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Students' experience of simulated workplace environments as a WIL model

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ABSTRACT

CONTEXT

Work Integrated Learning (WIL) provides great opportunities for students to engage and network with industry while studying. It builds connection between theory and practice through experiential learning by facilitating students' development of professional skills, via practice-based application of theoretical knowledge gained in coursework. In recent years, new WIL models have emerged to fulfil the demands of growing numbers of students; for example, micro placements, entrepreneurial WIL, virtual placements, studios and project-based activities. Simulated workplace environment (SWE) is one method of giving students an immersive practice-based and industry-linked experience.

PURPOSE OR GOAL

The purpose of this study is to evaluate a university-based SWE program that has been run for engineering students since 2017. The SWE program was implemented to offer students who faced challenges in gaining traditional industry placements, an opportunity to experience an authentic, immersive workplace environment. In particular, international students and students from disadvantaged backgrounds took up this opportunity. The program meets the requirement for an engineering student to complete 12 weeks of industry experience for an Engineers Australia accredited degree.

APPROACH OR METHODOLOGY/METHODS

We surveyed students to understand their experience of undertaking a 12-week SWE program. Data collection methods included a questionnaire survey (*N*=83) and interviews (*N*=32). With participant permission, interviews were recorded and transcribed for analysis. Data was coded for themes including students' experience, skills developed, job readiness and possible program improvements.

ACTUAL OR ANTICIPATED OUTCOMES

This study reports student perceptions of how the SWE program provided the necessary skills and opportunities to successfully apply theoretical knowledge into real world projects and prepared them to transition to industry. It is presented in the form of descriptive statistics from questionnaire survey about the simulated WIL and emerging themes drawn from interview data.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

This study can inform higher education institutions about the quality and effectiveness of SWEs and whether they are reasonable alternatives for industry-based placements for WIL programs. This may be of particular value for academics, universities and other higher education institutions who wish to support students who have difficulty in accessing the industry-based placements such as students in a discipline where industry placements are intrinsically scarce, international students on temporary study visas, students with certain disabilities, or students with learning difficulties.

KEYWORDS

Simulated workplace environment, WIL, engineering, disadvantaged students, international students.

Introduction

The importance of transforming engineering graduates into proactive professionals by bridging the skills gap between university learning and performing in the workplace has been discussed by both academics and industry professionals for many years (Sheedy, 2021). Industry associations have stepped in to provide necessary training in this space. The Australian Constructors Association (ACA) partnered with Engineers Australia (EA) to develop the Construction Engineer Learning and Development Guide in order to "[overhaul] the training and development guidelines for construction engineers to improve consistency…across the construction sector" (ACA, 2021).

Engineers Australia (2022) in their graduate program note the top priorities of skills and knowledge include self-management, communication, teamwork, attention to detail, project management, risk management, problem-solving, stakeholder engagement. Industry increasingly demands these essential skills including "emotional intelligence, community engagement, diversity, and inclusion".

Work Integrated Learning (WIL) has been a focus in higher education as a method of developing professional skills within students during their studies. The National WIL Strategy (Universities Australia 2014) is committed to supporting and expanding WIL opportunities for students. However, increasing students' numbers and the difficulty in attracting potential employers to take part in WIL programs have created challenges in providing industry based placements for all students (Clerke et al. 2021; Kay et al. 2019; Jackson 2017; Edwards et al. 2015). This challenge is further exacerbated for certain student groups who have particular difficulties finding industry-based placements, such as students in disciplines where industry placements are intrinsically scarce, international students on temporary study visas, students with certain disabilities, or students with learning difficulties (Paull et al., 2019). In light of this, universities are designing and implementing new WIL models, including, micro-placements, online projects or placements, hackathons, competitions and events, entrepreneurial WIL (with start-ups) and consulting (Kay et al. 2019).

This project aims to analyse the quality and effectiveness of a simulated workplace environment (SWE) for WIL programs in the form of an on-campus consultancy. The experience is analysed with reference to the comprehensive institution-wide quality assurance framework developed by Campbell et al. (2020) to determine the efficacy of the program. While the framework provides quality reference points across four domains of practice: (1) student experience, (2) curriculum design, (3) institutional requirements, and (4) stakeholder engagement, we focus on the student experience domain. We concur that a "quality WIL experience should provide students with a scaffolded, connected and supported pedagogical experience" (Campbell et al., 2020: 28), that WIL is "an opportunity to connect the learning within the university with the practice of the workplace" and WIL should increase student's "capacity to contribute to society at large" (Campbell et al., 2020: 21).

