students to go into the career and assist them with that. (Large-sized company)

This was followed by the opportunity to obtain extra resources to get jobs completed (reported by 41% of employers), including having someone dedicated to the job. For employers who provided paid work for students as part of this WIL experience, this also meant the ability to backfill positions when staff went on leave. These other productivity and 'student as a resource' related benefits are an interesting finding, as they are not widely considered in other literature.

Related to the corporate citizenship motivation was the desire to help build the STEM pipeline. Where 16% of employers in total saw WIL opportunities as a way of investing in the future of their industry, half of them combined this with the desire to fulfil their corporate citizenship. Employers generally saw WIL as building the next generation of STEM employees and as an opportunity to pass on their knowledge to the next generation. One employer saw it as a way of counterbalancing the ageing of the population in their industry.

> **Agricultural science:** We have a belief in the need for us to be investing in the future development of people for our industry; otherwise it will be harder for us to attract good employees. In addition, we do it also because fewer people are doing it. (Medium-sized company)

> **Engineering:** To prosper in the future with a variety of skills (and) counterbalance the ageing population. (Medium-sized company)

Employers were also keen to provide workplace learning for students as well as to help them to decide whether or not the career was for them, and if so to help them in their further development. This is something that also rated strongly in the PhillipsKPA study (2014, p.41), which showed that most employers wanted to 'give back to the industry/profession' or that WIL 'aligns with corporate responsibilities'.

Employers also wanted to have students in the workplace to access fresh ideas and sources of up-to-date knowledge on new technologies. This finding confirms the literature on employer motivations and benefits of WIL (Papadopoulos et al. 2011; Virolainen, Stenström & Kantola 2011).

Nearly 16% of employers offered WIL to provide practical skills training and experience for students. Less frequently reported were reasons concerned with developing student interest in the career, the industry and the company, developing closer ties with universities, and providing professional development for staff, especially junior staff. One employer wanted to provide WIL as a way of finding out the quality of education being delivered by universities. Another wanted to provide WIL opportunities to international students in commerce programs as a way of tapping into potential new export markets.

In table 12 we provide a breakdown of the reasons employers give for providing WIL for university students.

**Table 12 Employer motivations for providing WIL for students**

| **Motivation type** | *No. of employers (64)* | *% [(a)]* |
|---|---|---|
| Screen students for talent identification and recruitment | 40 | 63 |
| Fulfil corporate citizenship obligations | 28 | 44 |
| Obtain extra resources to get jobs done | 26 | 41 |
| Provide students with learning opportunities and career development | 13 | 20 |
| Feed STEM pipeline | 10 | 16 |
| Provide practical skills for students | 10 | 16 |
| Access fresh ideas, networks and up-to-date knowledge of new technologies | 9 | 14 |
| Develop student interest in career, company, industry | 9 | 14 |
| Work closer with universities | 4 | 6 |
| Other (professional development for staff, understand quality of education) | 3 | 5 |

Notes: (a) This column represents the proportion of employers providing different motivations for providing WIL, with some employers providing multiple motivations and so multiple responses; hence, the proportions sum to more than 100%.
Source: Employer interviews.

## Why enterprises offer WIL: discipline-specific examples

With the exception of two enterprises, all those offering WIL to universities reported that they did so to identify talent and to recruit talented workers. However, WIL was far more highly valued for some disciplines than others. For example, all the employers offering WIL to maths students and most of those offering WIL for biology and biotechnology students, did so for this reason. This was also the case for most employers offering WIL for physics, chemistry and ICT students, and just over half of those offering WIL to agricultural science and engineering students. Fulfilling their roles as corporate citizens was most important to those providing WIL to students of physics, geoscience, agricultural science and engineering. Companies in regional areas (mostly agricultural companies) were keen to help young people in these areas to find jobs. Having access to a ready-made resource to help with jobs was especially important for companies providing WIL for agricultural science students and maths students, while using the WIL experience to feed the STEM pipeline was identified as a reason mostly by companies providing WIL to students of agricultural science, physics and ICT. Illustrating this are sample quotes from different disciplines below.

**Discipline-specific examples**

**Agricultural science**: The main reason is the sense of community and stewardship of the agricultural industry in Tasmania. We want to encourage students to go into the career and assist them with that. Taking on students is also a useful way of finding summer workers. (Large-sized company)

**Biology:** It is a two-way thing: it enables us to fulfil course requirements and they get something in return — work completed that they have not had the time to do. It builds good collaborative relationships with universities, and we try to keep a network of experts going we can call on. The company staff also do academic lectures. We are able to recruit future staff with good expertise gained from the WIL opportunity. (Medium-sized company)

**Engineering:** For many years we have provided work experience for placements when students have approached us. It is part of our community responsibility. We are asked by many more students than we can accept. In general we take on those people that are undertaking studies relevant to our company. (Small-sized company)

**Geophysics/engineering:** To give students an experience and an opportunity to work in a field they are interested in and to apply their university skills to real situations, with real data, doing real work. Also because there is a body of work identified at a suitable level that perhaps otherwise would not be done. For example, we had a huge amount of data that had to be keyed into a database. We advertised for a petroleum engineering student, we received applications, and picked a student that was available for that period of time. (Large-sized company)

**ICT:** It is all about stocking the pipeline. We found there were not enough graduates in Australia with these capabilities, so we want to make sure they can get access to them. We know they have a phenomenal program and feel what we have to offer overall contributes to the skills set of gradates. (Large-sized company)

**Mathematics:** Partly to give students opportunities and exposure in a small actuarial business, professional experience, WIL is a means to attract people to stay full time. (Small-sized company)

**Physics:** Part of the framework of industry is to develop the STEM pipeline. We give opportunities for students to learn in practical situations and the company to learn from fresh ideas provided by students. WIL identifies a talent pool, the company keeps those who do good projects for us and it fulfils our corporate citizenship obligations. (Small-sized company)

**Box 3: Industry case study 3 — internships**

**Medical Institute (medical and biomedical science)**

Medical Institute is a large medical research institute predominately employing graduates in biomedical science, medical science and bioinformatics. Work integrated learning has been offered by Medical Institute for the last six years. The organisation normally takes ten to 15 students per year in chemistry, biomedical science and medicine. Their key reason for taking on students is as a recruitment strategy to identify honours and PhD students and research assistants. The company also provides WIL because it gives younger staff the opportunity to supervise students and to develop their own skills.

The company's particular program operates to provide undergraduates with a research opportunity and introduces students to a research laboratory. The program encourages students to work in the lab environment and run their own research project, which can be lab-based and experimental, or involving data analyses and bioinformatics. The program

allows university students to undertake a casual paid research placement over six months, for a maximum of eight hours per week.

Universities have no role in setting up or facilitating this program. Medical Institute advertises the program on websites and interested students submit an application online. The organisation then goes through the process of shortlisting applicants and undertaking interviews with candidates. The Medical Institute is happy with the current process; it works well for them. However, the company currently has two intakes each year but is looking at having one intake to make the process less labour-intensive. The company is also considering ways to make the students feel more involved and included in workplace culture, through an induction process and social activities.

Their expectations of the WIL program are that students will become excited about science projects and get to experience the world of real data. They expect students to get involved in their projects, be proactive in learning and show a genuine interest in research. They have had a couple of experiences where the project has not gone well because the student has not been engaged or the student—supervisor match did not work well, but generally speaking they have good experiences with students.

The program is an expense, as the students are paid and other staff are required to supervise the students; however, the benefits outweigh the costs and they will continue to offer WIL in the future.

## What employers expect their companies to obtain from WIL

In table 13 we provide a breakdown of the different types of expectations and the frequency with which they have been reported by employers providing this information.

**Table 13 Employer expectations from WIL engagement**

| **Expectations for the enterprise** | *No. of employers responding (61)* | *% [(a)]* |
|---|---|---|
| Identify and recruit talented and suitable students for the company | 18 | 30 |
| Get desired jobs done with student assistance | 17 | 28 |
| Provide practical skills and exposure to real work for students | 11 | 18 |
| Access students who are familiar with technical facilities and the fundamental skills of industry and can work independently and under pressure | 8 | 13 |
| Other (collaboration with university, high performance under pressure, mutual learning) | 8 | 13 |
| Not very high expectations or preconceived ideas | 8 | 13 |
| Fulfil obligations for corporate citizenship and feeding STEM pipeline | 7 | 12 |
| Access new ideas, networks, technology updates, facilities and funds | 7 | 12 |
| Provide career development support and encourage interest in company and industry | 6 | 10 |
| Provide promotional opportunities for company | 4 | 7 |
| Provide managerial and supervisory experiences for staff | 4 | 7 |

Notes: (a) This column represents the proportion of employers providing multiple expectations for their companies and so multiple responses; hence, the proportions sum to more than 100%.

Source: Employer interviews.

The most common employer expectations of the WIL experience was that it would provide their companies with assistance to get jobs (that had sometimes been put on the back burner) done, enable them to identify talented students who were suitable for the occupation and the industry, and provide practical skills for students through exposure to the commercial world of the workplace. However, employers were evenly divided between those who had few expectations or limited experience with WIL (and so had no preconceptions) and those who expected that students would have the fundamental skills

to be able to work independently and under pressures. Those who had few or low-level expectations recognised that students were still undergraduates and were learning their craft:

> **Physics:** The expectation for the company is that usually it has some projects that need to be done, but not at a high level. Interns are ideal for undertaking these projects.
>
> (Medium-sized company)

> **Biology**: Gives us the ability to supervise and train students, and get the students excited by science. We expect that there could be a higher loss of consumables.
>
> (Large research institute)

> **Agricultural science:** We expected the placement to enable us to see whether the student will fit, what kind of work ethic they have, how easy it is to train them, their drive and passion to learn, and how they handle themselves professionally in the workplace.
>
> (Medium-sized company)

Employers also expected that their engagement with WIL would enable them to fulfil their obligations as a corporate citizen as well as help to feed the STEM pipeline:

> **Engineering:** The student is expected to learn the practical things we do. We don't expect them to know the business. The enterprise meets its corporate citizenship obligations and helps to grow the skills and talent for the occupation and the sector. (Small-sized company)

They also expected that students would help to bring in fresh ideas and provide access to up-to-date knowledge and new technologies, and student networks:

> **Mathematics:** We expect that students will provide different insights into their projects and for them to make contributions as equals in the research project. Students bring a good cultural tone and energy to the company, and thus it's good for culture. (Medium-sized company)

That students would come in with an understanding of the fundamental skills of the industry and be able to work independently, and sometimes under pressure, were also clear expectations from some employers, especially those who are working at the high end of the skills scale:

> **Agricultural science:** We expect the students to get by with minimal or no supervision. We offer support if it needed, but we want them to get on with the job by themselves.
>
> (Medium-sized company)

Some employers expected their companies would provide students with career development support and encourage them to be interested in their particular industries; they also anticipated that WIL would provide staff with the opportunity to develop their supervisory and managerial skills. There was an expectation among some that, through WIL, the company would improve their connections with the universities, an issue also raised in the PhillipsKPA (2014) study, and that both students and company would learn from their WIL experience.

**Box 4: Industry case study 4 — placements**

**Rural management (agribusiness)**

Rural Management is a small company in rural Australia that provides management advice to farmers in the areas of agronomy, crop production, grain marketing, business management and HR management. The company employs people with agricultural science, as well as commerce and economics, backgrounds. They have provided WIL for 16 years and offer around ten industry placements to agricultural science students each year. During the placements, students are rotated through the company to give them a broad idea of the areas in which they might be interested. The length of placement varies, depending on the student, from one or two weeks to ten months. The short-term placements are

generally one-off and usually involve shadowing and observing. The ten-month placement is paid and part of the student's degree, usually undertaken in the second year. The placement is undertaken in a continuous block, and students are allocated a specific work-based project to lead and manage. They are often part of a team that is looking at a particular issue for a client. Students are expected to do internal research on their projects and find solutions for clients. The main reason Rural Management provides placements is the belief that the company needs to be investing in the development of the industry's workforce. The company also continues to offer placements because fewer businesses in the industry do so. Two additional benefits of providing WIL are that the company can fulfil its social responsibility and that it may have access to potential new employees.

The company expects students to be willing to learn, ask questions and be professional in the workplace. They also require students to contribute to the business and undertake some operational tasks as well as their own project.

In regards to setting up the placements, usually it is the individual students who approach them about the possibility of a placement. Once the student has indicated their interest, Rural Management develops a work program, looks at suitable dates and allocates an appropriate project and mentor. Once the students have started they are given a rigorous induction. The student has a specific plan and program to work towards to ensure that both the student and company are aware of the expectations and what needs to be achieved on the placement.

The company has very little interaction with the higher education institutes, and in one case they spoke to one university who agreed to coordinate the process but then did not deliver. In some cases, representatives from the higher education institutions may visit the students on ten-month placements, and usually there is an evaluation at the end of the placement, but generally there is no interaction.

Rural Management is satisfied with how the industry placement program is currently running. The company also runs a graduate program, which attracts some of former placement students.

## What employers expect from students undertaking WIL

In table 14 we provide details of what it is that employers expect from students undertaking WIL.

**Table 14 Employer expectations of students from WIL engagement**

| **Expectations of WIL students** | *No. of employers responding (61)* | *% [(a)]* |
|---|---|---|
| Students to apply learning to practical tasks | 21 | 34 |
| Students to have appropriate attitudes and behaviours | 11 | 18 |
| Students to be willing to learn in general, participate, and contribute to teams | 10 | 16 |
| Students to be enthusiastic, committed and willing to learn from others | 10 | 16 |
| Students to take responsibility for tasks and projects allocated like all employees | 8 | 13 |
| Other (career decision-making opportunities, staff development, rewarding experience for students, full-time employment) | 8 | 13 |
| Students to learn employability skills (people skills, problem-solving, communication, logical thinking) | 5 | 8 |

Notes: (a) Employers reported multiple expectations of WIL students and so multiple responses; hence, the proportions sum to more than 100%.

Source: Employer interviews.

The most common of the expectations that employers had of students was that they would apply the learning they had acquired at university to practical tasks.

> **Physics:** Our expectations for the interns are that they will learn about what is important practically and realistically in the field. The university environment is very limited, so we expect the interns to come into the 'real world', and learn all the activities required to produce a

reliable product, that works and meets the sales and marketing teams requirements. It's about learning how to move into the commercial world. We also expect students to have certain generic skills, mainly how to organise themselves, and communication skills, and continuing to develop those skills. (Medium-sized company)

**Biology:** Our expectations are for students to get experience and a different type of an experience to what they get a larger laboratory. (Small-sized company)

**Engineering:** It is about being able to get work done that needs to get done, but also about students seeing what goes on in the real world and their being able to make better selection decisions. The other side to this is that the student finds out if this is *not* a place in which he/she wants to work. (Large-sized company)

Other expectations were mainly related to the appropriate behaviours, attitudes, motivations and aptitudes. Employers expected students to be self-disciplined, have a good attitude and not to be disruptive in the workplace. They wanted them to act professionally, not divulge information that was market-sensitive and be prepared to undertake lower-level responsibilities when they first started.

Employers also expected that students would come into the WIL experience with a general willingness to learn, participate in the tasks allocated and make a positive contribution to their work teams. They also expected that students would show enthusiasm about their involvement, be committed to their work and willing to learn from others.

**Biology:** We want to expose them to the world of real data, attend seminars, and show commitment. We want them to understand, read and get involved, show a genuine interest and be proactive. (Large research institute)

Employers expected to be able to treat students just like any other employees, especially with regard to taking responsibility for their allocated tasks and seeing them through.

**Biology:** The expectation that students front up as a worker not as a student, that is, turning up and doing their work. (Large-sized company)

Although employers often did not expect students to come to the placement with highly developed skills, a small number of organisations, especially those working with high-level concepts and systems, expected students to have intelligence and capacity.

**Mathematics:** Our organisation has a high calibre of staff, many with PhD and Master's. Our graduates, like all in the public service have a high level of skills to meet the difficult entry-level requirements. We have high expectation of the placement students as well and expect them to be high-performing students. We would require the same sorts of skills and attributes from them as those that are used to test potential graduate employees for entry into the public service. (Large public agency)

Employers generally reported that their expectations of the WIL experience (for both company and students) were fulfilled. Some issues, generally identified by a small number of employers, were related to student attributes.

**Engineering:** Students learnt some practical skills and were willing to learn and enthusiastic. They were proactive. We fulfilled corporate citizenship role. (Small-sized company)

**Agricultural science:** All [low] expectations are fulfilled for the organisation, then it is even better to find some students who perform above expectation, who are truly motivated and keen to learn. (Medium-sized company)

> **Mathematics:** Company's expectations were fulfilled but we are noticing a lack of quality, technical expertise is still there but overall students are less mature and self-managed.
>
> (Small-sized company)

Much of the literature does not look at the specific expectations of employers when it comes to the WIL experience and the student. However, the literature is clear that employers would like the expectations placed on the employer, student and university to be made clearer before the WIL commences (Peach, Larkin & Ruinard 2012; Papadopoulos et al. 2011; Patrick et al. 2008).

**Box 5: Industry case study 5 — placements**

**D Engineering (engineering)**

D Engineering is a small engineering firm that builds and maintains industrial automation control systems and industrial equipment. It has been providing work integrated learning for engineering students for the last eight years and is happy to continue providing this experience. It does so because it wants to fulfil its corporate citizenship obligations, to increase talent for the industry and to use the program as an extra recruitment tool. Around 50% of the students who have come to do placements have been hired on completion of their studies.

Applications for the work placement are generally student-driven, with students contacting the company to request a placement. The company has a comprehensive recruitment process that is similar to that used to hire permanent employees. Once students make the first contact they are asked to provide a resume, which is used for shortlisting the candidates. They must also complete a questionnaire, which asks them to describe what they are looking to get out of the work experience. Once a student is shortlisted, they will be interviewed. This interview will try to identify the extent to which students display a positive attitude and will fit in with the culture of the organisation. Once the student is selected, the company negotiates a start date with the student. This start date is scheduled for around the time exams are finished and the summer break begins. The company prefers the placement to be undertaken during these summer breaks and is not keen on implementing programs for universities that require students to come at different times during the year. The company also prefers to be involved in programs that are not too prescriptive in terms of university expectations and which give them enough flexibility to tailor the experience to company work patterns.

On commencement, the student will undergo an induction program covering general human resource issues and the required workplace health and safety training. As the students will be working on electrical design software, they will work with electricians to familiarise themselves with equipment and materials and meet with the engineer who has been allocated to assist and support them. The company believes it is this approach to selection and implementation that is an effective feature of their placement program. Nevertheless, the program is continually evolving, with a focus on ensuring that there are internal projects that are achievable for students to do. It also understands that such an approach, which is company- rather than university-driven, works well because the company is committed to its success and is diligent in ensuring that the students get the right experience.

