WILNZ
Work-Integrated Learning New Zealand
Tuia te ako, tuia te mahi, tuia te ara whaihua e

Work-Integrated Learning New Zealand 2023 Refereed Conference Proceedings

Weaving together: The future of work-integrated learning

20-21 of April, 2023
Te Pae Convention Centre, Christchurch, New Zealand

Editors
Karsten E. Zegwaard, Patricia Lucas, Kathryn Hay, & Jenny Fleming
ISBN 978-0-473-67576-9

Front cover: Te Pae Christchurch Convention Centre, Christchurch, New Zealand
Photo credit: Te Pae

Work-Integrated Learning New Zealand 2023 Refereed Conference Proceedings

Refereed Proceedings of the 25th Work-Integrated Learning New Zealand Conference, held in person on the 20th to 21st of April, 2023, at Te Pae, Christchurch, New Zealand.

All papers were double-blind peer reviewed and amended before accepted for publication.

These proceedings are formatted for double-sided printing.

Published by Work-Integrated Learning New Zealand Inc (WILNZ)

Available online: www.wilnz.nz

ISBN 978-0-473-67576-9

Work-Integrated Learning New Zealand gratefully thanks its supporters

Gold Plus Sponsor

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Gold Sponsor

AUT
TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

Ako AOTEAROA

Sonia

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

DATACOM

Silver Sponsor

LINCOLN UNIVERSITY
TE WHARE WĀNAKA O AORAKI

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

CONTENTS

** Winner of the Allister McLay Best Paper Award*

Multidisciplinary work-integrated learning: The Impact Lab at University of Waikato

GAIL ADAMS-HUTCHESON
SANDY MULLER
KARSTEN E. ZEGWAARD
LEE MARTIN
NATASHA MILLER
The University of Waikato, New Zealand

INTRODUCTION

Learning through interdisciplinary opportunities plays a key role in enhancing graduate employability (Ferns et al., 2022). Further, Gardner and Perry (2023) argue for adaptive innovators with broad understandings of systems and knowledges to reflect the interdisciplinary nature of workplace practice. Literature has highlighted that interdisciplinary WIL is regarded as an innovative model of work-integrated learning (WIL) (Kay et al., 2022). Albeit the practice of campus-wide interdisciplinary WIL is uncommon, there are examples in the literature such as the CityStudio (CityStudio, 2023) and the Canadian University of Capilano's Co-Lab initiative (Baichoo et al., 2023). Here we showcase innovative multidisciplinary WIL by discussing The Impact Lab at the University of Waikato. Further, we utilise the term multidisciplinary to denote student heterogeneity, and the application of knowledge that stays within the boundaries of each student's discipline.

In 2018, the University of Waikato developed a new curriculum framework that presented WIL as a compulsory offering in all undergraduate degrees. This curricular redevelopment presented an opportunity to create campus-wide multidisciplinary learning. The Impact Lab places special emphasis on multidisciplinary collaboration that is supported by academic convenors, mentored by university staff and commissioned by work organisation(s), Iwi (Māori communities), community groups, Non Governmental Organisations (NGOs), and city and regional councils as a client for student teams.

Links to the United Nations Sustainable Development Goals

In 2015, the United Nations (UN) Summit developed the UN 17 Sustainable Development Goals (SDGs) as global objectives to be achieved by 2030 (United Nations, 2016). They present a shared blueprint for peace and prosperity for people and the planet for now and in the future. The SDGs are highly interconnected, achieving one goal such as poverty affects, climate change, education, gender, economy, and partnerships for example. Given that the SDGs are deeply interwoven, there is a clear demand for multiple approaches and strategies to find localised solutions (Nhamo & Mjimbo, 2020) such as multidisciplinarity. Thus, third year students from any discipline can enrol in The Impact Lab as their WIL option and are placed in multidisciplinary teams of approximately six students. Students entering workplace practice often step into a multidisciplinary team environment, so value is given to being able to communicate with others from different perspectives and arrive at sustainable solutions together (Burford et al., 2020).

DELIVERY TYPES

Currently, there are two modes of learning delivery in The Impact Lab; multiple projects where students preference a project, and a single project where several teams work towards developing a solution in competition with each other. The Impact Lab is facilitated through central administration, the WIL Central Unit (WILCU) with academic support from the Divisions. In this section, both delivery types (preferencing and competition) are discussed.

Preferencing Projects

Specific project briefs are developed between WILCU staff and external partners. Student teams have worked on a suite of projects for the university, Iwi, tourism ventures, councils, Non-Governmental Organisations, hospice, schools, and many more organisations. When students enrol in their divisional paper for The Impact Lab, they indicate a preference for choices of project. WILCU staff manage team numbers and degree specificities. In this way, multidisciplinary teams are built around projects that students relate to, or have an interest in, and the client benefits from diverse disciplinary perspectives.

Design Sprint Competition: Turning Waste into Value.

Students enrolled in The Impact Lab for the A trimester (Feb-June 2023) are all working on the same challenge for a single organisation. The sustainability problem consists of 're-purposing' marine-grade plywood off-cuts which currently enters landfill at approximately 1,000 cubic meters per year. Eight teams are in competition with each other to conceptualise a commercially viable plywood product that may be of benefit to the wider community. There are several areas that are key for this project, such as, ability to conduct detailed costing, concept design, consumer knowledge, and marketing that rely on multidisciplinary knowledge. Team members were selected to ensure a diverse knowledge base to support the project purpose and the teams are equitable.