The majority of students who have undertaken the SWE program in our engineering faculty are international students. Jackson (2015: 3-4) notes that international students experience more difficulty in securing industry work placements than domestic students. This has been attributed to "a lack of networks, unrealistic expectations, logistical barriers, and employers' concerns about cultural differences and inadequate communication skills" by academics and some employers (Jackson, 2015: 4). Jackson (2015) recommends expanding WIL delivery options to include simulated options that connect students with industry through on-campus, industry-based projects as way to enhance WIL outcomes for international students. At the University of Technology Sydney (UTS), Optik Engineering Consultancy in the Faculty of Engineering and IT (FEIT) offers students an opportunity to work full-time for 12 weeks on real business projects for industry partners in a professional consultancy environment, with academic and industry mentors. This paper evaluates one running of Optik in 2021-22, with the participants invited to take part in the study. Our aim is to reflect on the appropriateness of this SWE programs as an alternative to the more traditional industry-based placement, in the context of student experience and skill development outcomes.

The paper is organised as follows. Innovative WIL models, which are gradually replacing industry-based work placements at universities, are briefly discussed, followed by information about the specific WIL program, Optik Engineering Consultancy, that is evaluated in this study. The remaining sections include the Research Approach, Findings, Discussion, and Conclusion.

Innovative WIL Models

Work integrated learning (WIL) is an umbrella term used for a broad range of approaches/practices that allow students in higher education to apply the theoretical knowledge gained in classroom into workplace practices (Phillips, 2014; Vailasseri et al., 2021). Traditionally, students are placed in industry-based, on-site work placements that give them exposure to professional practice to link their theoretical learning to practice. Engaging students with discipline specific industries has supported job-readiness/employability of graduates (Wilton, 2012; Campbell et al., 2020). Due, in part, to a shortage of traditional internship places, universities are embedding alternative WIL models into programs to provide similar benefits for students. Engineering Australia, accreditation body for engineering degrees have made WIL a mandatory requirement in Australia (Vailasseri et al. 2021).

The popularity of WIL programs and an increasing number of enrolments in higher education have intensified the competition to secure relevant WIL opportunities for students within specific disciplines, including engineering students. Universities are becoming increasingly flexible in terms of the timing, duration, and types of WIL placements they offer (Kay et al. 2019). Universities are designing and implementing innovative new WIL programs such as micro-placements, virtual projects or placements, hackathons (co-design with industry), competitions and events-based partnerships, engagement with SMEs or community organisations, global WIL, entrepreneurial WIL (placements with start-ups) and SWE consulting (Kay et al. 2019).

SWE Program: Optik Engineering Consultancy

The Optik Engineering Consultancy is a Simulated Workplace Experience that meets the EA degree accreditation recommendation for students to complete a minimum of twelve weeks industry equivalent experience. It runs seven hours per day, five days a week for twelve weeks (equivalent to 60 days or 420 hours). At the time of writing, Optik has been running for five years with numbers of students ranging from 30 to 120 per intake. Although this program was originally developed for international students, some double-degree domestic students have also participated, if they were unable to find an industry based three-month placement. Further, usually domestic students undertaking a single B.E (Hons) degree undertake two six-month internships; one (junior) in the first/second year and the other one (senior) towards the end of their degree. However, in the most recent session (Nov 2021 – Feb 2022), a significant number of these students also participated in Optik due to the COVID-19 induced challenges of securing industry placements, and 120 students participated in the program.

Participants of the program work in teams of eight to twelve on projects for industry clients. The projects are supplied by industry clients and can be discipline specific or cross-discipline in nature, with teams structured accordingly. Optik is structured to mimic the experience of an Australian engineering workplace environment, with a managing director, HR manager, internship manager, lead engineer, site manager and team leader (selected from amongst the participants in each group), together with an industry client for each group. A general code of conduct is provided, along with dress code, attendance, time-sheet, sick leave and many other guidelines for participants.

Optik provides a lead engineer, site manager and student participant on site, providing general engineering guidance and support to participants on a daily basis. Industry clients meet with their project group on a weekly basis to provide specialised technical advice and feedback on progress. Industry clients are generally very satisfied with the professionalism of Optik project groups and the quality of project outcomes – often putting project outcomes into practice. Optik has return clients, and has gained new clients based on recommendations from past clients. Also, several students have gone on to gain employment with clients, post Optik.

Research Approach

Quantitative data collection:

An online survey was distributed to all (120) participants towards the end of the 12-week program. 83 (69%) participants completed the survey. Questions for the survey were adapted from Kirkpatrick

and Kirkpatrick's (2007) comprehensive evaluation guide. The questions were used to evaluate students' participation in the SWE program.