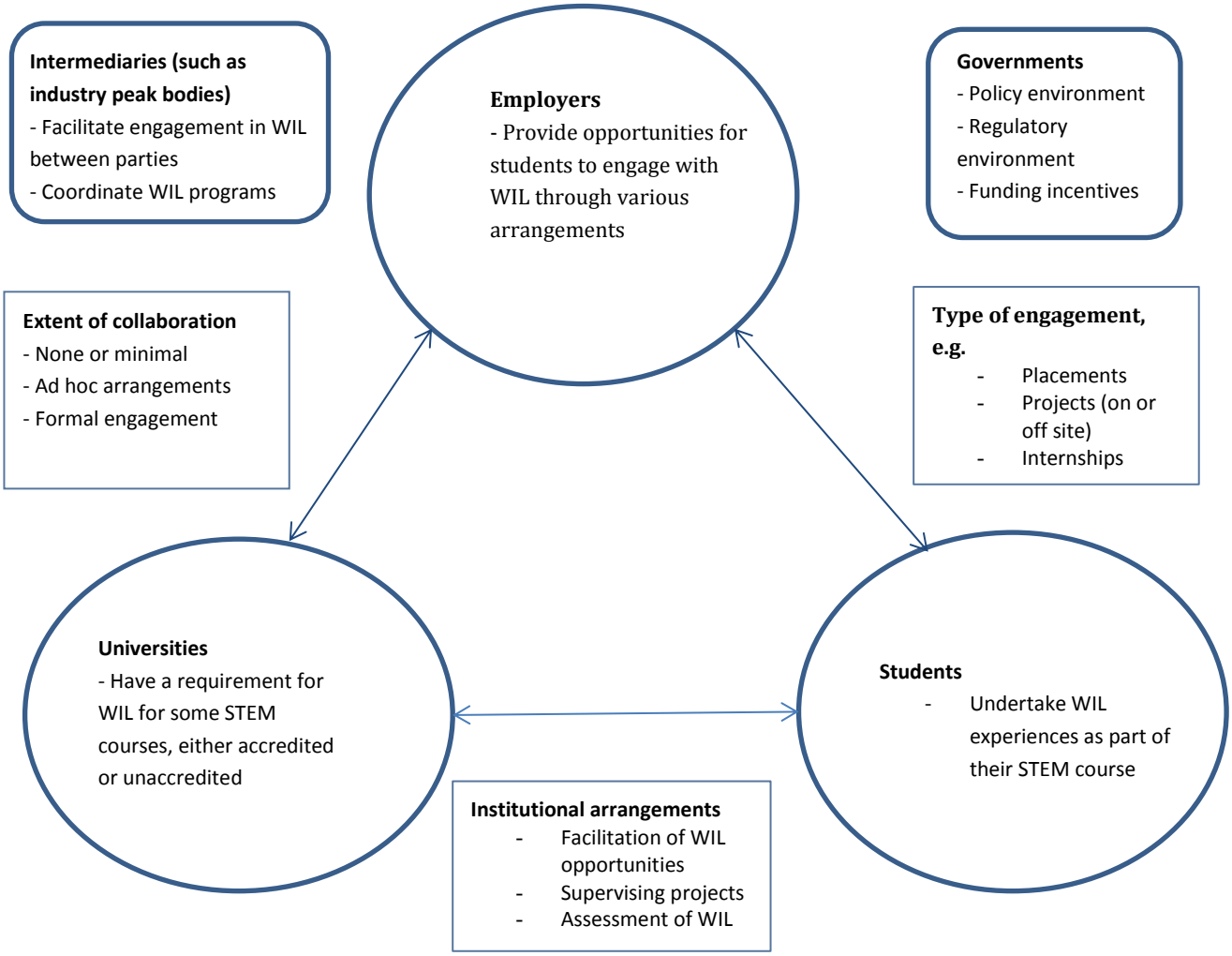
The company expects that students will learn the practical skills that it applies to its product development and maintenance functions. It also expect that students will hone their written and verbal communication skills (for example, preparing letters for clients that are clear and easy to understand and which have been proofread, and engaging in discussions with clients to elicit what is required). The company also expects that students will understand that they are part of a team and that sometimes people's individual needs need to be sacrificed for the benefit of the team. It is important for the student to be proactive and contribute to the team. They also require students to develop problem-solving and self-management skills by demonstrating that they have put in the time to work out independently what they would do to solve a problem and then to seek verification from superiors or work colleagues that this is the way to go about it. This shows that the student has done the thinking and has attempted to be self-sufficient (to a certain extent) before asking questions about how to accomplish it. Continually focusing on the development of specific and general technical skills is another expectation.

The key benefits of WIL programs for the company are to identify prospective engineers for future recruitment, to apply a comprehensive recruitment process, and to make use of the extended opportunity to evaluate the performance of the student. One key constraint which has been overcome to a certain extent is to have enough suitable activities for students.

# WIL roles and relationships

Understanding the specific roles of universities, employers and students in establishing the WIL programs can shed light on the key drivers of WIL. The nature of the relationships between enterprises and employers can also help to give us a better understanding of the dynamics between academia and industry.

Figure 1 Roles in the WIL process from the employer's perspective



## The role of universities

The majority of employers report a limited role for universities in arranging or establishing the placements, while 13 report no involvement by universities whatsoever. This finding is in contrast to the PhillipsKPA (2014) study, which indicated that around 40% of employers had been approached by universities to set up WIL.

Quite commonly the universities would not make direct contact with employers; instead, they would facilitate the company's advertisement for students. This included providing information to students about which employers were requesting placements and to notify them if they were successful in their applications. Sometimes they placed information on university notice boards or websites, or invited employers to make presentations at careers nights or fairs. In one case employers were invited to workshops where students made presentations to the staff. In another instance, employers were invited to pitch potential work-based project ideas to students. These served as a good way for identifying and selecting students for possible WIL recruitment. Employers also held 'get to know you events' to identify potential WIL participants.

Organising insurance requirements and signing formal agreements regarding intellectual property and the like were practised by a small group of universities. Other university activities, reported by small numbers of employers, related to student selections for placements, referring students to employers, validating the suitability of employer facilities and matching students to employers. Very few universities made the initial contact. Some used the services of an intermediary to establish the placements. One university was involved in co-supervising students.

> **Engineering:** University X has an office that contacts employers to set up placements for students. We were contacted by that office and then provided with 3 or 4 resumes of students who might be fitting the company's needs. (Small-sized company)

Despite the minimal interaction that seems to be reported for most universities providing students to employers in this study, there were some areas where they maintain contact and are keen to develop relationships with employers.

> **Agricultural science:** Unis keep in touch along the way. They conduct information sessions and hold affiliated meetings. All of the Regional Development Corporations are involved in intercollegiate carcass judging competitions. This attracts unis from all over Australia and internationally, and enables ad hoc meetings and contact with established networks — prove beneficial. (Medium-sized company)

> **Agricultural science**: It varies depending on the university. University Y don't have much involvement in setting up projects or internships, but University X and University Z have more formal processes and the company has had to complete reports for the interns. (Medium-sized company)

> **ICT:** The university hosts the 'projects day', where industry turns up and pitches potential projects to the students. (Large public agency)

While universities were found not to play a proactive role in many cases, a number of examples of where universities played a more active at one level or another were identified. While there could be some differences by discipline area or type of organisations, it was difficult to discern any clear pattern in this

from our sample, apart from some courses, typically engineering, where universities have a stronger role, by virtue of making work experience a mandatory component of the course.

A handful of employers mentioned that the university had a coordinating office, which could contact them. These were in the areas of engineering and ICT.

> **Engineering:** With the [university's] program they have a coordination team that make it easy for companies to participate, so we advised the university that we had a vacancy. The university promoted it and then we received applications, from which they undertook a simplified recruitment process, and then they advised the university who we had selected.
>
> (Medium-sized public sector organisation)

There were other cases where the university would initiate the contact.

> **Agricultural science:** The university lecturers give a heads-up as to which students may be suitable. [The university] shows the initiative to be in touch, and both the university and the company try to keep up communication. (Large-sized company)

Other examples of university involvement include individual staff holding an adjunct lectureship at the university and taking advantage of this situation to facilitate WIL. Some employers noted that the university would assist with organising the paperwork, legal obligations and insurance for the student.

> **Physics:** Faculty secretaries forward emails on to students informing [of the] company's opportunities for work experience. The universities organised the indemnity.
>
> (Small-sized company)

## The role of students

Students are a key driver of WIL and were proactive in making contacts with employers to request opportunities for placements. However, there were cases where their role was more limited, especially when the university undertakes the initial contact and selects students for certain companies. This is confirmed by just over half of the employers, with another third claiming that students made a formal application for WIL placements in response to advertisements or notifications, including through student societies. This differs from the findings of the PhillipsKPA study (2014), where over a quarter of employers were approached by students. Students were also asked to decide and to let employers know what they wanted to get out of the placement and to communicate this in plans or discussions. If these objectives could be satisfied by the employer, then the student would be accepted for a placement.

> **ICT:** Students need to research what it is that they want to get from the placement or work experience. Student requests the placement and writes out objectives of what they want to get out of the placement. (Large-sized company)

> **Engineering:** There is not much of a role since the university contacts the employer initially. The student then has to follow up with the employer and do an interview.
>
> (Medium–sized company)

> **Biology:** There is an online application process and students must provide an academic transcript, a CV and the names of two referees. Students must also indicate an area of research they are interested in. (Large research institute)

## The role of companies

The most common role for employers, reported by almost 40% of them, was to conduct the formal application and screening process. The next most frequently reported role (for almost 30% of employers) was to promote the WIL placements and other WIL programs via university faculties, student societies, career days and university and other websites. Employers also had a role in working out the program of activities for students, identifying which staff would supervise the student, and providing mentorship, facilities and materials. In two cases employers were involved in an adjunct lectureship capacity, which saw them give presentations and lectures to universities. Other roles were concerned with evaluating student capacity and encouraging interest, setting up the relationship with the university and identifying potential projects. Responsibility for providing reports on student performance was rarely identified.

> **Engineering:** The company sought out this program because we had a specific need at a particular time. We were made aware of the university program and followed it up. At the end of the program the company had to submit a short report on the performance of the individual, and we provided the student with references. (Medium-sized company)

> **ICT:** We have to screen resumes, shortlist employees and conduct interviews with them. (Medium-sized company)

> **Agricultural science:** The company interviews potential scholarship recipients and presents research ideas for Honours degree student projects. The faculty also brings students up to Ag Fest [an annual agricultural show held in May] and they put on a morning tea for employers and industry to come along to meet the students. We also sponsor prizes, where we go to an industry day and listen to the students present projects and then they judge and award prizes. (Large-sized company)

## Setting up the WIL experience: what works well; what does not work well

Employers were asked to identify what worked well and what did not work well in the establishment stage. They provided a variety of disparate responses. Over a fifth of the employers believed that, because the processes they had put in place had provided successful outcomes, it was their way of doing things that made it work. Employers gave a large range of disparate reasons for why the initial establishment stage did not work well. Because of the variety in the responses, there was once again no easily discernible trend by either industry size or discipline area. Nevertheless, 28% replied that there was nothing about this stage that presented them with difficulties.

### Placements: student-driven processes

In these situations it is the students who drive the setting-up of the placements, in that they take the initiative to cold-call employers or send in applications in response to advertisements. Those employers who respond to these requests and go on to provide students with placements are quite happy with this approach. This approach works well for these employers because there is little work involved for them. Such an approach is even more appreciated by those who had no interest in dealing with university bureaucracies. Employers often use these student-driven requests as an indicator of initiative on the part of the student.

> **Engineering:** This works well because it minimises the work for the company and also is a test of initiative for the students who apply. (Small-sized company)

> **Surveying:** This process is quick, direct, and hassle-free. By bypassing the official university process we can recruit interested STEM students without process barriers or having to deal with university bureaucracy. (Small-sized company)

Leaving it up to students to initiate the contacts with employers and request placements may save employers recruitment time but it may come with a number of other challenges. These relate to the timing of placements, such as if students approach employers at times that do not suit business cycles or when employers have insufficient work to occupy WIL students or are unable to release staff to undertake the supervision. Conversely, students may not be available at times when employers have some WIL capacity. Such an approach depends on students having sufficient information about which employers may have WIL opportunities and on their confidence in undertaking the cold calling required.

Another issue for employers in a situation where WIL is demand-driven is that they may accept students without having an up-front structured and comprehensive program to keep the student occupied. This might mean that it is the work teams that have to come up with tasks to keep the student engaged or busy.

## Placements: university–employer collaborations

Here the university and the employer work together to set up the WIL placement, generally with the university taking responsibility for connecting students with employers, while employers offer opportunities for WIL, which may include publicising WIL opportunities on university websites in metropolitan and regional areas. In some cases employers will attend the final project presentations of students to identify potential WIL students or invite students to a social night to evaluate how the student will perform in these situations. In one company the director is invited to a university 'final project presentation' day. He takes note of the students who seem to have a deeper understanding and interest in their type of work. The director will then give the student a business card and leave it up to the student to make the first contact. The director does not 'chase them up' and uses any eventual follow-up by students as an indication of their initiative.

Strong interpersonal connections between company staff and university lecturers are also seen as factors which facilitate the promotion and setting-up of placements and the matching of students to employers. These collaborations are strengthened in cases where lecturers have worked in the industry themselves and have maintained their industry connections. Such collaboration works well for employers as it saves time in recruiting and selecting students. In the main, employers report that this approach provides them with students of high calibre. Generally these collaborative activities were effective and easy-to-maintain interactions with universities and students and worked well for some employers.

> **Engineering:** It works well because there is a mutual appreciation. This process delivers quality students. Students' and university interests are served well. The arrangement takes into account change of market. Market has been difficult in the past. (Medium-sized company)

> **Mathematics:** It works well because it is a comfortable way of working. It is based on easy input for expected output. We have no problems with universities. Departments are very helpful and have been so for many years. (Small-sized company)

> **Agricultural science:** There is a win-win for all sides. University gets publications, students acquire knowledge and skills, organisation gets workers, and questions answered. We see kids before they are fully qualified, and can replace people before going on leave. We have good relationships with professors who are selecting the students. It is a symbiotic relationship between university and the organisation. (Large public service agency)

Although such collaborations work if both parties play their part, there are a number of challenges, especially when universities do not follow through with promoting placements more broadly or when the students they connect to employers are not suitable matches. At times employers claim that students who have been assigned for placements with them do not have the right technical skills for the tasks required or lack prior information about the company in which they will be undertaking the placement or about the associated industry sector. The maintenance of university websites to ensure currency of posts that offer WIL-related opportunities may also be an issue. Once the WIL placement has been decided, there can be delays in getting the relevant paperwork (including that related to agreements about intellectual property rights) signed.

## Placements: university-driven processes

In these situations it is the university driving the setting-up of the placement, in terms of deciding when the placement will be undertaken and the content of the placement program. Employers that work well with their universities find this approach to be useful, in that it assists them to understand the objectives of the placement. It also gives them some clear direction on the types of tasks or activities that will be acceptable for completing the placement.

For some employers there are some specific drawbacks to having overly prescriptive requirements, which affects their flexibility to customise the placements to the real work of the company. Overly bureaucratic processes can also delay the start-up of placements. However, there are also frustrations for employers, in that they perceive that universities are not committed to WIL, they are unaware of what is happening on the placement and they do not take the time to visit students or to monitor their progress.

> **Cross-discipline science**: Bureaucracy with the university is an impediment. There is a three way agreement to be signed around, for example IP, and worker's compensation. There can be quibbling over contracts which can go on for months. There is a lot of bureaucracy at the company as well but we are planning to look at this. (Large scientific and research organisation)

> **Engineering:** We can work with one type of structure (holiday placements) but it would be too difficult to work with different configurations. (Small engineering company)

> **ICT:** Some universities want to create an industry program and expect employers to fit in. And also, unlike us, most industries don't have the resources to put in what the universities are asking for. (Large-sized company)

> **Engineering:** University A and University B require a four-page report as an evaluation of the experience. I am not sure whether or not it carries any weight in terms of scores in final assessments. We found University C to be a bit inflexible in their requirements. They did not want to do it [WIL] in the holidays like the other two universities. This would make it more expensive for us. Their stringent expectations were not realistic for our business. University C have had an engineering program for four years and run the placement as subjects. For SMEs that do not have large internal projects this approach is not well-suited. Providing placements is expensive. It takes up 25% of time for involved staff. We can't keep doing this for the 26 weeks that University C want at the time they want it, when we are already doing the placements for University A and University B. (Small-sized company)

Employers can also be frustrated if the students assigned to them via university do not possess the desired technical skills or if there are insufficient numbers applying for specific placements. Employers sometimes voice concerns about the university's lack of real-world experience, including knowledge about commercial markets.

> **Agricultural science:** We accept that students/graduates need to have a thorough understanding of pure science. It is essential, but they should have a better understanding of how the pure science should be applied out in the field. They need to apply the process in the workplace. In addition, students and universities don't necessarily know the market or understand its importance. (Medium-sized company)

> **ICT:** Making sure students actually have the technical skills needed to do the project. The company has had a few issues with international Master's degree students doing projects who don't have the technical skills at that level. They've done undergraduate education in something else (i.e. business), and are now are doing their Masters in IT, but they just don't have those basic skills. (Large public agency)

> **Mathematics:** We don't get many students applying so we need to figure out how to get it [information on placements] out there. (Large organisation, mathematics discipline)

The length of time universities take to respond to enquiries, the lack of university follow-up during the course of the placement, and their inadequate promotion of programs to more students are other frustrations. Other comments on what does not work so well include the time it takes to build relationships (with the university).

## Placements: employer-driven

In these cases it is employers who take the initiative for promoting the placements, either by placing notices on relevant university websites, visiting university campuses to promote opportunities, asking students to attend company-provided social events, and administering the selection of students. Employers who take the initiative in setting up placements do so for business as well as altruistic reasons.

> **Mathematics and physics:** Some students are shy and may not take the initiative to go cold calling. The notice [advertisement for placements] serves as an invitation and a motivator for the student to make a request to the company. (Small-sized company)

Having in place a well-formulated and specific program of activities for students, as well as effective screening and recruitment processes, has also worked well for employers. This is the case whether or not the employer takes the initiative by seeking out WIL recruits or waits for potential WIL recruits to make the first contact. In the main, these selection processes are concerned with placing the student through the same application processes as used for existing workers. This means that once an initial contact is made the student is asked to send in a resume or to complete a formal application form. For some employers it is important that the students articulate what they expect from the placement, as this clarifies for both student and employer the aims of the placement. Working with the student to develop these statements helps employers to set up productive experiences.

> **Agricultural science:** Students know what they will do. We know what will do. Based on my own experience when I was a student and arriving at a company with no systematic program in place for my work experience I decided that will not be the case in this company. This is why we have specific plans and programs. (Medium-sized company)

> **Surveying:** Processes for asking students to set out expectations in a clear way. (Small-sized company)

In making their decisions about whether or not to take on students or when deciding the kinds of tasks the students will do, it is important for employers (especially in large enterprises) to be able to rely on the engagement or commitment of their line managers. Having line managers committed to the WIL program and who see it as a worthwhile exercise rather than a burden helps employers to set up the WIL

experiences that work best for the students and the company. In addition, having a dedicated person or groups to take care of the program and the WIL students is a further factor for success.

> **ICT:** Really the key is that line managers are engaged and brought into the process. Managers have to get the submissions in to get an intern, they need to plan the work. Human Resources manage the process but at the end of the day its line management that make it work.
>
> (Large-sized company)

A range of other more general and disparate reasons for why the establishment process for placements had worked well included: the company having initiated the process; real and course-relevant work and work tasks being given to students; and a process in place that was effective for both employer and student.

> **Mathematics:** Giving them a proper job. Identify a big chunk of a project [upfront on commencement]. (Medium-sized company)

The following comment illustrates many of the points above.

> **Surveying: This** process is quick, direct and hassle free. By bypassing the official university process we can recruit STEM students without process barriers or having to deal with university bureaucracy. (Small-sized company)

What works well for employers is having students arriving at times that suit the business cycle of the company. Once the timing has been agreed, employers have found it useful to allocate students to a mentor, buddy or supervisor. This is found to provide structure and a caring learning environment for the student.

Some employers, however, voice concerns about the lack of formal requirements regarding timing and the content of projects. Others issues include students' lack of interest (notable in the agricultural science disciplines), inadequate internal organisational processes for tracking students (a difficulty for organisations hiring large numbers of students), and a lack of full internal work programs to occupy students for the duration of the placement.

Employers were also critical of the lack of commitment or follow-through, support and interest from the university from which students came. This includes the availability of university personnel and was related to insufficient interaction with the university. One employer, who obviously would like more interaction with the university, also thought that universities could build more relationships with SMEs.

> **Engineering:** Universities are under pressure, and are doing a lot of other things as well as teaching and research. We find it frustrating that they don't necessarily make WIL opportunities available more broadly. There is no obvious maintenance or commitment with the process. We're not sure how other employers know about the website. There is no thank you or feedback from the university back to the employer. (Small-sized company)
>
> **Mathematics:** Universities could be more supportive in the student placements.
>
> (Medium-sized company)
>
> **Engineering:** It would be nice if universities started building relationships with SMEs because the volume of SMEs could provide a valuable source of student placements.
>
> (Small-sized company)

The specific issues faced by individual employers included the ineffectiveness and burden associated with having a rolling intake of WIL students, the difficulty of engaging with equity groups (mainly because of lack of take-up by women and Indigenous Australians), and an inability to satisfy student requests for

placements when the company had little work on and was unable to provide meaningful workplace learning.

In some large enterprises the human resources departments will take responsibility for the coordination of the WIL programs and students. Such an approach may run into difficulties when departmental personnel are unaware of what is happening on the ground. This lack of knowledge may lead personnel to allocate students to areas where they can't be accommodated or to areas for which they are ill suited.

## Internships

In these situations the employer will provide opportunities for students to spend extended periods of time (for example, up to 12 months) with the company. During this time the student is embedded in the work team and is given opportunities to contribute to the work of the team. In most cases employers implement highly formalised recruitment processes to identify and recruit interns. It is also important to note that companies may be using the term 'intern' for WIL students who in other companies might just be undertaking a work placement.

Employers find that having dedicated personnel in companies and in partner universities to oversee the internship program is especially beneficial. The internal team can ensure that the administrative issues are taken care of and can maintain a special connection with the interns throughout their programs. The university team can facilitate the matching of students to employers and can visit students on site to discuss and/or monitor student progress.

> **ICT:** We look at the whole internship program holistically — with a person dedicated to the internship program from start to finish — they help them fit in and feel happy. Having dedicated resources to look after the intern program makes a huge difference.
>
> (Large-sized company)

> **Engineering:** The interaction with the students and the university is great. [The company] tries to keep engaged with both the students and university. (Large-sized company)

> **Engineering:** Real key is that line managers are engaged and brought into the process.
>
> (Large-sized company)

## Industry projects

Industry projects are sometimes undertaken by students as part of their assignments in their course. In the main, these can be set up on a case-by-case basis when students approach employers for a research project opportunity or when employers promote the opportunities on university websites or initiate arrangements with the university faculty.

In one case an employer had an idea for a research project that would lead to the completion of an assignment for an international business course (to be undertaken by international students) and, if successful, to the opening-up of commercial networks offshore for the employer concerned. This project involved students devising a marketing research plan that could be applied offshore in their home countries on their return. Although this project idea eventually got off the ground and students took up the opportunities, a lot of work was involved in getting the university committed to the idea. This lack of university support for projects is also echoed by other employers.

Projects can also be undertaken as part of an industry sector research program. In these situations the employer will have discussions with relevant university coordinators to indicate the number of students who can be involved in such projects. The next step is to assign the student to a supervisor. Once the

project is decided upon, it may attract a small grant or seed funding. In the main, projects are finalised with the students' written reports and their presentations on what they have found.

One of the key challenges for employers entering into industry project arrangements is establishing the ground rules for who owns the intellectual property on the results of the investigations. This is often addressed up-front either in agreements between the employer and the student or the employer and the university. Generally, employers who have students working on significant research projects want to keep the intellectual property. A further issue relates to the finalisation of reports, in terms of the time it takes students to prepare and revise final reports, and employers to edit these final reports.

### Other issues with setting up WIL

Accredited or 'for credit' WIL was not specifically identified in our sample and did not arise as a specific issue for employers when identifying what does and doesn't work in the establishment process or acting as a barrier to WIL. That said, some employers raised issues such as organising insurance, determining intellectual property ownership, and contract administration as issues or possible constraints to participating in WIL, issues which are often linked to formally accredited WIL. This is discussed further in the chapter on 'constraints and barriers'.

## Variable relationships with universities

The majority of employers reported that their interactions with universities were spasmodic, informal or non-existent and many were content with these less formal and prescriptive arrangements. In addition, some firms prefer to deal with students directly.

> **Physics:** The company does not actively recruit. It is all based on word of mouth, personal relationships and whether there is work available for the student. The process is quick, direct and uncomplicated, it has worked well in the past. (Large organisation)

It was rare for employers to report having in place a formal partnership, although some identified these to be in their developmental stages. The small number of employers who did have closer relationships with universities claimed that what worked well in these interactions were frequent and open communication, access to university facilities, attendance at university meetings, and occupying formal positions on university faculties or boards. Other elements of these relationship that worked well included when the university pre-screened students for placements, looked after the schedule-of-payment processes, and embedded the requirement for students to undertake placements in course curricula.

> **Agricultural science:** We have a really good partnership with the university. Our CEO used to work there and still has a few connections there. We also have joint projects with two other universities and interactions through those projects. It isn't necessarily a formal partnerships and the WIL side of things is just on the periphery. The partnership with university is developing, as both the university and the industry are learning that they need each other and they can work together on projects which should have extension and development elements as well as research. Industry is involved at the generic level and brought in to review some research projects in the first year, and the industry bodies can ask for a change if the project isn't working or meeting the right objectives. (Medium-sized company)

It was rare in our sample for universities to visit students in the workplace. There was the occasional example provided where there was interaction during the placement, with the university visiting and contacting the employer during the placement.

> **Biology:** We had a phone hook-up after first 3 or 4 days. The university called to ask how they [students] were settling in. At end of the second week, the university came on site and spoke to the student and employer. They did this at the end again of the placements.
>
> (Small-sized company)

When employers were asked about what does not work well in their relationships with universities, they identified issues related to lack of interest, commitment and support, in terms of providing employers with feedback or maintaining the websites that provided information about the program. It was rare (but it did occur) that employers said that nothing about the relationship worked well.

> **Engineering:** The university does not provide feedback to the employer, thank us or ask for ideas on what to improve on. There should be a more deliberate outreach between the university, schools and industry. The university could look at the idea of [inviting] visiting lecturers from industry. Industry is happy to talk about their work, for example, their specific instrumentation equipment and processes. They are also keen to pass on information on other contacts that they are aware of in the real world of industry. In this way graduates could get to know about a whole range of different technologies/specific application of instruments in use.
>
> (Small-sized company)

> **Engineering:** From the student point of view it would have been useful to have the university do more checking up during the placement, like a mentor. The university could also have employers go to the university more often to speak. The best interactions are where there is some technical experimentation. Get some students to test in the university laboratories and then you might have the student to come into the business for a day to test it on your equipment too.
>
> (Small-sized company)

> **Mathematics:** Universities tend to wait until something is formally required. They would not do anything before a kind of deadline is due, so quite administrative by stickling to schedules. They could sometimes address issues early on before they become large issues. A partnership would benefit from more informality. (Medium-sized company)

Given that the literature emphasises the need for universities and employers to establish good partnerships and for universities to provide suitable information and maintain regular communication with employers, it seems to be a concern that many of the respondents in this study believed that this was lacking. However, this study also finds that some employers are quite happy with minimal interaction with universities and many prefer flexibility in arrangements. While employers tend to prefer flexibility in WIL, too much flexibility may be at odds with structured university programs and the course requirements for awarding graded credit for WIL activities.

**Box 6: Industry case study 6 — placements**

**Transport Group (engineering)**

Transport Group is an engineering consulting company which mainly services the transport industry and employs civil, mechanical and aeronautical engineers, and scientists with physics and chemistry backgrounds and an interest in engineering. It has been offering WIL programs for engineering students for seven years and is happy to continue to offer these. The main motivation for providing WIL programs for students is to recruit staff, fulfil their corporate citizenship obligations to industry and give younger staff an opportunity to supervise others.

The company provides placements for students from a number of different universities and promotes these placements in a variety of ways, including university employment websites and engineering student societies. One of the universities also provides a support group for students on WIL placements.

Interested students will complete an application complete with an introductory letter, a resume and an academic record. Once students have been shortlisted, they will undergo an interview. Some key markers the company looks for on resumes and considers in making selections are: time spent overseas or time spent in tutoring others. These experiences are felt to be of benefit because they reflect the maturity and self-sufficiency of the student.

Once the student has been selected for the placement, he/she is allocated to a buddy from another work team, someone who has volunteered to help the student to navigate corporate policies and procedures. Team supervisors allocate the tasks or projects that the student will work on. These tasks include engineering tasks that the student will complete on site or business activities such as organising an end-of-year function (to give them a taste of the social side of employment) or completing work tasks as part of a final-year project.

The typical work experience is 12- to 14-week block over the university summer break, with some students also adding a one-week placement in July. Students are expected to display responsible behaviour, complete their projects to the desired standards and make a presentation on their work to other staff. Student presentation sessions are very well attended and have often been found to be more popular than other company presentations. In the main the company expectations of what the student will learn have been met and often been exceeded.

Giving students an operational task with specific requirements to complete during their placements is considered to be a key to successful implementation. Issues arise when students do not have a full work program and when supervisors micro-manage work, do not communicate with students on a regular basis and are not committed to the planning and overview required.

There is minimal or systematic interaction with the university and this is what is considered to be part of the effectiveness of current arrangements. However, such loose connections may also be constraining the effectiveness of WIL, especially when the company is not aware of the type of programs taught at university.

The company believes it obtains a range of extrinsic and intrinsic benefits from offering WIL to university students. The extrinsic benefits include reducing recruitment costs, minimising the risk of hiring graduates who may not have the right skills and attitudes and providing professional development for younger staff. The intrinsic benefits include the satisfaction that comes from giving someone an opportunity to develop their workplace skills and improved understanding of the quality of university courses. The key issues generally relate to the time supervisors have available to supervise students.

The company expected students to be able to learn from the practical work situations in which they were involved as well as have the ability to reflect on and evaluate the most effective techniques for solving the problems presented. It wanted students to be able to organise themselves to complete projects and to learn about being a professional in the workplace as well as understand the key attributes of professional practice for engineers. Although the company appreciated the fact that good teamwork was especially emphasised in university programs (where students often worked on group projects), it expected students to continue to develop these skills in their work teams. The ability to work with computers and computer software were other skills that the company hoped students would develop during their placements.

The company believed it had an effective program in place; however, there was room for further improvements. These included: increasing the exposure students had to different parts of the company by arranging for students to provide fellow students with a guided tour of the areas in which they were working; maintaining a balance between breadth and depth of program content; and having a more structured application process.

# WIL benefits and the 'value proposition'

The benefits of providing WIL experiences for students reported by employers largely replicate the motivations described in table 12. These benefits and motivations have been distilled into a 'value proposition' below.

A little over 10% of employers reported gaining little or no benefits from providing WIL. This is mostly because their see their involvement in WIL as something done for the good of students and industry in general.

**Table 15 Benefits for employers in providing WIL for students**

| **Benefits** | *No. of employers responding (60)* | *%* |
|---|---|---|
| Opportunity to identify and recruit talented students | 32 | 53 |
| Access resources (inexpensive) for getting jobs done, including backfilling of staff on vacation | 26 | 43 |
| Opportunity to fulfil corporate citizenship obligations, including feeding STEM pipeline | 17 | 28 |
| Opportunity to engage with motivated students and their fresh or innovative influence in solving client and organisational problems | 12 | 20 |
| Provide practical experience and development opportunities for students | 10 | 17 |
| Provide staff development opportunities, including for junior staff | 9 | 15 |
| Limited or no benefit | 7 | 12 |
| Obtain return on investment, including for student | 6 | 10 |
| Collaborate with universities and obtain access to latest technologies | 3 | 5 |
| Promote the company to students and others | 4 | 7 |
| Provide feedback to universities for the development of their programs | 1 | 2 |

Notes: Employers reported multiple benefits from WIL and so multiple responses; hence, the proportions sum to more than 100%.
Source: Employer interviews for this study.

Just over 50% of the companies claimed that they benefited, in that they used WIL to identify potential recruits. Over 40% reported that a key benefit was obtaining extra resources (including inexpensive ones) for undertaking some desirable jobs that the company wished to see completed. About 30% reported offering WIL to fulfil what they saw as their corporate citizenship obligations (including feeding the STEM pipeline). These findings correspond with the findings on why companies choose to provide WIL.

> **Engineering:** The company gets to screen students for potential recruiting. But really it's an altruistic effort. (Medium-sized company)

> **Chemistry:** To have someone work on a problem at low cost and low impact. The company could have a couple of 'what if' ideas floating around without having time to focus on it, so a student doing the project is perfect. (Small-sized company)

In addition, employers believed that having young students around the workplace was good in terms of bringing in fresh ideas and the like.

> **Chemistry:** The company's workforce is currently an older demographic, so it was good to have some young enthusiastic new workers around to interact with the rest of the staff. It was a good way of getting new ideas in regards to new and cutting-edge technology. (Large organisation)
>
> **Agricultural science:** It is good to have students around and good to have them as a casual workforce during peak season. (Medium-sized business)
>
> **Surveying:** Students are interested and enthusiastic, and this is good for the general company climate. (Small-sized company)

Other benefits included providing practical experience and development opportunities for students and supervisory and mentoring experience for staff (especially junior staff).

> **Agricultural science:** Another benefit is the opportunity for other staff to mentor students. While it is quite intensive, it is good fun for them and great for their personal development to get some experience in mentoring and supervising students. (Large-sized company)

These findings confirm the results from the literature that described the benefits of WIL to employers.

## The 'value proposition'

Combining the findings on employers' motivations for providing WIL and the benefits to employers from providing WIL, the following 'value proposition' is offered:

WIL has been found to be of considerable benefit and value to employers in a number of ways, in:

- as a means of identifying and recruiting new staff and developing future talent for a company's workforce
- as an inexpensive resource for undertaking value-added business-related projects
- as an opportunity to fulfil corporate citizen obligations and give back to the community
- as a way to help to increase the broader industry workforce
- as a source of fresh ideas for the organisation and a means to access new technologies or research
- as a means to develop and strengthen industry and university partnerships.

As discussed in the chapter on 'Future strategies', we suggest that this value proposition be articulated to employers and industry groups.

# Constraints and barriers to providing WIL

Under a quarter of employers reported no major constraints or barriers to their participation in providing WIL for students (see table 16). The remainder cite a wide range of factors.

**Table 16 Employer constraints and barriers to providing WIL**

| Constraints and barriers | *No. of employers responding (58)* | *%* |
|---|---|---|
| Lack of sufficient budget to cover student wages and time for staff to be involved in supervision | 16 | 28 |
| Having enough, relevant and suitable activities or work to do when placements are required | 11 | 19 |
| Lack of sufficient time, facilities and space to be invest in WIL provision | 10 | 17 |
| Compliance with legal requirements (including insurance, workers' compensation arrangements, intellectual property issues, securing clearances and safe working | 7 | 12 |
| Issues with suitable scheduling of WIL | 6 | 10 |
| Dealing with university issues (including time management deficiencies, inflexibility, lack of structure for placements and poor preparation of students) | 5 | 9 |
| Low student uptake of WIL and specific STEM studies in general | 5 | 9 |
| Inadequate internal processes and arrangements for WIL | 5 | 9 |
| Inability to attract high-calibre students, including those with the right skills and attributes | 4 | 7 |
| Other (location of placement, lack of uptake because of unpaid nature of placement) | 2 | 3 |
| No constraints or burden | 13 | 22 |

Notes: Employers reported constraints and barriers to providing WIL and so multiple responses; hence, the proportions sum to more than 100%

Source: Employer interviews for this study.

One of the other more common constraints related to time and other resource commitments, often for SMEs, although time commitment was also mentioned by large companies. This confirms the PhillipsKPA (2014) study findings, which show that issues related to financial and time resources are the main barriers to employers providing WIL. The time issue tended to relate to staff having time to supervise or mentor the student in addition to their normal work duties and also to the time it takes to set up the WIL. Having staff interested and capable of being involved in WIL was mentioned for many of the disciplines, but it was more frequently reported by employers providing WIL to engineering and biology students.

> **Agricultural science:** The main constraint is the time and resources. It takes time to train and supervise a new student. This is something we need to consider before deciding whether to take on any new students. (Small-sized company)

> **Biology:** Staff resources are an issue. It takes time to supervise. We are too busy with actual work. It can be hard finding a relevant piece of work for them to do. If it is useful to our company it has to be done in a certain time. Short timeframes are also a challenge because generally our projects can be quite large over a long time. We need something the student can realistically complete to meet the outcomes and expectations of the experience. (Large public agency)

Related to this are other resource constraints, in particular, financial constraints. For SMEs the resource commitment also relates to having a focus on the bottom line, and particularly in a difficult economic climate it means that WIL may be less of a priority. Possibly for some of these organisations, WIL is only available if it does not impact on the bottom line. For some of the larger organisations, and a couple suggested this, there might occasionally be the option of allocating dedicated resources to WIL. The response below encapsulates these issues. Interestingly, this employer also mentioned that it would be good if universities started building partnerships with organisations like theirs (SMEs).

> **Engineering:** We are a small company, and the ability to take on and pay a student on placement entirely depends on the cash flow situation at a given point in time. Although the work is there for students to do, the financial means to pay them are not always available.
>
> (Small-sized company)

Another issue raised by a few of the organisations, again mainly SMEs, was related to the timing of the placement. More specifically, some organisations find it difficult to connect the WIL experience project with the availability of the student and vice versa. Smaller organisations do not normally have projects readily available so would like to have the student available when one comes along.

> **Mathematics:** As this is a consultancy company sometimes the timing of work and contracts does not coincide with demands of student placement. The workload is not aligned with the scheduled student placement times. (Medium-sized company)

This particular company went on to suggest however that the company could on occasions 'work around' this constraint by placing the student in a different area from that originally intended or find less technical work that could be done any time.

While not an explicit finding in this study, the literature shows that lack of flexibility and responsiveness on the part of the universities in accommodating the business cycle needs of the employer is a barrier to WIL participation. Some of the timing issues raised by the respondents in this study indicate that students and universities are not necessarily 'in tune' with the business cycle of the employers. In one case employers were able to renegotiate with the student and their university for the placement to be undertaken at a more suitable time.

> **Agricultural science:** We just tell them that timing is not suitable right now and tell them when it is a more suitable time for them to come. A suitable time will provide a better outcome and investment of time for both the student and us. A student from University A wanted to come at a certain time last year. It wasn't going to work for us so we negotiated a new time and she was able to come then. (Small-sized company)

One company that had recently put on an intern who was externally funded also referred to the cost and time constraints involved in setting up, administering and funding the program. The company also identified some particular issues for students from different science disciplines.

> **Physics:** The cost and time constraints are always a problem. We have to make sure that we can give the interns the right supervision and attention they need, but this can be very demanding on our existing staff. We are in the process of making the transition from start-up to fully functioning and profitable business, so it is not always easy to access the time and financial resources to pay for students. That's why this type of internship is great, as it is externally funded, and someone else does a lot of the administrative work. (Medium-sized company)

When asked about the barriers and constraints to offering WIL for students undertaking physics, this employer responded that, although it was something the company would like to do in the future when

they grew and had more demand for these types of roles, it was currently difficult to accommodate in view of the economic climate. There were also sensitive issues associated with the type of work in which students would be involved, as physicists are involved in the patenting side of things. This means that the company would have to make sure that physicists as well as physics students had been through the appropriate security clearances and would not leak the intellectual property acquired during their work or work experience. For engineering staff and WIL students the situation was felt to be quite different because they would be working on specific client projects, which would bring in income.

> **Physics:** But in regards to science staff, we are limited in how many of those we can employ and carry. It is even more difficult when you are talking about science students, who don't necessarily have the knowledge of someone with experience. (Medium-size company)

Having enough relevant, suitable activities and work at the time the placements are required also proved a challenge. This once again is an impediment more related to SMEs due to the smaller scale of their operations. Nevertheless, large businesses also report difficulties when they have large numbers of students for whom to provide relevant and suitable activities. Having sufficient activities is also related to the amount of work companies have on at the time and, as already noted, the availability of staff to supervise students. One employer reported that students for WIL activities were only recruited when suitable work and senior staff were available.

> **ICT:** The key constraint is the availability of suitable projects/work and the cost due to senior staff time that needs to be allocated for training and supervision. Also, finding students who are high calibre is a key constraint. (Medium-sized company)

Around 12% of companies reported constraints related to occupational health and safety concerns, the regulatory environment and security or privacy issues. In one defence organisation the barriers included the need to arrange on-site security clearances for students prior to their being accepted for WIL placements. The time it took for companies to get these clearances sometimes meant that students had negotiated a placement with another company by the time the security clearance had come through. Intellectual property issues, already discussed with regard to physics students, are especially a concern when projects are being done for an external client.