Table 1 shows the distribution of the participants in reference to their gender, whether they were a domestic or international student, undertaking undergraduate or post-graduate degree as well as students who took part in the program instead of regular junior or senior industry-based placements.

Table 1: Distribution of participants

Description		Number	Percentage
Total Number of participants		83	69%
Gender	Male	72	87%
	Female	10	12%
	Non-binary	1	1%
International or Domestic	International student	49	59%
	Domestic student	34	41%
Undergraduate or Postgraduate	Undergraduate	76	92%
	Postgraduate	7	8%
Optik or Junior or Senior internship	Optik	64	77%
	Junior internship	12	14%
	Senior internship	7	8%

Qualitative data collection:

32 out of the total 120 students from the program were randomly chosen to participate in interviews. 16 sets of interviews were conducted. They are referred to as interview 1 to interview 16 in the results section below. 10 interviews took place in one-to-one interview settings however, others were conducted in groups of up to six students (two in interview 11 and 13; three in interview 1; four in interview 3; five in interview 4 and six in interview 14) . All students were given equal opportunity to answer questions during the interview.

Data analysis

Participant experiences were analysed to verify the quality of the program based on evaluation criteria suggested by Drewery et al. (2016): relatedness, learning and impact. All interview data was audio recorded with student permission and transcribed verbatim through human transcription. NVivo was used to categorise interview data.

Results

Survey results

The survey participants rated the program based on seven different aspects as shown in Table 2 below. Relatedness refers to the relevancy of the program and its outcome to their individual study and career direction, as shown in question a) and f). Question d) identified learning opportunities in the program. Questions e) and f) referred to the impact on their employability and skill development.

Table 2: Perception of survey participants about the program

Rating of the following statements	Poor	Fair	Good	Very Good	Excellent
a) The program (interest, benefit to your academic learning, quality of work you completed, etc.)	2%	5%	27%	35%	31%
b) Work supervisor in the program (knowledge of field, ability to communicate, supportive, likeable, etc.)	2%	2%	16%	35%	45%
c) Workload and schedule (amount of work, number of hours)	0%	6%	28%	31%	35%
d) The program as an educational experience to enhance your academic degree	1%	8%	19%	35%	36%
e) Impact of the program on your professional skill development	1%	8%	22%	31%	37%
f) Impact of the program on your employability	2%	13%	25%	27%	33%
g) Relevance of the program to your needs and interest.	1%	16%	23%	30%	30%

Based on the above results, the majority of survey participants found the program beneficial. A large percentage of participants agreed that the industry mentors/work supervisors were very supportive. The full-time schedule and the workload during the program seemed appropriate, as participants rated them positively, with only 5 (6%) rating 'Fair' in this category. Responses to questions e), f) and g) in Table 2, which measured the impact of the program on their professional skill development and future job perspectives as well as the relevance of the program was also fairly positive.

Overall, gathering quantitative data of survey participants has enabled us to gain an understanding of participant satisfaction relating to the above evaluation criteria.

Interview results

The questions in the interviews were mainly focused on the following aspects of the program:

- Benefits of the program
- Client requirements and challenges
- Relevancy with real world and future job perspectives
- Recommendations for improving the program in the future

Benefits of the program

Most participants enjoyed the Optik program. The degree of satisfaction varied depending on roles and the project they were involved in. One of the common achievements for students was learning soft skills in the project as both leader and member of a team. As one of the participants explained:

> While doing the internship at Optik, they have also taught us some soft skills to communicate with the client. I'm quite happy with what Optik has given and I have developed some soft skills. [Interview 10]

Other participants reinforced the benefits they received from the program:

> I would say being at Optik has helped a lot in terms of, as said before, making connections and all of that. Both through people in Optik and also clients, I would say as well it does help me a bit more in what I want to look at. …The internship has given me confidence. [Interview 14]

> And I feel that all the skills I have learnt from Optik can be applied to all of these positions, with my technical skills from uni. [Interview 6]

All participants were asked to list their top five skills they gained from the program. To represent all the responses, we added them in Mentimeter and presented the result as shown in Figure 1 below.