> **Engineering:** [There were] confidentiality issues once the student left the company. We did not want certain things disclosed to competitors. (Small-sized company)

> **Cross-discipline science:** The only issue we really have apart from space is the different health and safety systems that apply. Sometimes the policies and procedures don't align so you end up with two lots of reporting which can sometimes be at odds. School placements are even harder to undertake because of health and safety restrictions. We work with quite risky stuff such as live highly venomous animals and high value and culturally sensitive items. The training that's involved to get students up to speed outweighs the benefit of the internship. We have to balance the value propositions and sometimes the younger the intern is the more restrictions there are and the more difficult to find something that is truly meaningful and will add value.
>
> (Large-sized organisation)

Other constraints and barriers included inadequate internal processes for administering the placements, timetabling and scheduling issues, and the inability of some industries to attract high-calibre students or suitably skilled students (agricultural science and information technology), and the low uptake of specific STEM studies in general (mainly agricultural science and geoscience). Having internship arrangements only available in one location and the situation whereby no wages are available to WIL students were also cited as constraints.

Employers in this study tended to focus on the barriers and constraints pertaining to their own operations, and therefore these mainly related to resources and their own capacity or capability to take on students. Only a small number of companies identified the perceived deficiencies in university processes and student preparation for WIL placements as constraints or barriers. These included universities: not being prompt in their response to employer questions; taking time to complete the necessary paperwork; and issues associated with administration. While the reasons for the low level of concern over these types of issues is unclear, it may be that employers are more concerned with the pressing business-related issues mentioned earlier than with other possible constraints associated with WIL, including their interaction with universities.

The barriers to WIL identified in the literature but not raised in the employer interviews include employers:

- lacking understanding of their role and expectations
- lacking information on WIL and understanding the regulations associated with WIL
- unaware of who to contact in the universities about WIL.

**Box 7: Regional case study 1 — Newcastle**

The three organisations interviewed in this region have been offering WIL for fewer than ten years and indeed one of them only for about a year or so. All the organisations are in the engineering sector and work integrated learning is part of the industry in the region.

The region in which these interviews took place had been a region in economic decline with a need to rejuvenate itself, although a great deal has been done in recent years in efforts to reposition the region. The companies in this region had also been affected by the decline. Two of the organisations are medium-sized enterprises and one is large.

When asked why they were motivated to take students for WIL the variety of responses largely reflected the responses of our broader sample of employers. These included:

- social responsibility reasons, such as providing students with work experience and looking after the industry
- potential recruitment of well-trained and qualified graduates
- attempts to provide balance in an ageing workforce.

An additional motivation relevant to the location is looking after undergraduates and graduates in the region.

Similarly, the benefits employers listed also reflected the broader sample of employers and included:

- the potential for fresh ideas into the company
- future recruitment of graduates (as per motivations)
- an inexpensive source of labour
- being part of the of the larger manufacturing community and also demonstrating leadership in the industry regarding WIL

One of the respondents also mentioned that it provided a pipeline of graduates for that particular region.

The three organisations interviewed in this region all offer placements in various guises. All three companies engage with the local university to one degree or another, although one of the organisations also has a relationship with other universities for some of their programs. The placements generally run from about three to six months, depending on the company. The placements are conducted in blocks of time, for example, 12 weeks full-time over summer. Two of the organisations offer placements/traineeships for first year undergraduates (which are a requirement of the degree). Students from the later years tend to have their own projects to work on while the first year undergraduates tend to

have a more passive interaction such as shadowing existing employees. In addition, the students could also be involved in other aspects of the organisation. Examples mentioned included dealing with customers, making client presentations, design implementation and modifying equipment.

One organisation also offered a scholarship arrangement, which is a one-year placement following the three years of the bachelor degree.

One of the companies had formed a relationship with the lecturers at the university, who would inform their students about this company for their placements. This process was seen to work well as it helped to build mutual appreciation and provide access to quality students for the placement.

'It flows because lecturer, student and company have a similar vision' (Medium-sized company, engineering discipline).

In the other two companies, the students tend to initiate contact and there was little interaction with the university. Both these companies desired greater involvement with the university in regard to these placements. The company that had only been offering WIL experiences for a year or so intends to develop more formalised arrangements with the university in the future, their aim being to have a better process in place for arranging student placements.

Better planning or structuring of the placement was mentioned by all three respondents. In part this involved better initial planning by the organisation but also greater involvement with and by the university. One other area where a barrier or constraint was mentioned was the timing of the placement. Similar to the broader group of employers interviewed, one employer mentioned that occasionally the workflow did not match the timing of the placement.

## Some examples of discipline-specific constraints

The constraints experienced by different employers in providing WIL vary. Examples of the issues identified by the employers in different disciplines are given below. These are examples only and should not be interpreted as pertaining to the discipline as a whole; it is difficult to discern any clear differences by discipline.

**Discipline-specific examples**

**Agricultural science:** The main barrier seems to be getting high school students into agricultural science degrees and careers in the first place. There used to be a structured program from Year 11 and 12 high school students (the Primary Industry Centre for Science Education [PICSE] program). It was originally set up by [university], then other universities joined, but since 2014, [university] doesn't do it anymore. The program aims to try and get more students interested in agricultural careers. We used to be invited to attend an expo where students did small ag-related projects and we would judge and provide an award for the best project. Not sure how it will go now that this program doesn't seem to be in place here anymore. (Medium-sized company)

**Biomedical:** The most difficult thing has been getting interest and buy-in from other departments. Up until this year, all students have been hosted in the same area. Other departments haven't been interested in taking on students. Perhaps they have a mental block because they think they don't have the time to supervise or put effort into the students. It usually takes a leader or individual who is keen to drive it. This year one of the other departments has seen the benefits from hosting students, so they've now taken one on. Would like to have more students. (Large-sized organisation)

**Engineering:** We have to manage saturation as a lot of work is required to supervise the student. Need to have capacity in the management structure. There is such a thing as too many students. (Large-sized company)

**Geoscience:** We do not have any other geographical places across Australia as we are based in one city. So a constraint is being able to access a wider range of students as there is not a large pool to choose from. Internships in the city are easy, but students outside the city are responsible for their travel and accommodation while they are on the internship. As they are paid at a low rate for three months there seems to be no money to live on. If a student was able to manage a part-time arrangement it might work. (Large-sized organisation)

**ICT:** Getting around security clearances and International Trade Arms Regulations Clearance [ITAR; from US]. ITAR specifies who can access technology and what they can do with it. It is tightly controlled. Students can't have criminal record and get security. The administration burden is onerous and the security questions relate to the last ten years of someone's life. This is a disincentive for students to follow up their acceptances unless they do not have any other alternative or if they are specifically focused on marine occupations so have to come to our company. (Large public organisation)

**Physics:** The key constraint is whether there is work. In the end consulting is a cut-throat business and there is not much space for providing student placements out of altruistic motives. (Large-sized company)

## Intention to continue with WIL in the future

Just over 90% of employers said that taking students for work integrated learning was worth the effort. Not one employer responded in the negative. In addition, 85% of employers were intending to continue their involvement, with just two employers saying that they were not intending to do so. A few caveats were mentioned, such as having to consider whether it would be financially viable and whether there would be enough and suitable projects and activities for students to work on. There were very few employers (18%) who had 'dismissed' a student from the work placement during the course of the placement. Dismissals resulted from student lack of enthusiasm, work ethic or interest in the job, non-ethical behaviour, inability to fit into the culture of the organisation, language problems and lack of understanding of the skills required and the tasks allocated.

**Box 8: Regional industry case study 2 — northern Tasmania**

Six employers were interviewed in one particular industry group — agriculture. Agriculture has a strong regional presence in terms of businesses. Five of the employers were medium-sized businesses and one was a large business. There is one main university in this region.

The main motivation for employers to engage with WIL was its potential as a recruitment source. However, three of these six employers also mentioned that they wanted to support the local agricultural community more broadly by encouraging students to stay in that field. This motivation goes beyond WIL in higher education. It also includes encouraging student interest in STEM and agriculture in primary, secondary and vocational education, as a means of developing the industry's future workforce and keeping the 'talent' in the state. This motivation is possibly more specific to employers in a regional area.

'The main reason is the sense of community and stewardship of the agricultural industry, in the region' (Medium-sized company, agriculture discipline).

Other employer motivations included students helping out with work, supporting students who want to develop a career in agricultural science and helping students to learn about the technical side of agriculture.

Not all the employers interviewed in this region offer formal WIL, with some of the engagement with students coming under the general umbrella of work experience. However, they still offer work that is relevant to the student's area of study and often in a structured way. One of the organisations in this area did have a formal internship arrangement with

interstate universities, although the more common arrangement was for students to negotiate arrangements with the employers separately.

In summary the types of engagement included:

- an internship arrangement with a university
- the Primary Industries Centre for Science Education (PICSE ) program, which involves a camp and a one-week placement (with a project to work on) for Years 11 and 12 students as an entrée to a career in agricultural science
- scholarships for undergraduates and postgraduates through the company, offered by four of the employers
- postgraduate students undertaking projects as part of their coursework (mainly off site but with a small on-site component)
- casual jobs in a laboratory or undertaking fieldwork for students relating to their future occupations (although not strictly aligned to WIL).

The workplace learning opportunities for students tend to be more employer-driven than university-driven (hence not strictly work integrated learning). In this instance the employers in a particular sector have found a model that suits them, for example, offering scholarships to students.

The employers engage with the university through various mechanisms such as the PICSE programs and research partnerships. Lecturers at the university are also aware of the opportunities and inform students of opportunities, including alerting them to companies offering scholarships.

The internship offered by one of the medium-sized companies comprises a set project that meets some broad criteria established by the university and is assessed as part of the student's coursework. This means that there are some reporting requirements to the university. The internship lasts about six to eight weeks. Internship students are recruited through a recruitment-type process that tests their employability skills. The company is happy with the internship arrangement and plans to continue offering it. A couple of the interns are now working for the company.

One point of difference between agricultural employers and other employers are the communication skills requirements. Due to the nature of the work they need to be able to effectively communicate with farmers face to face and by telephone and online.

'Communication skills, learning how to get along with farmers, and the importance of IT skills, are considered to be the most important skills due to the increased use of push notification technology to get in touch with farmers and communicate the research and information to them' (Medium-sized company, agriculture area).

There is also a general feeling that students need to have greater focus on agricultural extension and development, to encourage an interest in the applied aspects of agronomy and agribusiness.

# Suggestions for improvement

There were varied suggestions for improving the WIL experience and overcoming the barriers and constraints faced by employers. The variety of responses to this question can be observed in table 17.

**Table 17 Suggestions for improvement**

| Suggestion | *No. of employers responding (52)* | *%* |
|---|---|---|
| OK as is | 20 | 39 |
| Increase university involvement in setting out formal expectations, mentoring students, and receiving feedback | 14 | 27 |
| Integrate placement program with organisational plans and structures | 10 | 19 |
| Streamline and formalise application and selection processes | 6 | 12 |
| Improve communication with students about their responsibilities | 2 | 4 |
| Other (check insurance, simplify projects, increase time for dedicated supervision, allocate real-work projects, change number of days at work and no. of days at university, not exploit students, attract interested students) | 10 | 19 |
| Not sure | 2 | 4 |

Notes: Employers reported constraints and barriers to providing WIL and so multiple responses; hence, the proportions sum to more than 100%.

Source: Employer interviews.

The most frequent response, provided by both large companies and SMEs and by just under 40% of employers, was that they were happy with the way things were.

The second most common issue (reported by nearly a quarter of employers) was a desire for closer interaction and collaboration with universities. This finding confirms the literature, which also indicated that employers would like to see closer interaction with universities. Some companies are happy with this situation, but other employers thought that greater interaction with universities would be more beneficial in improving the WIL experience. This was probably more of a factor for some of the SMEs, who thought they could benefit from greater collaboration.

> **Engineering:** Acknowledge we may need to have a stronger partnership with the universities and it would be great if the universities had some model or program whereby we can meet the students and be introduced to them. (Medium-sized company)

> **Chemistry:** It would be great if the university could take on more of a facilitator role to check in with the interns, provide updates and deal with unrealistic expectations. Just someone to explain the program and explain to students and employers what they have to do.
>
> (Large-sized company)

There were also a few comments in terms of improving processes within the firm. This included integrating the work to better align with the placement and ensuring that a suitable project is available when the student arrives. A few of the larger and medium-sized companies mentioned their focus on continuous improvement, including, for example, asking for feedback from students at the end of their placement, conducting post-program evaluations and working on training and development tools to improve the placement experience.

> **ICT:** Year on year we get feedback from students every time they exit. We are always trying to make improvements to the way interns can get up to speed faster. (Large-sized company)

This accords with the literature, which shows that employers would like to be more involved in feedback and post-WIL activities (Peach, Ruinard & Webb 2014; McEwen, Mason O'Connor & Williams 2010; Wallace, Murray & Overton 2009).

Some of the larger companies said that it would be good to broaden the experience of the students by for example exposing them to other parts of the firm. This is something that smaller companies are not able to do because of their size. One interviewee mentioned:

> **Mathematics:** Perhaps we can't rotate as much as with a larger company. We can't provide in-depth aspects of large projects as in a large company. (Medium-sized company)

One employer in a medium-sized company mentioned that they really benefited from the assistance of a larger public sector organisation (the Defence Materiel Organisation), which provided them with their internship.

> **Physics:** The formal and funded nature of the program is great and there could be more programs like that available for small businesses. We would like to be involved in more of these types of formal and funded schemes. (Medium-sized company)

Other less frequently raised issues included students needing to have to have their own car because of the lack of public transport where the organisation was located.

## Some examples of discipline-specific suggestions

Employers made a variety of suggestions for improving the way they approach WIL. Examples of the suggestions made by employers in the various disciplines follow. Again, these are examples only and do not necessarily relate to the discipline as a whole. Engineering firms frequently identified the need to improve their collaboration with universities so that both have realistic expectations of the placement and its delivery. Companies providing WIL for agricultural science students offered a wide array of suggestions, including the need to attract students into the field, especially from high school. Allocating time and dedicated personnel to take care of WIL students was also commonly identified across many disciplines.

**Discipline-specific examples**

**Agricultural science:** We've just recently been involved in student/teacher placements. The idea that teachers come along and have a tour of the site as a PD thing for themselves, then they go back to the class and can share their experiences with students. (Medium-sized company)

**Biology:** Has been pretty good so far. We need students who have their own car because there is no decent public transport out here. Students are never left alone. This means that they don't quite experience the full experience as there are some staff who work alone (given the hours of the company are 6am to 10pm).We need to have an appropriate mechanism for communication in handover situations. (Small-sized company)

**Chemistry:** It would be good to know who in the universities to contact. We would also like to know how it works in other organisations. It would be great if the university could take on more of a facilitator role to check in with the interns, provide updates, and deal with unrealistic expectations. We need someone to explain the program and explain to students and employers what they have to do. (Large-sized company)

**Engineering:** Better initial planning by the company, including: not taking on more students than planned, being better prepared for unknown quantity of students, understanding better what the lecturers want and in turn what lecturer can expect from company. (Medium-sized company)

**Geophysics:** It would be beneficial to include a component of fieldwork in the WIL to give the students a context for what they are doing when processing data. However this is not always possible and health and safety hurdles act as a deterrent for an organisation of our size. (Small-sized company)

**ICT:** Make application process easier. Streamline the process. Application to shortlisting stage should be decreased. Sometimes the student has moved on when we send out the acceptance letters. (Large public organisation)

**Mathematics:** For the company: structure work to better align with the student placement, and plan the projects better. For the student in a 10-week placement, it's hard to improve as the organisation always gets positive feedback! Although we perhaps can't rotate students around as much as a larger company can, so we can't provide them with the in-depth aspects of large projects as those undertaken by larger companies. (Medium-sized company)

**Physics:** The more time that the company can spend on supervising the student the better. Make sure you give student something real to do and have a dedicated supervisor or supervisors to give them guidance and assistance. (Small-sized company)

# Reasons for non-engagement

We spoke to only a small sample (ten) of employers not undertaking students for WIL. These employers were from a range of discipline areas, including information technology (four employers), maths (one, although the company was multidisciplinary and included areas such as commerce and engineering), agriculture (one), engineering (three) and chemistry (one, but also a multidisciplinary company and included areas such as engineering and maths). The graduates they employed came from these discipline areas and others such as finance/commerce, physics, and trades qualified. All the employers interviewed in this group were small to medium enterprises.

These employers were questioned about their reasons for not taking students for WIL experiences and about their willingness to take on WIL students in the future. If they indicated that they would take on WIL students in the future, they were asked about their expectations, and the key constraints in taking on these students. The relatively small number of questions and employers accounts for the small number of responses in this section. In addition, the small numbers make it difficult to discern any differences by area/discipline.

## Awareness of WIL and resources/constraints

When asked about whether they had been approached to take WIL students in the past, five of the employers indicated they had. Their main reasons for not doing so included:

- not having enough work and not being set up for it, didn't think it was necessary in the past
- lack of resources/budget (two of the five mentioned this)
- the course type not being relevant to the needs of the business
- a reduction in productivity because it takes staff away from their core work to supervise the student (and only a very small business)
- the fear of having intellectual property copied.

When asked about the reasons and constraints for not taking on WIL students they reiterated the sentiments above and included lack of time and resources, limited ability to pay for students for a small business, disruption to the business, concerns with intellectual property and confidentiality, lack of a suitable project to give the student, and that the local universities program was not suitable. These findings confirm the PhillipsKPA (2014) study, which also found that a lack of information about WIL and not knowing who to contact were much more prevalent for those employers who don't currently offer WIL.

Responses included:

> **ICT:** Mainly because the Bachelor of Computing (in the local university) has been very focused on software development. We don't need students working on a software development project; we need people with more infrastructure capabilities. (Medium-sized company)

> **ICT:** As a small business, there are simply no resources available to supervise or tutor students. Also, paying them would cut into the bottom line. (Small-sized company)

> **Chemistry:** Main reason is productivity as it will lead to a reduction in the productivity of staff that have to train students. Depending on the period of the placement it could be a significant

amount of time. There are so many graduates out there, why would you go for an undergraduate? (Small-sized business)

**Multi-disciplinary science**: Intellectual property and confidentiality are issues. What the students do will have to remain confidential so that means they can't say what they researched, so therefore what do they report? (Small-sized company)

One of the other organisations that was aware of work integrated learning mentioned that they had tried to set up WIL projects for two engineering students; however, there had been no interest on the part of the university they had contacted.

## Potential to take on WIL students and expectations

The employers were also asked whether they would be prepared to provide WIL for STEM students in the future. Only three of the employers indicated they would (in the agriculture and engineering areas) and one said maybe (medium-sized IT company). One of the employers that had said yes explained that they were currently in discussions with a university, while another other explained that the management of the organisation had changed and they were now more amenable to the idea. The other organisation that had said yes was the one that had previously attempted to set up a WIL program but had experienced no interest from the university (as discussed in the previous section).

One employer that said they would consider it if they had a gifted student. Another employer that had said no to future WIL students (small company, chemistry and related areas) indicated that taking on an undergraduate for a short period is not commercially justified. This employer also said that the company had the flexibility to take on a graduate and would be prepared to invest in internal training for them if they were reliable. This largely aligns with the PhillipsKPA (2014) study, which found that, despite these objections, it wasn't that employers weren't interested in offering WIL at all, they simply felt that they did not have the capacity to do so.

The employers who indicated that they might be interested in taking on WIL students provided a variety of idiosyncratic answers on what their expectations of the student would be. These included the student being part of the production process so there is hands-on learning, shadowing for short placements, learning a narrow skill set, having the 'right personality', being able to adapt quickly and understanding commercialisation process. The overall tenor of the responses was that they would want the student to do something practical/hands on.

**Agricultural science:** For short unpaid 2—4 week placements probably just shadowing a staff member and don't really expect them to do any gainful work. For longer more structured paid placements they would be expected to learn a narrow skill set through menial work such as data entry, and recording data from harvesting trials. It is difficult to justify to the board to have someone who isn't fully trained and experienced on a good wage. The person would also be expected to have the 'right' personality type because of the type of people they would be dealing with out in the field. (Small-sized company)

**ICT:** It would depend entirely on the availability of appropriate projects/work for them do to. Also, they would have to be able to adapt very quickly from the programming platforms used at university to those more specific ones used here.

(Small-sized company)

**ICT:** Would want the students to have an understanding of the commercialisation process, not just having software ideas and designing something, but being able to see a commercial market for it.

(Medium-sized company)

There were also a couple of organisations apart from these nine that had supported WIL arrangements in the past but not currently because the nature of their work had changed. For example, one SME in the biotechnology area said that they are now focused on 'standard operating procedure' and not on research and development as in the past, making it difficult to bring in a student on a specific project.

> **Biotechnology:** WIL was offered in the past but now the company is driven by Standard Operating Procedures (SOP) and this makes it too difficult to bring in a student.
>
> (Small-sized company)

# Focus group findings

This chapter reports the results of the focus groups undertaken as part of this project. In total, five focus groups were conducted. Two of these focus groups were industry-based (agriculture and biotechnology); one of the groups involved people who do not provide WIL, while the other two included other employers with a mix of experience in WIL.

- Focus group 1: Agricultural sector in regional Victoria, mix of WIL and non-WIL employers
- Focus group 2: Biotechnology sector in a capital city, varying levels of experience with WIL
- Focus group 3: Mixed industries in capital city, no employers providing WIL
- Focus group 4: Mixed industries in capital city, both employers providing WIL
- Focus group 5: Mixed industries in Canberra, varying levels of experience with WIL, and government representatives

The aim of each focus group was slightly different. A standard focus group protocol was followed for focus groups 1, 3 and 4. Focus group 2 discussed issues broader than WIL, but specific to their industry and models of engagement for students; focus group 5 was mainly concerned with issues affecting SMEs and strategies to enhance the uptake of WIL students among SMEs.

A breakdown of the focus group participants by discipline type and employer size is included at appendix A, with a copy of the focus group protocol included at appendix D.

## Focus group 1: Agricultural industry focus group

Attendees at this focus group were from the agriculture (crops) industry in rural Victoria. Seven people attended this focus group (three state government representatives, a representative from a water catchment authority, the CEO of a group training organisation and VET college, the CEO of a grower group, and a representative from a large multinational organisation). A focus group protocol was followed, which included the reasons and benefits of undertaking WIL; or if not, why not; and the benefits and constraints in undertaking WIL. Note that not all the attendees represented organisations that offer WIL.

### WIL experiences and benefits

The participants in the focus group mentioned a range of experiences in engaging with students, some of which are not strictly WIL. These range from casual work over summer (not WIL), through to internships and postgraduate programs.

Casual labour is used by the state government participants over the summer period. It gives the students some laboratory skills and is cost-effective for the department. However, these are not formal arrangements and, as noted, do not strictly adhere to the definition of work integrated learning.

Programs that do fall under WIL include internships. In addition to providing opportunities to students, they are also beneficial, in that they are used as a vehicle for recruitment. One of the internship programs mentioned was the Wimmera Internship Program. This program illustrates the motivations for engaging with work integrated learning in this region. The program is offered by the Wimmera Development Association. The impetus for this internship is to attract and retain new students and graduates to the region, given the difficulties in getting professionals to live and work in rural areas. The Regional

Development Authority works with employers in the region to identify opportunities and then matches these to students from universities.[5] The students live in the rural community during their placement to experience living and working in a rural community, which employers cited as a benefit.

Another benefit, particularly for the student, was the development of skills not learned at university. This includes seeing how a business operates and, in the case of one participant, dealing with multicultural customers. One participant claimed that the more opportunities the workforce has to integrate with students the better off everyone will be (although this takes time and effort and there are practical difficulties). Another mentioned that when they are looking for graduates they are looking for evidence of previous work experience or volunteer work.

## Constraints and issues

The discussion of constraints and issues was quite clear and came down to three main issues: costs (which affect smaller businesses to a greater extent), the timing of the placement, and the regional location.

As mentioned, costs are more of an issue for smaller businesses than for large businesses. The cost and overheads associated with a small business were seen as a limitation by participants to taking on WIL students. These costs include supervision time, but also other overhead costs such as those related to IT and insurance requirements. Where there is a funding body involved in the project, the costs may have to be extracted from them. On participant noted:

> [There is] no way to recoup costs in a tendering type of environment.

One participant mentioned that taking on a student can be justified at a postgraduate level because there is a return on the investment but at lower levels (undergraduate) it is harder because the costs of training exceed the benefit.

Participants also mentioned that sometimes the timing of the placement can be a problem; that is, the placement needs to fit in with the needs of the business (cycle). In agriculture, there tend to be peaks and troughs at particular times during the year and these do not necessarily align with university semesters or the summer vacation period.

The regional location was also mentioned as an issue by the participant from the large multinational company. In particular, there is a need to be able to find people willing to move to a regional location where the business has its operations. However, it was mentioned that people also need to have a social connection with the area.

## Assisting small business to engage in work integrated learning

There was some discussion in the focus group about what can be done to assist small businesses to engage with the WIL experience, given the constraints they have particularly around cost.

The idea of a 12-month placement was mentioned to help develop the student's skills. As the person has to be trained, it takes up to six months for there to be a net benefit to the organisation and with many competing pressures on the organisation, this has implications for resources. It was pointed out that the company is 'not paid to be a training organisation'.

It was mentioned that another way by which to assist small business is to ensure that the timing of the placement meets the needs of the agriculture industry (which has peak times, in terms of the agricultural

[5] See <http://wda.org.au/special-projects/internship-program>.

cycle). This involves the university and industry collaborating on the time of the WIL. The representative from the group training organisation explained that they designed their placement in two segments to accord with industry needs (which is April to June and September to December).

Another point raised referred to the relationship between the training provider and the industry, specifically in terms of being upfront and honest about what the students can offer on one side, and what business can offer on the other. This establishes the right expectations at the beginning and enables a better match of students and employer.

# Focus group 2: Biotechnology industry

Nine people participated in the biotechnology industry[6] discussion session. Seven of those had worked in private companies in these areas, one in a university, and the remaining one in the relevant peak industry body. All of the participants had some experience with WIL, but of varying levels.

As noted earlier, this discussion session did not follow a structured protocol but was rather more a free-flowing conversation focused on issues particular to the biotechnology industry and models of engagement. There was also a follow-up discussion with one of the participants, which is reflected in the text below.

## Issues relating to the biotechnology industry

Much of the discussion centred on participants' desire for the growth in their industry. A couple of participants argued that a larger stronger biotechnology industry would be better placed to provide more WIL to students. In their view, WIL is only one small component for developing the skills the industry needs for growth.

Another substantial issue centred on the nature of sections of the biotechnology industry, in particular, those involved in the development side of the industry rather than research. It was considered that there was a lack of understanding of what is involved in development (by decision-makers and universities). In particular, the industry is characterised by entrepreneurship (meaning that there are many 'start up' companies with an inherent risk of failure). In addition, the industry's development cycles are generally of more than 12 months duration.

In this context therefore there was considerable discussion around the value of shorter (three-month placements). It was considered by some present at the discussion, mainly those working in development, that the three-month placements were not worthwhile, both from the employer's perspective and also from the perspective of the student. Further, the skill sets of the students were felt to be more suited to research than to development (for which the skills take a long time to develop). One of the participants noted:

> Employers are very mindful of the responsibility they are taking on with the students and quite frankly if we cannot look after them well and we cannot give them some benefit, then we are not going to want to do it.

However, others thought that the shorter internships could be valuable as 'taster' programs to get students interested in a STEM career. It was thought that many students were not aware of what was available. In addition, one participant mentioned that on the manufacturing side it is possible to have smaller more discrete projects.

> We get a little project out of it, they get something of it, and everybody wins.

There is a different perspective on the manufacturing side, with one participant saying the three-month placement offers the student exposure to the nature of the industry. Their company also provides mentoring to students with resume-writing and guidance on how to present themselves in the market. Another said that the undergraduate is to 'start the spark'. However, the participant from the manufacturing company indicated that it would be good to have a central database of students to select from, as interns were difficult to find and he was not sure where to go to get them.

[6] Very generally, the biotechnology industry refers to activities related to the invention (research), development and production of biological products and processes.

One of the other main issues discussed and which related to the points above was the relationship between industry and government. In particular it was thought that government did not really understand the needs of their industry sectors. One participant stated that:

> I want the decision-makers to walk a mile in the industry's shoes and to seek time to understand the needs of industry. I see a complete disconnect. A three-month program is not going to build an industry.

In this vein, another participant discussed their willingness to invest in PhD students but not in undergraduates. As they are developers, their core competencies differ from those of science research and they felt that this was not understood.

> The answer is to listen to industry and its needs. It is different from the needs of research. It's not about getting someone in for three months.

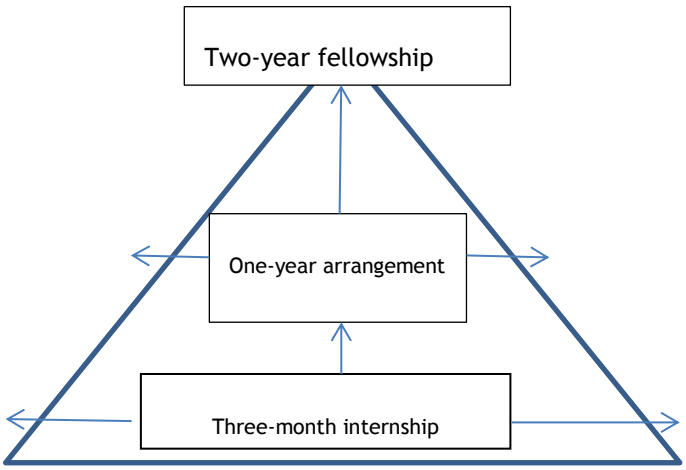
They also said that these competencies (in development) take a long time to develop.

> It's about strategic thinking, thinking on so many different planes and creating other core competencies that are needed to be built as part of the ship.

## Models of engagement

During the discussion session several models of engagement with students at various levels (and also graduates) were mentioned. Not all of these are what would be considered traditional work integrated learning; however, they should be considered in terms of an overall hierarchy of models that meet different purposes. These are largely focused on simultaneously meeting the needs of industry and the student (in terms of the issues discussed above). More particularly, a hierarchical triangle was proposed (figure 2). At the base is the three-month undergraduate placement and at the apex is the 'elite' (postgraduate) fellowship.

Figure 2 Hierarchical triangle of WIL arrangements



The three-month internship forms the largest component of the workplace experience. These internships are valuable in terms of understanding work and learning some on-the-job skills, such as presentation skills. They are also useful when a discrete project can be undertaken within this timeframe. They can also serve as a 'taster' to the industry. However, they may not be suited to all industries. For instance it was mentioned by the biotech development companies that three months is insufficient for completing a project.

At the next level are longer placements, for example, a one-year internship. This type of arrangement may be more suitable for companies with longer cycles. These would be less common than the three-month internship.

At the apex of the triangle are the fellowships. These are not undergraduate workplace experiences but could be considered more 'elite' because they provide a graduate with a significant experience and further training. As indicated by the triangle there would be relatively few of these.

In this vein, one of the participants also described a program they had that was referred to as the 'three pillars', which were 'tasters', pharmaceutical engagement, and (strategic) capability building.

Some linkage between these three levels may be possible; for instance, a three-month internship could be followed by a later 12-month internship.

The idea of a joint internship was also discussed. This was in the area of engineering (but could be extrapolated to other discipline areas). This idea of joint internship was thought to be important because of the depth of experience required for an engineering career. More particularly it was proposed that one of the internships could take place in a design company and the other in a manufacturing company so that the student can get a grasp on how the design is transferred to a manufacturing process (including issues related to purchasing and quality). This of course has implications for the coordination of the internships between the two different types of companies.

During the discussion participants spoke about several models in Australia and overseas, whereby students and graduates can gain useful industry experience. The programs are at various levels (as per the hierarchical triangle mentioned above). Some of these programs include the:

- *Major Industrial Project Placement Scholarships (MIPPS) Scheme*: this is a full-time industrial placement program for high-achieving fourth year students in the School of Chemical and Biomolecular Engineering at the University of Sydney. Students receive a $13 000 tax-free scholarship and have their first semester's requirements replaced with six months of full-time work (projects) with industrial and academic supervision.
- *Science Industry Placement Program (SIPP)*: this program is offered by Monash University to their science undergraduate students. The program has several aims, including providing the student with industry experience, applying the knowledge gained from their studies to real-life situations, developing leadership and communication skills, and fostering collaboration between the university and industry. The industry placement is between 30 and 80 hours and is voluntary; that is, it does not count for credit towards the course. One participant reported that they host these students for 80 hours and put them on a program. During the program students have to document their processes. By the end of the 80 hours the science undergraduate has to present data.
- *Rutgers University Research Fellowships*: based in Rutgers University in New Jersey in the United States, this program offers industry-based pharmaceutical research fellowships to PhD students. One of the participants in the discussion group mentioned that these PhD students are on annual

salaries of $80 000 and are kept on for three years. Funding is also provided for them to attend conferences. (It was not clear from the discussion however exactly how the salary is funded.)

- *Industrial Transformation Training Centres*: these aim to provide higher degree by research and post-doctoral industry-based training. They are funded by the Australian Research Council (ARC) as training centres and are partnerships between university and industry. ASTech (ARC Training Centre for Portable Analytical Separation Technologies) was one training centre mentioned at the discussion; it is a partnership between the University of Tasmania and Trajan (or one of its partner organisations).

In summary, the dominant themes to emerge from this discussion were:

- The type of arrangement needs to be tailored to the needs of the industry. Options for undergraduates include:
    - joint internship arrangements across two companies in a different part of the 'cycle' (for example, development and manufacturing)
    - longer work placements of at least 12 months to enable the company to realise some return on its investment
- That there are opportunities for greater understanding by decision-makers of the needs of certain aspects of the biotechnology industry, in particular, the development aspect.

# Focus group 3: Mixed industries, do not provide WIL

The discussion in Sydney followed the protocol for employers that do not undertake WIL (appendix D). There were only two people present at this discussion, one a representative from an accounting and business advisory company and the other a coordinator from a peak industry body.

## Constraints/barriers in taking on students for work integrated learning

The main reason why employers may not take on students for work integrated learning experiences are quite clear. They said that the case for WIL rests on 'costs' versus' benefits' for the business. This is particularly the case where the benefits to the organisation are not clear. The issue of costs is more pronounced for small businesses.

Another potential barrier noted was the extent to which the experience of WIL could be related to what the student was learning at university, and the support offered by the university.

It was also thought by one of the participants that it is difficult for employers to engage with universities. For instance, there might be no central contact at the university, and different universities and even different faculties within universities had different processes for dealing with WIL. In other words, there is no uniform procedure.

## Possible strategies

In terms of making WIL accessible to employers, participants said that it needed to be made as easy as possible for the employers. This involves developing specific projects and then being able to match these to appropriate students.

Another strategy for making WIL more accessible was greater promotion of WIL and communication by universities, in terms of meeting with industry, checking with employers and students regularly during the WIL, and evaluating the outcomes and benefits of the WIL for all parties.

## Focus group 4: Mixed industries, provide WIL

Three people participated in this focus group in Adelaide: the managing director of a state-based electronics company, a human resources manager from a large international consulting company and a state government representative (involved with science, technology and research workforce issues). The focus group followed the focus group interview protocol.

### Reasons for WIL involvement

The two private companies in the group discussed their reasons for taking on WIL students. Both companies provide WIL placements for university students to fulfil basic company needs. They also use the experience to identify talented individuals for future employment; they benefit from the latest knowledge and skills that students bring with them; and they meet their corporate responsibilities for increasing skills in the community and in industry. The representative from the large consulting firm explained that they participate in the provision of WIL for university students with the express purpose of converting these WIL students to graduate employees. In this way both the company and the student benefit from the experience.

Both companies were of the opinion that the involvement of other staff in mentoring WIL students has become a key part of the company culture, as well as an effective staff development tool. Both companies are keen to develop an innovation culture and to take advantage of the new ideas and skills relating to the 'cutting edge technologies' and facilities to which students are exposed in the academic environment and which can be shared with company staff.

The electronics company representative believes that including a work placement should be essential for all degree students, as it is for those undertaking engineering degrees, and that such placements benefit the company that provides the work experience and the students that undertake it. WIL students are felt to 'bring a breath of fresh air' to the company environment and help to achieve company objectives by working on projects that have been neglected because of lack of resources. Other employees (especially those who are involved in working with students) also confirm the benefits of students in workplaces. In relation to the electronics company, WIL is no longer perceived as a burden.

In terms of recruiting for the placements in these companies, students undergo a recruitment process quite similar to those who are looking for permanent employment. In many cases it is the student who will approach the company for a placement, either on their own initiative or in response to some company promotional activities. One of the universities approaches the company to request placements for students. Both companies report being inundated with applications, suggesting that there is considerable demand for WIL for these paid placements.

When students begin the placement at the electronics company they will undergo a formal induction process, after which they will all start in the production areas (including Stores, Production and Engineering). Here they will get exposure to how the business operates as a whole. This approach is felt to be a good start to the placement because it helps students to become part of the team.

### Organisation and content of placements

The participant from the electronics company reported that he has arrangements for placements with all the local universities. The placements include 12-week vacation placements and 20-week placements through the academic year. The consulting company offers three-week placements during university vacation.

For both companies the placements aim to provide relevant experience for students. While the experience is separate from the students' coursework, the students will draw on the skills they have developed at university. The placements in both companies provide the students with hands-on experience working on projects or tasks the company needs doing.

At the electronics company the students are provided with practical experience related to their particular specialisations. The company rather than the university determines the content of the project on which they will work during their placement. Students will generally spend half of their placement time working on this project, drawing on the skills learnt at university as well as those developed in the workplace. For example, chemistry and biotechnology students have been examining the development of material safety data sheets, as well as undertaking a risk assessment of the enterprise's physical environment. A student from engineering is working on a project which involves the application of 3D printing. In this he is using and sharing the skills and knowledge he has learnt at university in 3D printing programs as well as educating the team with which he is working. The completion of the task to specific timelines is not considered as important as completion of the task itself and the outcomes achieved. The student projects are evaluated by other employees.

One of the universities involved expects its students to make a presentation to the student body, while the other two expect students to complete a written report. No university is particularly prescriptive in what the student is expected to do in the placement, and in the main the company decides on the content of the placement.

The placement program in the large consulting firm is used as a pipeline to the company's graduate program, enabling the company to identify talented students who will be employed in their graduate program. Students who are unsuccessful in the WIL placement do not become eligible for the graduate program.

## Interactions with universities

Both companies have loose connections with the universities from which their WIL students come, and both are generally satisfied with the level of this interaction, believing that the same applies for the universities. However, the practice of university lecturers taking the time to visit students in the workplace is felt to be a good thing and should apply to all placements.[7] The companies promote their programs through attendance at university career fairs, competitions[8] for students and other events. Connections are also developed through staff involvement in university tutoring courses or representation on course advisory bodies.

## Constraints

Both companies have experienced very few constraints in providing WIL for students. However, the electronics company is reluctant to work with universities who insist on companies signing over to the university intellectual property rights to products developed by the student during the placement. In this company the student will sign an agreement in which he/she agrees not to share the IP developed during the completion of the project with others. However, the student can draw on the material for

[7] One university had provisions for lecturers to visit students on placements.

[8] The consulting firm asked students to submit a question to company partners. If this question was judged as thought-provoking and challenging, then the student would be asked to attend a lunch with company partners where such questions were answered.

presentation purposes but the IP stays with the company. The increasing lack of female applicants for WIL programs over the last few years is an issue for the consulting firm.

# Focus group 5: Canberra-based, mixed industry that provides WIL, and government

This discussion session focused mainly on issues for small to medium enterprises when taking on WIL students and also suggestions for strategies that could assist SMEs to take on students. Two initiatives to promote WIL were also discussed.

Nine people participated in this discussion session. Five were from private companies and mainly in the engineering, IT and design discipline areas and tended to be SMEs. In addition, there were three ACT Government representatives and one representative from an organisation involved in collaboration regarding innovation. The ACT economy has a unique employment market, as the public service contributes disproportionately to an economy with a small population base. Despite these economic factors, participants in the group discussed similar benefits and challenges to engaging STEM students in WIL as other states and territories.