Communication skill was most cited by the participants. The following comment from a participant notes the centrality of communication in their SWE experience:

> Communication is where you build everything else from... Because it's one of the baseline things that you generally have to do. It's basically unavoidable. You're going to have to communicate. You have to do it effectively, be succinct….. Especially exposure to clients, that's really a big thing. [Interview 11]

Figure 1. Skills gained from the program

For team leaders, leadership was commonly cited as significant skill gained from the program:

> So, definitely the leadership skills and technical skills I am going to take away from this, because that's the biggest thing. [Interview 16]

Client requirements and challenges

Project scopes varied as public and private organisations of different sizes clients were selected. Some concerns surfaced regarding different levels of expectation from clients in different groups. A few groups faced difficulties with clients being unable to disclose substantial information to them:

> Some of the data that the [client] provided was confidential. So he said we can't use the data. And then some of the data he didn't even send us because he can't share it with Optik. [Interview 14]

Besides the project scope, client requirements and expectations sometimes created frustration:

> Some things the client might think is basic common sense and industry standards, for them, we don't know that. So if clients could communicate and understand that we are interns, and maybe realise that we don't have this knowledge and communicate more specific requirements to us earlier [Interview3]

Relevancy with real world and future job perspectives

Participants generally recognised the program as a valuable transition to the real workplace:

> This is actually as close as you can get to the real-world environment. It's a good transition between university and the real workplace. Team dynamics, working on a real actual project, clients having expectations based on real workplace requirements not just university level requirements. [Interview 3]

Diversity and inclusion aspects were mentioned in a positive way by a few participants:

> So I have a chance to experience different cultures and collaborate with people with different cultures which is really interesting as well. [Interview 12]

> And as a girl inside the engineering field which has a lot of guys, learning to interact with them and collaborate with them is really interesting for me as well. [Interview 12]

Participants also observed the challenges posed by the COVID-19 pandemic as they also had to work from home:

> We were working from home for two weeks and one week where each of us had COVID, so we spent an extra week due to that. [Interview 14]

> 2 to 3 weeks [from home] ... it was very hard because my energy levels were so low. [Interview 15]

Others offered a contrasting view, perceiving a real workplace would differ to the program:

> It's definitely going to be more stressful. Honestly, the client is not expecting us to make a really good product, although we were working really hard, the client wasn't expecting much." [Interview 8]

> In any workplace, there's a pressure/incentive to keep working, get things done. And as the presence of management looking over your shoulder, and you have to report to this person, get this done by this time. You don't question the necessity of having to get that work done. It's hard to see where that comes from. But that's definitely not here. [Interview 2]

Recommendations for improving the program in the future

Participants recommended the following improvements to Optik going forward:

> Fieldwork or site visits or hands-on experience should be incorporated into the program. [Interview 13]

> A bit of fieldwork to get out of office for a bit. But obviously that didn't happen because of COVID but I think fieldwork is a good component to include. [Interview 11]

> One improvement that all students should experience is a bit more exposure to the project- site visits, or more hands-on stuff. [Interview 15]

Financial compensation was also raised as a possible change in the program:

> The only thing I can think of is, I want to get paid. Because I put maximum effort. At least, I feel like I deserve it. So I want to get paid. [Interview 1]

> If we were paid, everyone would have a more serious attitude. Even though, generally speaking, the attitude was okay. … motivation of payment. [Interview 11]

Improved technology in the university offices (rooms) was another suggestion:

> At least one decent computer so it's possible to do anything that requires decent computing power… couldn't really run what we're working on at the university, we had to run it at home. [Interview 4]
>
> Because these computers are locked, you can't install anything because we don't have Admin right. So essentially, for doing actual development, we can't actually use them. [Interview 4]

More guidance from a subject management perspective was also suggested for improvement:

> I feel like Optik needs to do more work and assist … to clarify uncertainties from clients. [Interview 7]
>
> The supervisor should have been a little more hands-on. …sometimes I wish they came in and guided us a bit better… there was a lot of people doing internships with Optik. [Interview 13]
>
> The better guidelines from Optik management. More project related to our subject. [Interview 13]
>
> I think the team leaders have a very advantageous role. Always being in contact with [Supervisors and Managers]. They were always getting involved. And their communication skills were obviously improving. I think Optik could have given a better chance for other [team members]. [Interview 14]

Discussion

Engineers Australia requires students complete a minimum of 12 weeks equivalent industrial experience during their undergraduate degree. However, an increasing demand for internships due to rising numbers of students is creating challenges for universities and students who struggle to find suitable work-based placements. In the case of students from diverse backgrounds and minorities, finding a placement can be even more challenging (Clerke et al., 2021) for a variety of reasons. For example, social networks have been found to help some students access work-based placements (Paull et al., 2019). But international students may not have the same access to social networks as domestic students. Further, students from diverse backgrounds may be disadvantaged by unconscious bias operating in internship recruitment ecosystems which favour able-bodied, middle-class, Anglo Celtic, CIS-normative, and male persons.