## Issues for SMEs in taking on WIL students

The main issues raised related to SMEs' financial/resource constraints and also their lack of knowledge of what is expected of them.

In terms of the first point, SMEs were unlikely to take on students for WIL unless they benefited (that is, it needs to be cost-effective). The one participant who worked for the organisation involved in the innovation collaboration explained that it is difficult to articulate the benefits to small businesses flowing from WIL as opposed to general work experience programs and that there needs to be a clarity of purpose about WIL before it can be promoted to SMEs.

Regarding the second point, the process for taking on WIL students is unclear. For example, clarification is needed about what students want and what skills they have. Many SMEs don't know what is involved in taking on a student for WIL. A related issue was the difficulty of finding and working out the correct award for interns.

In addition to these two major concerns, a few other issues were raised, one of which related to companies building relationships with universities, being successful in some cases but in other cases less successful. It was also mentioned that for some businesses the three-month internship model is not adequate for the student to do a proper placement or project.

Furthermore, some parts of STEM were felt to be more specialised than others. The question was therefore raised about how many SMEs could take on a student in a specialised area. It was agreed that, for those who can't, perhaps some of the more general and transferable skills held by general science students could be promoted to SMEs.

Security was also raised as an issue for some. This was particularly in relation to foreign students and their visa status and what tasks they are able to work on.

## Strategies to improve uptake of WIL by SMEs

A great deal of discussion took place on ways to improve the uptake of WIL by SMEs. Many of the suggestions were aimed at mitigating the two main issues discussed above.

- Develop a simple package on what's available and how to do it using language appropriate for business. The package would articulate a value proposition for SMEs taking on WIL students, a step-by-step guide on how to go about it and who to contact, and information on any

funding/assistance that may be available. Intermediaries such as peak bodies would be helpful in developing and distributing these. The packages could also be discipline-specific. It was mentioned that CPA Australia has very good work experience guidelines and that something like this could be adapted to the context of work integrated learning.

- Develop mechanisms for SMEs that already support WIL students to visit those SMEs that do not and explain the value of WIL and what is involved. Appropriate forums to do this need to be sought. This could be done through industry and discipline-specific peak bodies or even a forum such as Rotary, which often has connections to SMEs.
- Similarly, appropriate government agencies could be invited to speak at various forums. Once again, these could be peak bodies or organisations such as Rotary.
- Universities could establish a central contact point for all matters relating to WIL. This first point of contact would direct the employer to the most appropriate person in the university. The contact details could be put on the university's website.
- Following on from this, universities could provide their contacts to the appropriate employer bodies.
- There should be a way of matching the profiles of employers to students and the skill sets of the student.
- Regional students studying in capital cities could be supported by finding WIL placements for them in their region.
- A suggestion was made for including a clause in government contracts awarded to SMEs that they demonstrate involvement in the community by taking on students for WIL placements.
- Coordinating the timing of the placements for SMEs to help them reduce costs was also given as a possible approach. For example, if two interns were appointed at the same time (rather one at one time and one later), it would reduce the mentoring cost of the students.
- Find a way for students who have undertaken WIL to promote its benefits to other students. This may be particularly useful in disciplines where there is a relatively low uptake of WIL.
- Have the option of internships longer than three months (say at least eight months) to meet the needs of particular industry sectors.

## STEM 4 Digital Business Internship program

Three of the participants were from the ACT Government and they discussed a scheme supported by them that promotes WIL to businesses in the ACT. The scheme provides grants to ACT-based businesses that take on undergraduate (second year or higher) interns in STEM-based disciplines at a Canberra-based university or the Canberra Institute of Technology for period of the equivalent of 12 weeks full-time.

The scheme funds 75% (or $7500) of the internship, with the business funding the remaining 25% ($2500). Under the scheme the intern is visited halfway through the internship and also at the end of the internship by the government representatives. As part of these visits the interns are surveyed about their internship, while the business is asked about the internship.

## TechLauncher

Another initiative mentioned at the discussion group is an initiative by the Australian National University called TechLauncher. Under this initiative students from any discipline can become involved in technology-related projects that develop their research and professional skills. Students can be involved in teams that create start-up companies or in teams working on actual industry projects. All teams will have experienced mentors to guide them. The projects and start-ups occur across a variety of disciplines, with high school students also able to participate. Courses undertaken under TechLauncher are assessed and graded.

# Alternative models of engagement

Discussions with employers have revealed a variety of models that engage students with the world of work. Not all of these would be considered as strictly work integrated learning for undergraduate students. For example, some engagement occurs at the postgraduate level (master's and PhD candidates) and some via scholarships or informal casual work experience or a cadetship model based on the apprenticeship model. However, it is important to be aware that the traditional WIL program (for example, a three-month summer work placement) is only part of the picture of student engagement with industry and may not meet the needs of every business in a given industry sector and organisation size.

This section summarises some of the alternative models identified during this study, which may be relevant to a broader range of industries or disciplines.

The alternative models raised in interviews and discussions included:

- *The model used by the Australian Mathematical Sciences Institute (AMSI)*: this is a good example of an intermediary organisation facilitating an industry-based internship program (see box 8)
- *Industry-based cadetships*: the industry employs the (potential) student as a cadet and a requirement of the cadetship is enrolment in a relevant degree (to be undertaken online). The company funds at least part of the degree. The cadetship can take four to six years to complete (see box 9).
- *Industry-based scholarships*: such scholarships fund degrees in areas relevant to the industry. In some cases, the students are casually employed by the company, but there is potential for 'work experience' or WIL of some kind to be integrated into the scholarship requirements (see box 10).

In addition to these models, suggestions for other models of engagement arose out of focus group 2 (the biotechnology focus group). In summary, these suggestions include:

- *The hierarchical triangle of engagement*: in this triangle model, the 'traditional' three-month WIL forms the base of the triangle and is the largest component of WIL. Following this is a smaller group of longer placements (12-month) that immerse the student into the industry more deeply and may be suitable for companies supporting work projects with longer development cycles. At the apex of the triangle sits a small number of fellowship arrangements (post graduate study) of around two or three years in length to develop the work-related skills to a very high level. It is noted that these three can be linked.
- *Joint internships*: these internships take place in two or more companies. The example used was in the engineering area, whereby one three-month internship could take place in a development or design stage of company, while another could take place in a production stage company, both providing the student with a broader experience.
- *Fellowships*: these take place after the student has graduated but provide the graduate with a significant level of experience and further training. They would be about two years in length.

**Box 9: Alternative model 1 — the AMSI Internship**

The Australian Mathematical Sciences Institute (AMSI) internship provides an example of engaging with and promoting the industry to STEM students. Although it is not a work integrated learning program as such, and it is aimed at postgraduate students, it still offers an interesting model for providing students with skills relevant to their learning.

The views of two companies were sought regarding this internship. One is a medium-sized company in the area of commercial mathematics and the other is a large biomedical company. The first company has had four or five interns since 2008, whereas the other has had two interns to date (with another just starting at time of interview). All the interns in both companies were PhD students. Both companies had a very positive view of this internship arrangement.

**Brief background about AMSI internship**

AMSI offers an industry internship program in order to promote collaboration between mathematical scientists and industry. The internship involves four parties: the intern, and industry partner, an academic mentor in a university and AMSI. The interns are postgraduate students or post-doctoral fellows. The company is asked to invest $3000 per month for three to five months (the money going to the student via AMSI) and in addition AMSI invests $5000 for each internship to encourage academic mentors to supervise the student. The intern works on a predefined project of value to the host company. About half of the intern's time is spent at the host company, with the other half at the university or research institute.

**How it works on the ground**

The interviewees were asked why they took on these interns. Interns were seen by both companies as an extra resource. One of the companies noted that interns are accepted in areas where there is a lack of depth in a certain skill set. The commercial mathematics company also added that the maths community is small so they are looking after the supply side by ensuring their maths graduates are well trained.

'We are passionate about the industrial application of mathematics. However in addition to this the students are an extra resource and also bring in fresh thinking to the organisation.'

AMSI presents candidates for interview. The biomedical company on the other hand has also had contact with an academic supervisor who can recommend a candidate for WIL.

While the AMSI interns work on projects, in both these companies the way they go about it is different. In the commercial mathematics company they find a high-quality candidate and then set a project to suit the candidate. The candidate should be able to achieve the following in terms of the company's business problems: frame the problem, formulate a possible solution, code the potential solution (the most challenging part) and run/iterate the code until the solution is achieved. Their interns also need to be able to deal with messy data, have 'social capability' and be able to deal with clients.

The biomedical company, as mentioned, looks for candidates to fill skills gaps. The company gave an example of an intern who had an engineering background but also had IT training, meaning that they could work in the area of bioinformatics, which is a skill set not held by their current staff. This company also noted that the students need to have good communication skills in addition to technical skills. They believed that the students they select have initiative because they have applied for the internship in the first place.

Given that the internship is run through AMSI, the two companies mainly interacted with AMSI rather than universities (although there was some contact with the university). In addition to presenting candidates for interview, AMSI also handles contracts and administration. Both companies found that this relationship with AMSI works well.

There were no major constraints or barriers to the program identified by the two interviewees. One mentioned that there could be a broader base for selecting the candidates (that is, they all appear to be local).

**Box 10: Alternative model 2 — industry-based cadetships**

This company is a multinational resources company with a large workforce — a total of 20 000 staff nationwide. The primary Australian operations are based in regional Queensland, where there are approximately 4000 staff. The primary STEM graduates and students working for the company are engineers, metallurgists, chemists, surveyors and geologists. The company offers several WIL programs for university students including: 2.5-month vacation placements for mining engineers and geo-technicians, which are supplemented by scholarships and bursaries for the students. It also sponsors engineering PhD candidates to develop new exploration techniques and mining methods. Of particular interest is the cadetship program. The company takes on 15—30 employees per year (and up to 60 in peak years) as cadets. The cadets work full-time for the company but must also study engineering, geology or earth sciences degrees online. These are either fully or partly funded by the company, depending on their relevance. Potential cadets are required to apply for the cadetship, go through the selection process and complete maths and English tests. Cadets are assigned a 'non-supervisor' mentor to assist them with any work or study issues and they typically take four to six years to complete their study.

The company has partnerships with other universities in regards to other programs and projects. However, there is no formal relationship with any university in regards to the cadetship program. The company has preferred universities for enrolling their students as it needs the course delivery to be flexible to suit the work and study demands of the cadets. It does not use Queensland universities, but generally the universities based in other states which are more geared towards providing online delivery.

Some of the challenges the company has faced in attracting suitably qualified staff have been associated with recruiting non-local workers due to the relative isolation of the location in regional Queensland and the lack of appropriately qualified people in the local workforce. The company introduced the cadetship to help alleviate this problem and to provide education and training and employment to local workers. Some of the benefits of the program for the company include: the ability to fill skill gaps and upskill existing workers; the employment of highly motivated and productive cadets; and increased retention, as cadets are more likely to stay with the company.

Some of the barriers to the success of the cadetship program are balancing work and life commitments, which can prevent cadets for completing their study and the lack of a nearby university campus, meaning that all study is done online. This can be challenging for some students.

While this cadetship model isn't strictly WIL because the employment is the primary focus, rather than only a component of the study, it is an example of another approach to providing workplace experience and education and training to future STEM professionals.

**Box 11: Alternative model 3 — industry-based scholarships**

Another alternative model to WIL adopted by small, medium and large companies in the agricultural industry in Tasmania are the three- to four-year scholarships for students studying agricultural science and chemistry. In some cases the scholarships are offered for the full degree, may include honours, or start in the second year. Different companies have different mechanisms for attracting and offering students. One company advertises the scholarship on its website and students are invited to apply, where they go through a selection process. Other companies follow the advice of lecturers and other university contacts, who recommend suitable students. While scholarships certainly aren't a new concept, in these cases, many of the scholarship students work part-time, or casually with the companies during their holidays or throughout the year. These working relationships aren't a formalised component of the scholarship, and most of the companies are happy with the ad hoc nature of the employment relationship with the scholarship students, as it is flexible and suits the needs of the business and student.

However, one of the companies suggested that they would look into including an employment commitment into their future scholarship offers. This is something that other companies in other industries could consider, and it may be another approach for companies to engage with students and support the development of their work-ready skills.

# Future strategies to engage employers in WIL

The one-on-one interviews and the group discussions with employers and the findings of the literature review provide some direction for the development of high-level strategies with the potential to improve employer engagement with work integrated learning.

The strategies are aimed mainly for government or university implementation. While the strategies proposed relate to businesses of any size, they are particularly pertinent for small to medium enterprises. The underpinning principles of these strategies are promotion, communication and the use of intermediaries.

- Develop an online information portal for use by government, employers, universities and students. The main aim of the portal is to link employers with students and university coordinators to facilitate student/employer 'matching' and to act as an information source on WIL and other forms of industry engagement with students. Possible functions could include:
    - a database of students who are seeking to undertake WIL projects or placements, which can be considered by employers
    - research or work-based project ideas submitted by employers, which can be considered by students and university contacts
    - employer registration of interest in taking students on placement or work experience
    - employer and intermediary promotion of their own vacation or internship programs to students and lecturers
    - university promotion of their own WIL programs to employers
    - a database of contact details of various university WIL program coordinators, intermediaries or other relevant contacts
    - guidelines and best practice guides for employers to follow, and act as an information hub.

    To ensure its relevance, any 'information portal' would need to be filtered by location and discipline to ensure that universities, employers and students are able to make meaningful contacts and matches. Employers, universities and students would all contribute to the portal. The success of the online portal depends on its being targeted to and used by industry groups and individual employers. It also needs to be adequately maintained to ensure the technology and content is up to date. Australian Collaborative Education Network Ltd ACEN currently has a portal in place, which is described as a 'one-stop-shop' for industry, community and the professions, enabling the promotion of all types of WIL opportunities. There may be potential for this platform to be expanded and developed further.
- Develop partnerships with intermediaries (particularly industry organisations and discipline-specific peak bodies) to facilitate WIL. Intermediary bodies have excellent connections with specific industries, and they understand the industry's cycle and needs. Two examples of WIL driven by intermediaries are AMSI (discussed in box 8) and the Undergraduate Research Opportunities Program run by Biomedical Research Victoria. Another model for consideration

introduced in 2015 is South Australia's Department of State Development partnership with the Defence Teaming Centre to provide scholarships to support work-based honours projects and internships to STEM students in the defence sector. Both government and universities could pursue these types of partnerships with intermediary bodies.

- Develop a broader communication strategy, with a specific focus on communicating the 'value proposition' of WIL to SMEs and also guidelines on how this is done. Whether it be setting up a WIL portal, or developing partnerships with industry body intermediaries, it is essential that the value of WIL and its mechanisms are well communicated to employers. Employers prefer greater communication about WIL: in terms of understanding its value and benefit; in relation to the specific WIL processes; and in regard to the clarification of roles and expectations. Potential ideas for communicating with employers include:
    - Develop partnerships with intermediaries (such as industry organisations and peak bodies) to communicate to employers the value of WIL and where to find information on WIL.
    - Provide information sessions on WIL, hosted in partnerships with industry associations and university coordinators.
    - Develop information packs which include: the 'value proposition', information sheets, guidelines outlining the roles and expectations of WIL and information on available funding or specific programs. These information packs could be developed and distributed in partnership with government, universities and intermediaries (such as university bodies and industry bodies).
    - Information packs can be tailored to specific industries or disciplines and industry bodies or association.
    - Share WIL information packs and other guidelines and best practice documents widely with employers via the 'information portal'.
    - Promote the 'information portal' to industry.

## Strategies specifically for SMEs

While the broader strategies listed above apply to SMEs, the findings and suggestions from employers indicate that additional strategies can be utilised for increasing engagement in WIL among SMEs.

- Develop information packs (detailed above) specifically for SMEs. These would include: articulating a value proposition for WIL, a step-by-step guide on how to take on a student for WIL and what is involved, and any funding assistance that may be available (for example, ACT Government model).
- Universities could ensure that current information sources are targeted specifically to SMEs, including the benefits, implications and expectations of WIL.
- Universities could target SMEs to encourage their participation in various activities such as campus visits, guest lectures and career days.
- Universities could provide a central contact for WIL on their websites, as employers do not necessarily know who to contact and may find university bureaucracies overwhelming. In addition, universities could provide their contacts to all the appropriate employer bodies.

- Where relevant, universities could consider greater flexibility in the timing of the WIL to suit the needs of the individual business cycle, as well as the broader industry cycle.
- Develop a mechanism whereby SMEs who have had experience with WIL students have discussions with other SMEs in various forums, including Rotary associations.
- Encourage flexible models to fit the needs of SMEs (noting that some of the alternative models are not strictly defined as WIL) and communicating to SMEs the variety of available arrangements. Some alternative models of engagement are provided in the previous chapter.

The strategies listed above reinforce and build on those outlined in the newly released National Strategy on Work Integrated Learning in University Education, released by Universities Australia et al. on 11 March 2015.

The eight high-level strategies in the National WIL Strategy are:

- Provide national leadership to expand work integrated learning (WIL).
- Clarify government policy and regulatory settings to enable and support growth in WIL 3.
- Build support — among students, universities, employers across all sectors and governments — to increase participation in WIL.
- Ensure that investment in WIL is well targeted and enables sustainable, high-quality experiences, stakeholder participation and growth.
- Develop university resources, processes and systems to grow WIL and engage business and community partners.
- Build capacity for more employers to participate in WIL
- Address equity and access issues to enable students to participate in WIL.
- Increase WIL opportunities for international students and for domestic students to study offshore.

The following strategies which aim to build capacity for more employers to participate in WIL are particularly relevant for the findings of this report:

- Increase employer participation in WIL.
- Increase SME participation in WIL.
- Develop WIL in specific and priority sectors (including STEM).
- Build and track employer engagement.

While the National Strategy on Work Integrated Learning is broad and applies to all disciplines and industries, the strategies remain relevant to STEM disciplines.

# Observations and conclusions

## Types of WIL arrangements

Although employers make a variety of WIL experiences available to students, the key WIL approaches used by the employers who participated in this study are those that require students to spend some time in the workplace, generally working on specific projects or on operational or production tasks. Work placements, longer-term internships, cadetships and traineeships tend to be the most common arrangements. These approaches offer students the opportunity to undertake practical work and enable them to be embedded into work teams, including those undertaking commercial work for clients. They also give students experience in taking responsibility for all or part of a task (often with mentorship and supervisory support) and being accountable for the results achieved. However, a number of practical considerations, particularly relevant to SMEs, may limit the availability for 'placement' type WIL: some companies may not have the budget, staff or time resources, or workload capacity to have highly structured WIL programs or to offer WIL regularly.

In the interviews and focus groups several discipline areas were covered. While the occasional discipline-specific issue arose, overall there were very few differences. Generally, differences pertain more to the size of the company and the work the particular company undertakes rather than the discipline. Where there are particular differences, it is usually where a discipline is more closely associated with a specific industry, such as the agriculture industry.

## WIL by industry

The organisations in the interviews and focus groups covered several industry groups to various degrees. The largest number of respondents to the individual interviews by far was in the professional, scientific and technical services industry (36 in all). For the purposes of this report, this particular industry was further broken down into those that are governmental in nature (6), those involved in laboratory operations (4), those that design, develop, manufacture and service their own products (10), and those involved in consulting, research, project management or other services (16). However, no clear differences in patterns of WIL engagement were revealed by this breakdown for the professional, scientific and technical services industry. It is noted however that this grouping takes on students for WIL from a variety of discipline areas.

Other industry sectors where there were several respondents to interviews and/or focus groups included agriculture (nine respondents, one focus group), and manufacturing (eight respondents). Overall, it was difficult to discern any major patterns in WIL by industry sector based on our sample of employers (through the interviews and focus groups). The few issues that were identified are discussed below. Appendix A shows tables of employer interviews and focus groups broken down by industry.

It is clear that the agricultural industry has an interest in developing their future STEM workforce. The nature of the agriculture industry means that many of the companies are located in rural locations. This has particular challenges for attracting students for WIL experience, particularly where the university is not located close by, and indeed as potential future employees. This was apparent as an issue both in the employer interviews and in the focus group, where a few employers mentioned WIL as a source of potential new employees. It was also noted in the focus group with the agricultural industry that a regional development organisation offers an internship with the specific aim of attracting and retaining new students to the region.

Another issue pertinent to the agricultural industry (although potentially applicable to other industries) was the timing of the WIL placement. In particular, the agricultural industry is characterised by cycles, which would require WIL students to fit in with this cycle. From the interviews, in terms of the arrangements used by agriculture industry respondents, five of the nine organisations said the WIL experience was organised as blocks of weeks. In this industry also the most prevalent form of WIL arrangements were placements (five of the nine organisations), and projects in the organisation (also five of the nine); there were also a couple of a couple of internships/scholarships.[9]

In the professional, scientific and technical services industry there are some implications for WIL for those companies in this industry group involved in development (as opposed to research or production). In particular, the focus group with representatives from biotechnology companies indicated that companies involved in development require longer WIL placements due to the length of the development cycles, the 'traditional' eight- to 12-week WIL experience being not sufficiently long. These interviewees also noted that the development process may require a different set of skills from those obtained during the students' course. While this discussion took place in the context of biotechnology, this may have broader applicability to organisations involved in development in the professional, science and technical services industry.

Overall in our sample of interviews with employers in this industry group, the most common form of arrangement was a placement (27 of the 36 organisations) and often of a duration of eight to 12 weeks. For some industries, such as manufacturing, this placement length may be suitable. It is noted in our sample of organisations in the manufacturing industry that the WIL students were largely from the engineering discipline and their placements tended to conform to this length. One employer from an organisation in the manufacturing industry explained that in this industry larger projects can often be broken into smaller components, enabling students to have a meaningful WIL experience in a shorter timeframe.

Concerns were also raised about intellectual property for certain companies in the professional, scientific and technical services industry, say, for example, where there are patents involved, although this could also be an issue in other industries (for example, information and communications technology). These concerns were associated with the copying of intellectual property and ensuring adequate security clearances for WIL students.

## Benefits and barriers to WIL

Employers consider WIL (in its diverse forms) to be a worthwhile exercise. Not surprisingly, they are motivated to engage in WIL because of the responsibility they feel for advancing the practical skill and knowledge development opportunities for STEM students and the STEM industry. This altruism is also accompanied by practical attractions, discussed in further detail below.

Employers' belief in the value of WIL is evident both in their keenness to engage with WIL in the first place, their assessment of its importance, and their intention to continue to provide WIL opportunities for students. Even companies who do not currently provide WIL or have not done so in the past believe that WIL is worthwhile and claim they would be prepared to undertake WIL if they had enough suitable activities and projects for the purpose.

[9] Note that some of the organisations interviewed had more than one type of arrangement, for example, a project and a scholarship.

A sense of responsibility for fulfilling what they see as their corporate citizenship obligations, including feeding the STEM pipeline, and providing practical learning opportunities for students is a key driver of employer engagement with WIL. These altruistic sentiments are also accompanied by practical and pragmatic considerations, especially with regard to gaining the extra resources for jobs that WIL provides and using WIL to identify and recruit talented students.

Not surprisingly, the types of benefits employers identified as deriving from the WIL experience accord with the reasons for engaging with WIL in the first place, including their expectations of the WIL experience. In line with the motivations cited above, the most common benefits were the opportunity to identify and recruit talented students, to access resources for getting jobs done, and the ability to fulfil corporate citizenship obligations. Hosting students also provided some professional development opportunities for the staff who were responsible for supervising and mentoring the student. Having students in workplaces also gave companies opportunities to learn about any state-of-the-art techniques or equipment and facilities and up-to-date knowledge on new technology, and also provided a 'fresh' outlook in terms of new ideas and enthusiasm for learning. These benefits appear to be particularly relevant in the STEM disciplines, where employers may be looking for specific expertise and experience.

A number of key barriers and constraints limit employer engagement in WIL. Despite the tendency for some STEM disciplines to be less engaged in WIL compared with other disciplines, this report finds that there are no discernible differences when it comes to the constraints in providing WIL. The constraints which affect employers from taking up WIL in general are also the same as those affecting employers providing WIL to STEM students. Not surprisingly, the main barriers are related to resources for funding WIL activities, including a budget to cover student wages and for staff to be involved in supervision. In addition, the lack of time to invest in the student is also considered a major constraint, as is the capacity of employers to provide suitable projects or work experience activities for the students. SMEs were particularly sensitive to the challenges of resources and time. While the lack of resources limited all employers' capacity to provide WIL, it also created particular challenges for SMEs and their capacity to learn about and set up, organise, and run WIL in the first place.

## Interactions with universities

In the main, most employers prefer relationships with universities that are not overly prescriptive or administratively burdensome. This requirement for flexibility in WIL is mediated by the practical realities of having sufficient numbers of suitable types of projects and activities for WIL students at the time they are requested. While employers tend to prefer flexibility in WIL, too much flexibility may be at odds with structured university programs and the course requirements for awarding graded credit for WIL activities, so it is important that flexibility meets the requirements of both employers and universities.

A considerable number of the employers did not consider themselves to have tight partnerships with universities when it came to WIL, and many employers liked it this way. The relationship with universities, reported by small numbers of employers, involved making selections for student placements, referring students to employers, validating the suitability of employer facilities, and matching students to employers. According to the employers, few universities made the initial contact with them, and WIL was generally driven by students actively seeking opportunities or employers running their own programs.

Having flexible requirements is paramount if WIL is to be beneficial to both students and employers. Universities should consider how best to collaborate with employers to determine: what employers can reasonably provide; the most suitable time to provide WIL; and, taking into account their particular requirements, the form of WIL that suits the needs of the employer. Although employers see WIL as a

corporate citizenship responsibility, it does need to fit with their commercial realities — including timeframes and forms — as outlined in the 'value proposition'.

Communicating the 'value proposition' of WIL is key to any strategy aimed at increasing employer engagement in WIL. Indeed, as outlined in the literature and in the strategies proposed in the previous chapter, appropriate communication and promotion of WIL, its value and the processes involved are vital to improving employer engagement in WIL in STEM disciplines.

## Key findings from the literature

The findings from the discussions with employers in interviews and focus groups mainly support those from the review of the literature, especially in terms of the variety of WIL approaches available to students, the employer reasons and benefits for engaging with WIL and the constraints and issues employers face.

As the literature shows, the take-up of WIL programs varies between STEM disciplines, with these programs more widely used in engineering and information technology than in general science areas. WIL in the science and mathematics disciplines does not figure prominently in the literature. This project confirms these findings and also demonstrates that the barriers that prevent employers from engaging in WIL with STEM students are the same that other employers face.

According to the literature, the barriers to employer participation in WIL are often contextually driven and can include:

- a lack of, or limited, resources and time
- inadequate information about the specific roles of employers, students and universities in setting up and implementing WIL programs
- lack of clarity about objectives and outcomes.

The literature points to a range of strategies which may assist in overcoming the barriers and enhance employer engagement in WIL. Such strategies include:

- employer support for improving communication channels with universities to ensure greater clarity around roles and expectations
- promotion of the benefits of WIL more widely to employers and industries, and the need to customise promotional messages to specific business contexts
- an increased and more formal role for employers in course design, delivery and assessment. Inviting them to deliver lectures or to attend student presentations is also seen as a way to make connections between the workplace and the campus.

As the literature suggests and our findings confirm, the major challenge in improving employer engagement lies in finding a balance between a desire to be more involved and having the available time and resources.

# References


Australian Workplace and Productivity Agency 2013, *Future focus: 2013 National Workforce Development Strategy,* Commonwealth of Australia, Canberra.

——2014, *A scoping paper: work integrated learning*, Commonwealth of Australia, Canberra.

Bennett, K 2008, 'Managing experiential education: work-integrated learning in the context of a cost-benefit analysis', *Journal of Cooperative Education and Internships*, vol.42, no.2, pp.34—44.

Business Council of Australia 2011, *Lifting the quality of teaching and learning in higher education,* BCA, Melbourne.

Choy, S & Delahaye, B 2011, 'Partnerships between universities and workplaces: some challenges for work-integrated learning', *Studies in Continuing Education*, vol.33, no.2, pp.157—72.

Coll, RE & Zegwaard, KE (eds) 2012, *International handbook for cooperative and work-integrated education: international perspectives of theory, research and practice*, 2nd edn, University of Waikato, Hamilton, New Zealand.

Deloitte Access Economics 2014, 'Australia's STEM workforce: a survey of employers', unpublished, Canberra.

Dressler, S & Keeling, AE 2011, 'Benefits of co-operative and work-integrated education for students', in *International handbook for cooperative and work-integrated education*, 2nd edn, eds RK Coll and KE Zegwaard, World Association for Cooperative Education, Lowell, MA, pp.261—76.

Ehiyazaryan, E 2010, 'In situ and in the curriculum: towards an integrative approach to work-based learning pedagogy', *Learning and Teaching in Higher Education (LATHE)*, no.42, pp.3—20.

Engineering Australia 2008, Accreditation criteria guidelines, Engineers Australia, viewed August 2008, <https://www.engineersaustralia.org.au/sites/default/files/shado/Education/Program%20Accreditation/AMS%20Professional%20Engineer/G02%20Accreditation%20Criteria%20Guidelines.pdf>.

Fifolt, M & Searby, L 2010, 'Mentoring in cooperative education and internships: preparing protégés for STEM professions', *Journal of STEM Education: Innovations and Research*, vol.11, no.1 & 2, January—June, Institute for STEM Education and Research, Auburn, Alabama, pp.17—26.

Fraser, SP & Deane, EM 2002, 'Getting bench scientists to the workbench', in A Fernandez (ed.), *Proceedings of Scholarly Inquiry in Flexible Science Teaching and Learning Symposium*, UniServe Science, Sydney, pp.38—43.

Jackson, D 2013, 'The contribution of work-integrated learning to undergraduate employability skills outcomes', *Asia—Pacific Journal of Cooperative Education*, vol.14, no.2, pp.99—115.

Koppi, T, Ogunbona, P, Armarego, J, Bailes, P, Hyland, P, McGill, T, Naghdy, F, Naghdy, G, Pilgrim, C & Roberts, M 2013, *Addressing ICT curriculum recommendations from surveys of academics, workplace graduates and employers*, Office for Learning and Teaching, Sydney.

Koppi, T, Edwards, SL, Sheard, J, Naghdy, F & Brookes, W 2010, *The case for ICT work-integrated-learning from graduates in the workplace*, Conferences in Research & Practice in Information Technology Series, 107, Australian Computer Society Inc., Sydney.

McEwen, LJ, Mason O'Connor, K, Williams, C & Higson HE 2010, *Integrating employers in effective support for student work-based learning (WBL): an evidence base to inform innovative policy and practice,* Higher Education Academy, <https://www.heacademy.ac.uk/sites/default/files/McEwen_Final_Report.pdf >.

Mahalinga-Iyer, R, Hargreaves, D, Lenz, C & Beck, H 2004, 'Liaison with industry in modelling work integrated learning for engineering undergraduates', in *Creating flexible learning environments: proceedings of the 15th Australasian Conference for the Australasian Association for Engineering Education and the 10th Australasian Women in Engineering Forum, 446,* Australasian Association for Engineering Education, Toowoomba, Qld.

Mellors-Bourne, R 2011, *Work experience for STEM students and graduates*, Science Council, London.

Office of the Chief Scientist 2013, S*cience, technology, engineering and mathematics in the national interest: a strategic approach*, a position paper, Australian Government, Canberra.

——2013 *Top breakthrough actions for innovation*, Office of the Chief Scientist <http://www.chiefscientist.gov.au/2013/02/breakthrough-actions-for-innovation-released/>

Orrell, J 2011, *Good practice report: work-integrated learning*, Australian Learning and Teaching Council, Sydney.

Papadopoulos, T, Taylor, T, Fallshaw, E & Zanko, M 2011, *Engaging industry: embedding professional learning in the business curriculum*, Australian Learning and Teaching Council, Sydney.

Papakonstantinou, T, Charlton-Robb, K, Reine, RD & Rayner, G 2013, 'Providing research-focused work-integrated-learning for high achieving science graduates', in *Asia—Pacific Journal of Cooperative Education,* vol.14, no.2, p.59.

Patrick, C-joy, Peach, D, Pocknee, C, Webb, F, Fletcher, M & Pretto, G 2008, *The WIL [work integrated learning] report: a national scoping study,* Queensland University of Technology, Brisbane.

Patrick, C-joy, Fallon, W, Campbell, M, Devinish, I, Kay, J, Lawson, J, Russell, L, Tayebjee, F, Cretchley, P, 2014, *Leading WIL: a distributed leadership approach to enhance work integrated learning*, Office for Learning and Teaching, Sydney.

Peach, D, Larkin, I & Ruinard, E 2012, 'High-risk, high-stake relationships: building effective industry—university partnerships for work integrated learning (WIL)', in *Proceedings of the Australian Collaborative Education Network National Conference/Australian Collaborative Education Network*, ed. Australian Collaborative Education Network, Australian Collaborative Education Network, Springvale, pp.230—36.

Peach, D, Ruinard, E & Webb, F 2014, 'Feedback on student performance in the workplace: the role of workplace supervisors', in *Asia—Pacific Journal of Cooperative Education*, vol.15, no.3, pp.241—52.

PhillipsKPA 2014, *Engaging employers in work integrated learning: current state and future priorities,* report to the Department of Industry, Commonwealth of Australia, Canberra.

Pilgrim, C 2011, *Work-integrated learning in ICT degrees*, Conferences in Research & Practice in Information Technology, Australian Computer Society, Sydney.

Pilgrim, C, Koppi, T 2012, *Work integrated learning rationale and practices in Australian information and communications technology degrees*, Conferences in Research & Practice in Information Technology, Australian Computer Society, Sydney.

Precision Consultancy & Business, Industry and Higher Education Collaboration Council 2007, *Graduate employability skills,* Precision Consultancy, Melbourne.

Radloff, A & Coates, H 2010, *Doing more for learning: enhancing engagement and outcomes*, Australasian Survey of Student Engagement: Australasian student engagement report, Australian Council for Educational Research (ACER), Camberwell.

Smith, C, Ferns, S, Russell, L & Cretchley, P 2014, *The impact of work integrated learning on student work-readiness*, Office for Learning and Teaching, Sydney.

Stewart, A & Owens, R 2013, *Experience or exploitation: the nature prevalence and regulation of unpaid work experience, internships and trial periods in Australia,* report prepared for the Fair Work Ombudsman, The University of Adelaide.

Universities Australia, Business Council of Australia, Australian Chamber of Commerce and Industry, Australian Industry Group & the Australian Collaborative Education Network 2014, *Statement of intent: work integrated learning — strengthening university and business partnerships,* viewed 1 July 2015, http://www.bca.com.au/publications/statement-of-intent-on-work-integrated-learning

Universities Australia 2008, *A national internship scheme: enhancing the skills and work-readiness of Australian university graduates,* Universities Australia position paper no.3/08, Universities Australia, Canberra.

Virolainen, M, Stenstrom, M-L & Kantola, M 2011, 'The views of employers on internships as a means of learning from work experience in higher education', *Journal of Vocational Education and Training*, vol.63, no.3, pp.465—84.

Wallace R, Murray, B & Overton, T 2009, *Effective practice in industrial work placement,* Higher Education Academy Physical Sciences Centre, viewed 1 July 2015, <http://www-new2.heacademy.ac.uk/assets/ps/documents/practice_guides/practice_guides/effective_practice_in_industrial_work_placement.pdf>.

West, M 2012, *STEM education and the workplace*, occasional paper series, issue 4, September, Office of the Chief Scientist, viewed 1 July 2015, <http://www.chiefscientist.gov.au/wp-content/uploads/OPS4-STEMEducationAndTheWorkplace-web.pdf>.

# Appendix A

**Table 18 Summaries of interviews conducted with employers providing WIL experiences**

| *State or Territory – where interview was held* | *Industry* | *Discipline* | *Organisation size* |
|---|---|---|---|
| Australian Capital Territory **– 8** | Agriculture **– 9** | Agriculture – **11** | Large – **25** |
| New South Wales – **11** | Electricity, gas etc. **– 1** | Biology – **6** | Medium – **21** |
| Queensland **– 8** | Financial and insurance services – **2** | Chemistry – **3** | Small – **18** |
| South Australia – **12** | Information, media and telecommunications – **3** | Cross-discipline – **2** | |
| Tasmania – **9** | Manufacturing – **12** | Engineering – **22** | |
| Victoria **– 10** | Mining – **3** | Geoscience – **4** | |
| Western Australia – **6** | Professional, scientific and technical services – **29** | Information and communications technology**- 6** | |
| | Public administration and safety – **5** | Mathematics **– 6** | |
| | | Physics – **3** | |
| | | Surveying – **1** | |

Source: Employer interviews for this study.

The table below shows the breakdown respondents to the individual interviews by industry segment.

**Table 19 Industry sector of employers who provide WIL**

| *Industry area* | *Numbers of respondents* |
|---|---|
| Agriculture | 9 |
| Electricity, gas, water and waste services | 1 |
| Financial and insurance services | 2 |
| Information, media and telecommunications | 3 |
| Manufacturing | 8 |
| Mining | 2 |
| Professional, scientific and technical services | 36 |
| Public administration | 3 |
| Total | 64 |

Table 20 provides similar information for employers not providing WIL.

**Table 20 Summaries of interviews conducted with employers not providing WIL experiences**

| *State or territory - where interview was held* | *Industry* | *Discipline* | *Organisation size* | *Total number of interviews* |
|---|---|---|---|---|
| South Australia | Information, media and telecom. – **1**<br>Manufacturing – **1**<br>Education – **1** | ICT – **1**<br>Maths – **1**<br>Engineering – **1** | Small – **1**<br>Medium – **2** | 3 |
| Queensland | Agriculture **1**<br>Information, media and telecom. – **1**<br>Professional, scientific and technical – **1** | Agriculture – **1**<br>ICT – **1**<br>Chemistry – **1** | Small – **3** | 3 |
| Western Australia | Rental, hiring and real estate - **1**<br>Information, media and telecom. – **1** | Engineering – **1**<br>ICT – **1** | Small – **2** | 2 |
| Victoria | Manufacturing – **1** | Engineering – **1** | Medium – **1** | 1 |
| Tasmania | Information, media and telecom. – **1** | ICT – **1** | Medium – **1** | 1 |

Source: Employer interviews for this study.

Table 21 provides an overview of the characteristics of the focus group participants. The total number of focus group participants is 31, which include representatives from the following:

- 17 representatives from 16 private companies
- 8 representatives from 4 government departments or agencies
- 4 representatives from 3 peak bodies
- 2 representatives from 2 education providers.

**Table 21 Focus group participants**

| *State or territory (where focus group was held)* | *Industry (all)* | *Discipline (excluding peak bodies and education providers)* | *Organisation size (excluding peak bodies)* |
|---|---|---|---|
| Australian Capital Territory **– 10** | Agriculture **– 2** | Agriculture – **6** | Large – **14** |
| New South Wales – **2** | Education **– 2** | Biology – **2** | Medium – **11** |
| South Australia – **3** | Financial and insurance services – **1** | Design – **1** | Small – **3**<br>NA – 4 |
| Tasmania – **NA** | Information, media and telecommunications – **2** | Cross-discipline – **3** | |
| Victoria **– 16**<br>• Metro **9**<br>• Regional **7** | Manufacturing – **3** | Engineering – **4** | |
| Western Australia – **NA** | Professional, scientific and technical services – **12** | Information and communications technology**-3** | |
| | Public administration and safety – **8** | Mathematics **– 2**<br>NA –10 | |
| | Retail – **1** | | |

# Appendix B

## Interview questionnaire for employers who offer work integrated learning

The National Centre for Vocational Education Research (NCVER) is undertaking this study on behalf of the Office of Chief Scientist. The project looks at employers' perspectives of work integrated learning for students in science, technology, engineering and mathematics (STEM) disciplines.

Work Integrated Learning (WIL) includes a variety of different practices and programs which link undergraduate students with the workplace and employment experience. The aim of work integrated learning is to develop students' employability skills and knowledge of the workplace. Common types of WIL include placements, internships and field visits. Other types of WIL include industry-linked projects, simulated and virtual experiences, industry guest speakers, and case studies.