SWE programs are among the emerging models of WIL (Kay et al., 2019) that may offer a viable solution. SWE programs can accommodate large numbers of students, are inclusive of students from diverse backgrounds, and can meet EA requirements for professional practice engagement. Yet, while they have been found to have significant merit, SWE programs also have challenges (Kay et al. 2019) that need to be addressed. The findings in this study highlight both the merits and challenges experienced by students in a current, Australian SWE program.

Development of professional skills

A key purpose of work integrated learning is to provide students with opportunities to develop skills that will contribute to future employability. The findings indicate that SWE programs help students to develop a range of professional skills, including, inter alia, communication, project management, leadership and teamwork, problem-solving, risk management, technical skills and time management: (Interview 6, 10, 11, 12, 14 & 16). The majority of students stated that the program prepared them well for their future jobs in the real world. This finding aligns with most other studies of WIL programs (Coll et al. 2009; Wilton 2012; Smith-Ruig 2014).

The range of skills students indicated they gained from Optik (see Figure 1) is highly correlated to the professional skills identified by both EA and ACA needed to effectively put technical skills into practice independently in the workplace. This indicates that SWEs can provide realistic enough conditions to facilitate the development of these fundamental professional skills.

"Real-world" Perception

The challenge of SWE programs is to expose students to as close to the real pressures, stresses, expectations and professional atmospherics of an actual industry workplace. As a student on an actual industry placement, there is considerable self-motivation to gain the respect and recognition of the established professionals around them, to be accepted as a valued colleague. This is hard to replicate on campus (Interview 2 & 8).

Because students attend the SWE on-campus, they can struggle to alter their mentality from one of a student to one of a practicing professional. As such, they may expect the kind of scaffolding and guidance in an educational environment to be present in the SWE (Interview 13). Similarly, students may be inclined not to consider the "stakes" to be as high in the SWE environment as industry (Interview 2), also acknowledged in a similar study by van Eck et al. (2019).

Development of professional identity

Communication and collaboration emerged as the most significant skills developed in this study (Interview 3, 10, 11 & 14), and this aligns with previous findings where engineering students in WIL programs have adjusted their perception of engineering identity of being purely technical (Vailasseri et al. 2021). However, SWE programs may not be developing other aspects of professional identity development, which, along with skill development, helps prepare students for the world of work (Interview 2, 7, 8, 11, 13, 14 & 15). Professional identity development is about professional socialisation; understanding workplace cultures and how one might fit in, and developing agency, the capacity for forethought, awareness and intention within the complex power hierarchies of a workplace and profession (Trede et al. 2012; Trede & Jackson 2021).

Impact of industry mentors

The vast majority of students in the SWE program were satisfied with their industry mentors and found them to be knowledgeable, supportive and good communicators. A small number of students aired frustration about industry mentors who they perceived as hard to contact, not responding to requests, either providing too much or too little information, or assumed too much student knowledge or had low expectations (Interview 3, 13 & 14). Similar issues are common to many WIL experiences, particularly internships, and among the most difficult to manage (Jackson et al., 2016).

During the COVID-19 pandemic it was unavoidable to face disruption in the program. Working from home (WFH) for students was an alternative method during the time when some members of groups tested positive to the virus (Interview 14 & 15). Dean and Campbell (2020) recommended such adjustments of WIL offering during the pandemic.

Limitations

There are several limitations in this study, including that:

- we have not compared the SWE program with other WIL offerings in the university;
- the program was disrupted by the COVID-19 pandemic which may have affected impacts; and
- due to the program running during the summer break and Christmas holidays, some clients were not readily available to respond to participants resulting in communication delays.

Implications and Conclusion

Traditional WIL experiences, such as industry internships, are becoming more difficult to access for engineering students, particularly those from diverse backgrounds. SWE programs widen student opportunities to engage with professional practice. Access is a key strength of SWE programs.

The findings indicate that SWE programs are beneficial for developing professional skills, however, may provide less opportunity to develop professional identity. Improved outcomes may be realised through field visits and more access to industry mentors for all students, not just team leaders.

The variability in the mentorship quality of industry mentors is an issue that is common to all WIL programs, including traditional internships. There may be greater opportunity for this issue to be minimised in SWE programs as academic supervisors may have more influence with industry mentors in classrooms than those in workplaces. The higher level of proximity may provide better leverage and control over the student experience.

Further research is required to compare the outcomes of SWE programs with traditional internships and other types of WIL programs to ensure all students can access high quality learning experiences.

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