We would like find out employers' experiences and perceptions of WIL; including reasons and benefits for offering WIL, experiences with students and university partners, and the constraints and issues in providing WIL.

We will also be speaking to employers who have not been engaged in providing placements to find out what are the key constraints on them doing so. We are also interested in identifying what employers, like yourselves, consider to be the key or critical skills that STEM students should have to be successful in the workplace.

Thank you for agreeing to share about how your company provides work integrated learning placements and opportunities for university students in STEM disciplines.

Please fill out this questionnaire and return to Georgina.Atkinson@ncver.edu.au. We thank you for your participation in this study and please be assured that no personal or business names will be identified in the findings.

**About the company**

**Demographic details**

1. Name of enterprise
2. Type of business/industry
3. Company ID
4. Size of company
5. STATE
6. Metro/regional/rural location
7. What type of STEM type graduates do you employ in your company (information on the field, for example chemistry, physics etc)?

**Extent and type of enterprise experience with WIL**

8. What type of work integrated learning is offered by your organisation (e.g. placement, internship, project or other)?

9. How many years has your organisation been offering WIL

10. Number of students currently undertaking WIL
a. Course being undertaken (Engineering, Mathematics, Science, IT etc.)

11. Number of students undertaking WIL in the past
a. Course being undertaken (Engineering, Mathematics, Science, IT etc.)

12. Which of your branches, occupations, or fields are currently hosting WIL students

13. Which of your branches, occupations, or fields have hosted WIL students in the past?

14. How long is the typical WIL experience?

15. Are WIL experiences a 'once off' or do some students undertake more than one placement or other WILL experience with your organisation?

16. How is time configured for placements and internships (block of weeks, day release, regular days per week or term, university holidays, ad hoc etc.)?

17. For work-based projects, what types of interactions do students have with your organisation?

18. In general what type of tasks are students expected to do? (operational, shadowing, observing, projects)

**Reasons for and expectations of WIL participation**

19. What are the main reasons the organisation provides WIL placements for students?

20. What expectations did you originally have of what the (a) enterprise, and (b) student could achieve from having students on WIL placements?

a. Which of these expectations were fulfilled?
b. Which of these expectations were not fulfilled?
c. Why were these expectations not fulfilled?

21. What type of generic skills did you expect students to learn through the WIL experience? And to what extent did they learn these skills? Examples include:
    - communication skills,
    - teamwork skills,
    - problem-solving skills
    - self-management skills
    - any others you may think are important or relevant to your business

22. Have you ever had to tell the student you did not want to continue with the placement during the course of the placement?
a. What was the main reason for this?

**Interactions with university partners**

23. How was the WIL set up?

a. What is the role of the university, student and the company in setting up the WIL?

b. What works well about this setting up stage?

c. What does not work well?

24. What interaction did or do you have with the university during the course of the placement?

a. What works well about the partnership with the university?

b. What does not work well?

**Key enterprise benefits from participation**

25. What are the key benefits for your company in providing WIL placements for students?

26. What have been the key constraints or issues experienced in either setting up or providing these work placements?

a. How did you address the constraints or issues?

**Suggestions for improvement**

27. Do you think WIL is worth the effort?

28. Does your organisation intend to continue to offer WIL opportunities in the future?

29. How would you improve the WIL experience for both the company and the students?

**Definitions**

30. Finally, we would like to ask you about critical skills that STEM graduates should have. A previous survey of employers (conducted by Deloitte on behalf of the Office of the Chief Scientist) has identified several of these skills. The top five rated skills identified were:
    a. Active learning (ability to learn on the job and pick things up quickly)
    b. Critical thinking
    c. Quantitative skills
    d. Complex problem solving (e.g. complex mathematical, engineering , analytical projects)
    e. Creative problem solving (innovative solutions, trying new things)

    For each of these skills could you please firstly let us know if you agree with them as being critical skills (and if not why not), and secondly what these skills mean specifically in terms of business practice in your organisation.

**Any other comments**

Do you have anything else to say?

# Appendix C

## Interview questionnaire for employers who do not offer work integrated learning

## Interview schedule for non-WIL provision (face-to-face, or telephone)

**Introductory conversation:** Thank you for agreeing to meet with me today to talk about work integrated learning (WIL) placements and opportunities for university students who undertake STEM (science, technology, engineering and mathematics programs).

WIL includes a variety of different practices and programs which link undergraduate students with the workplace and employment experience. The aim of work integrated learning is to develop students' employability skills and knowledge of the workplace. Common types of WIL include placements, internships and field visits. Other types of WIL include industry-linked projects, simulated and virtual experiences, industry guest speakers, and case studies.

The study is composed of two parts. One part (being undertaken by another project team) aims to find out the extent of WIL in university STEM programs as well as the strategies that have been used to engage with industry to provide such opportunities. This part of the study investigates the employer experience in the provision of WIL. It aims to find out from employers who have not been engaged the reasons why they have not chosen to or not yet been asked to provide WIL. This part of the study is also interested in identifying the key constraints and barriers to preventing employers from providing WIL.

We are especially interested in identifying what employers consider to be the key or critical skills that STEM students should have to be successful in the workplace. This interview should only take about 30 to 40 minutes to complete. Please be as frank as possible as we will not be identifying participating employers by name.

**Demographic detail**

1. Name of enterprise
2. Type of business/industry
3. Company ID
4. Size of company
5. STATE
6. Metro/regional/rural location
7. What type of STEM type graduates do you employ in your company (probe to get more information on the field, for example chemistry, physics etc)?
8. What types of generic skills do you require from the STEM graduates you employ? Examples include:
    - communication skills,
    - teamwork skills,

- problem-solving skills
- self-management skills
- IT skills
- any others you may think are important or relevant to your business

**Reasons for non-participation in WIL provision**

9. Have you ever been approached to provide WIL for university students?

    a. If yes, what was your main reason for not agreeing?

    b. If, no, did you know that it is possible for you to provide WIL for university students?

10. Would you ever be prepared to provide WIL for students undertaking, (STEM) programs?

    a. If no, what would be the key constraints to offering WIL for these students?

    b. If Yes, what would be your expectations of the WIL experience?

    c. If you were to provide WIL for university students what types of courses would be most applicable for your company?

**Definitions**

11. Finally, we would like to ask you about critical skills that STEM graduates should have. A previous survey of employers (conducted by Deloitte on behalf of the Office of the Chief Scientist) has identified several of these skills. The top five rated skills identified were:

    - Active learning (ability to learn on the job and pick things up quickly)
    - Critical thinking
    - Quantitative skills
    - Complex problem solving (e.g. complex mathematical, engineering , analytical projects)
    - Creative problem solving (innovative solutions, trying new things)

For each of these skills could you please firstly let us know if you agree with them as being critical skills (and if not why not), and whether the STEM graduates you employ have these skills.

Secondly what does each of these skills mean specifically in terms of business practice in your organisation?

**Any other comments**

Do you have anything else to say?

# Appendix D

## Focus group schedules

**Focus group questionnaire for employers that <u>undertake work integrated learning</u>**

**Preamble**

Hello, my name is [facilitator name] from [organisation]. Thank you for taking the time to participate in a focus group on work integrated learning (WIL) for students in Science, Technology, Engineering and Mathematics (STEM) courses.

work integrated learning is a broad term for a variety of programs linking undergraduate students with the workplace in order to provide them with work experience. Its aim is to make students more 'work ready' by developing their employability skills and knowledge of the workplace.

In terms of the focus group today WIL we are interested in a variety of work experience arrangements including placements, internships and field visits. Other types of WIL can also include industry-linked projects, simulated and virtual experiences, industry guest speakers, and case studies.

This focus group is part of a larger project that is looking at the benefits and constraints of WIL from an employer's perspective. We are interested both in employers that engage with WIL and also those that don't. In addition to conducting focus groups we are also conducting a series of one on one interview with employers across Australia.

You are a group of employers who have some engagement with WIL. We would like to hear from you about the benefits and constraints of WIL from your perspective. We are also interested in hearing from you about skills that you consider to be critical for STEM graduates to have.

During this focus group x questions will be asked. Please keep in mind that there are no "right" or "wrong" answers to any of the questions that will be asked. The purpose is to stimulate conversation and hear the opinions of everyone in the room. The focus group should take about one hour.

Please note that this session will be recorded (or [name] will be taking notes during the focus group) to ensure we adequately capture your ideas during the conversation. However, the comments from the focus group will remain confidential and your name will not be attached to any comments you make. Do you have any questions before we begin?

**Questions**

1. Let us do a quick round of introductions. Can each of you tell the group your name and the name of your organisation, and what area it is in (e.g. agriculture, engineering etc.), and very briefly, what type of WIL you provide to students.
2. What are the main reasons your organisation provides WIL and what are the benefits for your company and the students?
3. What are some of the constraints or barriers you may have had in engaging in WIL?
    a. Probe for resourcing issues (time, money)
    b. Probe for issues in setting up the WIL and the relationship with universities
    c. Any other constraints

4. The final issue we are interested in today is the types of skills that employers reported were important in the workplace for STEM graduates, so we are focusing on graduates now.

Here is a list of five skills employers thought important from a previous survey:

- **Active learning**: The ability to learn on the job, pick things up quickly and to show initiative and a willingness to learn
- **Critical thinking**: The ability to think and work through issues using a logical process and mindset of scientific enquiry.
- **Quantitative skills**: To have generally good numerical skills and to be able to understand the underlying quantitative theories as relevant to their particular job
- **Complex problem solving**: The ability to solve more complex science related problems using a structured analytical approach.
- **Creative problem solving**: The ability to think innovatively and more broadly beyond the current way of doing things in order to solve a problem

Do you agree with the definition of these skills? Please provide additional or different meanings for these skills in the context of your organisation.

Do you think the STEM graduates in your workforce have these skills, and in relation to the framework provided to you, which level do you think the **new STEM graduates** in your workforce are likely to fall under?

Do you think undertaking WIL facilitates the development of these critical skills?

Thank-you all very much for your time today. It's been a very stimulating discussion etc.

**Focus group questionnaire for employers that <u>do not undertake work integrated learning</u>**

**Preamble**

Hello, my name is [facilitator name] from [organisation]. Thank you for taking the time to participate in a focus group on work integrated learning (WIL) for students in Science, Technology, Engineering and Mathematics (STEM) courses.

work integrated learning is a broad term for a variety of programs linking undergraduate students with the workplace in order to provide them with work experience. Its aim is to make students more 'work ready' by developing their employability skills and knowledge of the workplace.

In terms of the focus group today WIL we are interested in a variety of work experience arrangements including placements, internships and field visits. Other types of WIL can also include industry-linked projects, simulated and virtual experiences, industry guest speakers, and case studies.

This focus group is part of a larger project that is looking at the benefits and constraints of WIL from an employer's perspective. We are interested both in employers that engage with WIL and also those that don't. In addition to conducting focus groups we are also conducting a series of one on one interview with employers across Australia.

You are a group of employers who have not engaged WIL. We would like to hear from you about the reasons you have not engaged in WIL arrangements so far and whether you may consider them in the future. We are also interested in hearing from you about skills that you consider to be critical for STEM graduates to have.

During this focus group x questions will be asked. Please keep in mind that there are no "right" or "wrong" answers to any of the questions that will be asked. The purpose is to stimulate conversation and hear the opinions of everyone in the room. The focus group should take about one hour.

Please note that this session will be recorded (or [name] will be taking notes during the focus group) to ensure we adequately capture your ideas during the conversation. However, the comments from the focus group will remain confidential and your name will not be attached to any comments you make. Do you have any questions before we begin?

**Questions**

1. Let us do a quick round of introductions. Can each of you tell the group your name and the name of your organisation, and what area it is in (e.g. agriculture, engineering etc.)
2. What are the main reasons that you have not engaged in WIL to date?
    a. Probe for whether they were aware of these placements, issue concerning engagement with a university, and also budget and other resource constraints.
3. Do you take on students for any other kind of placements? If so, what do they involve?
4. Would you be willing to engage in WIL placements for STEM students in the future?
    a. Probe for reasons why.

1. The final issue we are interested in today is the types of skills that employers reported were important in the workplace for STEM graduates, so we are focusing on graduates now.

Here is a list of five skills employers thought important from a previous survey:

- **Active learning**: The ability to learn on the job, pick things up quickly and to show initiative and a willingness to learn
- **Critical thinking**: The ability to think and work through issues using a logical process and mindset of scientific enquiry.
- **Quantitative skills**: To have generally good numerical skills and to be able to understand the underlying quantitative theories as relevant to their particular job
- **Complex problem solving**: The ability to solve more complex science related problems using a structured analytical approach.
- **Creative problem solving**: The ability to think innovatively and more broadly beyond the current way of doing things in order to solve a problem

Do you agree with the definition of these skills? Please provide additional or different meanings for these skills in the context of your organisation.

Do you think the STEM graduates in your workforce have these skills, and in relation to the framework provided to you, which level do you think the **new STEM graduates** in your workforce are likely to fall under?

Do you think undertaking WIL could facilitate the development of these critical skills?

Thank-you all very much for your time today. It's been a very stimulating discussion etc.

**Discussion group questionnaire for employers that <u>do and do not undertake work integrated learning</u> in the same industry group**

**Preamble**

Hello, my name is [facilitator name] from [organisation]. Thank you for taking the time to participate in a discussion session on work integrated learning (WIL) for students in Science, Technology, Engineering and Mathematics (STEM) courses.

work integrated learning is a broad term for a variety of programs linking undergraduate students with the workplace in order to provide them with work experience relevant to their course of study. Its aim is to make students more 'work ready' by developing their employability skills and knowledge of the workplace.

In terms of the discussion session today we are interested in a variety of work experience arrangements including placements, internships and industry-linked projects.

This discussion session is part of a larger project that is looking at the benefits and constraints of WIL from an employer's perspective. We are interested both in employers that engage with WIL and also those that don't. In addition to conducting discussion sessions we have also conducted a series of one on one interviews with employers across Australia.

We would like to hear from you about the benefits of engaging in WIL, and, if you do not offer WIL, the constraints and barriers in doing so. We are also interested in hearing from you about skills that you consider to be critical for STEM graduates to have.

During this session 7 questions will be asked. Please keep in mind that there are no "right" or "wrong" answers to any of the questions that will be asked. The purpose is to stimulate conversation and hear the opinions of everyone in the room. The discussion session should take about 90minutes.

Please note that this session will be recorded (and [name] will be taking notes during the session) to ensure we adequately capture your ideas during the conversation. However, the comments from the session will remain confidential and your name will not be attached to any comments you make. Do you have any questions before we begin?

(We will aim to capture information about type and extent of WIL from the employers that offer it before the session).

**Questions**

1. Let us do a quick round of introductions. Can each of you tell the group your name and the name of your organisation (and what area it is within the broader industry group), and very briefly, whether you provide WIL opportunities to students.
2. If your organisation provides WIL, what are the main reasons your organisation provides WIL and what are the benefits for the students and the value for your company?
3. If you do not provide WIL, what are the main reasons that you have not engaged in WIL to date?
4. What are the constraints you may have had in engaging in WIL?
    a. Probe for resourcing issues (time, money)
    b. Probe for industry specific issues
    c. Probe for issues in setting up the WIL and the relationship with universities
    d. Any other constraints
5. Do you have any suggestions for how some these constraints can be overcome?
6. Two common types of WIL are:

a. placements of various lengths (ie internships, work experience etc) where the student spends a period of time in the workplace undertaking project work and/or operational tasks
b. project-based WIL, where a student or team of students is based on campus, but works on specific projects for industry partners.

What are your views on these two types of WIL and how they can contribute to the experience for the student and the company?

7. The final issue we are interested in today is the types of skills that employers reported were important in the workplace for STEM graduates, so we are focusing on graduates now.

What types of skills do you think are necessary for graduates to have in the workplace? (for example, communication skills, teamwork skills etc).

A previous study identified the following five 'critical' skills employers thought important for STEM graduates:

- **Active learning**: The ability to learn on the job, pick things up quickly and to show initiative and a willingness to learn
- **Critical thinking**: The ability to think and work through issues using a logical process and mindset of scientific enquiry.
- **Quantitative skills**: To have generally good numerical skills and to be able to understand the underlying quantitative theories as relevant to their particular job
- **Complex problem solving**: The ability to solve more complex science related problems using a structured analytical approach.
- **Creative problem solving**: The ability to think innovatively and more broadly beyond the current way of doing things in order to solve a problem.

Do you agree with the definition of these skills? Please provide additional or different meanings for these skills in the context of your organisation.

Do you think the STEM graduates in your workforce have these skills, and in relation to the framework provided to you, which level do you think the **new STEM graduates** in your workforce are likely to fall under?

Do you think undertaking WIL could facilitate the development of these critical skills?

Thank-you all very much for your time today. It's been a very stimulating discussion etc.

**Pre-discussion group questionnaire**

Thank you for participating in this discussion group. Before we start, can you please answer the questions below to help us identify the extent of your engagement in work integrated learning (WIL).

1) Name of business

2) Type of business and industry

3) Size of business workforce

4) State and location

5) What type of science, technology, engineering and mathematics (STEM) graduates do you employ in your company?

6) Do you offer work integrated learning opportunities to science, technology, engineering and mathematics (STEM) students? If no, this is the end of the- pre-focus group questionnaire.

If yes;

> What kind of WIL do you offer (placements, internships, work-based projects etc.) and how does your particular program or opportunity work? (For example, how long do placements or internships go for, how are they configured and what types of work do students do?)

7) How many students do you usually take on each year?

8) How is the WIL set up, and what it the role of the university, students and your company?

Here is a list of five skills employers thought important from a previous survey. These skills will be discussed in greater depth at the focus group, so please think about what they mean in the context of your organisation.

- **Active learning**: The ability to learn on the job, pick things up quickly and to show initiative and a willingness to learn
- **Critical thinking**: The ability to think and work through issues using a logical process and mindset of scientific enquiry.
- **Quantitative skills**: To have generally good numerical skills and to be able to understand the underlying quantitative theories as relevant to their particular job
- **Complex problem solving**: The ability to solve more complex science related problems using a structured analytical approach.
- **Creative problem solving**: The ability to think innovatively and more broadly beyond the current way of doing things in order to solve a problem.

Using the framework provided below, please indicate which level you think the **new STEM graduates** in your workforce are likely to fall under, for each of the listed skills.

- **Active learning**
- **Critical thinking**
- **Quantitative skills**
- **Complex problem solving**
- **Creative problem solving**

STAGES

| 1 A Novice performer | 2 An Advanced Beginner | 3 A Capable performer | 4 A Proficient performer | 5 An Expert performer |
|---|---|---|---|---|
| Has little or no practical experience of the Skill Area on which to base actions.<br><br>Is highly reliant on explicit 'rules' (e.g. instructions, processes, procedures, models), guidance and support and priorities determined by others, to guide activities. | Has some practical experience of the Skill Area and is beginning to recognise patterns (e.g. routines, regular responses, links and connections) that help understanding and influence action.<br><br>Is still reliant on explicit 'rules' and on assistance to identify priorities, but can apply these more autonomously in familiar, routine situations. | Has sufficient practical experience of the Skill Area to identify patterns and organising principles and establish priorities for action.<br><br>Can comfortably apply the explicit and implicit 'rules' associated with familiar situations.<br><br>Adopts a systematic, analytical approach to tasks, especially in unfamiliar situations. | Has considerable practical experience of the Skill Area in a range of contexts and is moving from reliance on externally prescribed rules to recognition of principles that guide actions.<br><br>Organises knowledge and practical experience as patterns, concepts and principles, which makes it possible to assess, and respond to situations in an increasingly intuitive and flexible way.<br><br>Reverts to analysis and seeks guidance when making important decisions. | Has extensive practical experience of the Skill Area, with both a big picture understanding and an eye for relevant fine detail.<br><br>Operates fluidly, intuitively and flexibly in highly complex situations, drawing on knowledge and practical experience organised into highly refined patterns, concepts and principles.<br><br>Uses a combination of informed intuition and analysis in different situations, recognising that 'it all depends'.<br><br>Will often reconceptualise approaches and practices to produce more effective outcomes, while also recognising which rules and principles are always applicable. |