ASSESSMENT STRUCTURE

Ensuring that WIL learning experiences are authentic is important (Bosco & Ferns, 2014), and reflected in the assessment structure. The role of assessment for The Impact Lab differs to that of individual placement as all students are required to complete group-based work with equitable assessment tasks, regardless of degree background or project specifics. Unlike other university offerings, students in The Impact Lab are often in diverse settings away from the university with a range of external partner expectations (Ferns & Zegwaard, 2014). Therefore, designing effective assessment practices remains one of the more challenging aspects of delivering WIL (McNamara, 2013).

Assessment typically accommodates a wide range of learning activities and students do a mix of individual (student), group (team), and peer assessment. Further, scaffolded student support in the beginning weeks of a trimester is important. Initial workshops were are based on professional development and transferable skills (critical thinking, problem solving, emotional intelligence, teamwork, and time management) which are vital for WIL engagement and preparing students for global workforce opportunities. Ferns and Zegwaard (2014) discuss that WIL assessment protocols need to be responsive to practice-based settings, collaborative, and outline expected professional behaviours.

The Impact Lab assessment is made up of:

- *Professional Profile 15% (individual assignment)*. Developing student professional identity is important (Trede, 2012; Zegwaard et al., 2017). This assignment involves developing a CV, cover letter, and LinkedIn profile. This is supported by a two-day workshop, drawing on the concept of 'work-ready' graduates with understanding of their employability skills (McNamara 2013).
- *Project Plan 15% (group assignment).* Developing a clear project plan is vital. Consideration is given to the organisations' needs as well as the discipline-specific contributions that the students can provide. The assignment uses a template and 'kick-starts' the team's thinking about the project pragmatics, including a timeline for deliverables.
- *Midpoint Reflection 15% (individual assignment).* Critical reflection on practice plays a key role in developing student knowledge and links theory with practice (Windgrove & Turner, 2015). This assignment requires students to reflect on the progress of the project, their individual learning so far, and team dynamics. Individual insight on how well the team is working together is crucial and can serve as an early indication for the need for greater mentor intervention.
- *Oral Presentation 20% (group assignment with some individual assessment).* Communication is one of the most sought-after skills that employers seek in graduates (Khoo et al., 2020). This assignment requires and assesses team presentation of the project outcomes. The team is assessed on the validity of project deliverables, including responding to questions, and also the quality of individual contribution to the presentation.
- *Final Report 25% (group assignment).* The final report outlines the project undertaken and outcomes in more detail than the oral presentation. This report also provides an outcome for the organisations. Standard technical or business case study report structures are expected. Reports are marked internally, and students are given time to create a revised copy with disclaimer to provide to the client(s) as a tangible project output.
- *Peer Assessment 10% (mixed group and individual assessment*). The peer assessment asks students to critically evaluate each other's contribution to the overall project and allows recognition for those who expressed leadership and carried the bulk of the work, and those who may have contributed less.

Partner Input

Partners work with The Impact Lab teams directly to guide the students on workplace requirements. This reflects the insights by Fleming et al. (2021, p. 705) that "significant support is needed from industry and/or community partners, through providing valuable opportunities for authentic learning, giving students access to real-life problems, data and scenarios". In The Impact Lab, the client provides a supervisor that works with WILCU staff on shaping the project and expected outcomes. As the projects are bespoke in nature, the assessment is designed to allow for content that reflects the project specifics. In the competition approach, the oral presentation is adjusted to account for multiple teams engaged with the same business client, using a format akin to a 'dragon's den' with a panel of expert judges.

BENEFITS

Engaging with sustainability issues for an external partner is a win for the student and the organisation. Often an external partner lacks time and capacity to explore the complexities of sustainability and whether SDGs are adequately addressed within their business. Having a team of students applying their diverse skills to a complex issue is beneficial for both parties.

The importance of graduates demonstrating well-developed skills, knowledge, and attitudes for effective workplace performance is widely asserted as a key dimension of employability (Fleming et al., 2021). Being able to offer key transferable skills (critical thinking, time management, teamwork, project management, etc.) in an authentic setting is useful and vital for employability. While Fleming et al. (2021) rightly interrogate how employability skills and knowledge is transferred in the workplace by focusing on workplace supervisors, The Impact Lab students are actively supported by project mentors (university staff) as well as industry experts who manage skills and knowledge transfer together.

CHALLENGES

Although multidisciplinary learning is seen as crucial for future graduates as adaptive innovators (Gardner & Perry, 2023), institutionalised settings are traditionally departmentalised (aka siloed) into disciplines (Ferns et al., 2022) where cross-discipline learning activities are difficult to facilitate. Since multidisciplinary learning opportunities operate across, rather than within, these traditional structures, the departmentalised nature of offering learning opportunities, funding distribution, and resourcing (physical and staffing) is a particular challenge. Thus, multidisciplinarity as a process is complex and fraught with internal administrative challenges. Further adding to the challenge is that the concept of multidisciplinarity is not well understood or sought after by teaching staff, especially within institutions still recovering from the 'panic-gogy' caused by COVID-19 (Dean & Campbell, 2020).

CONCLUSION

Consideration needs to be given "to developing new understandings of quality in WIL and appreciation of diverse learning afforded by sustainable, innovative, non-placement models of WIL" (Dean & Campbell, 2020, p. 355). The Impact Lab is positioned to enable a suite of WIL opportunities for students to engage with the 'new economy' that is demanding skills in creativity, communication, teamwork, and entrepreneurship for most graduates. While multidisciplinarity is held as an achievable gold standard of opportunities for student learning, the departmentalised nature of university settings does not easily encompass pan-university learning opportunities. These challenges should not prevent the development of multidisciplinarity, especially considering the reciprocal benefits for each of the key stakeholders, the student, the organisation, and the institution. Offering external organisations the unique opportunity to pose a sustainability challenge to a group of diverse students ready to apply their skills to a project that matters, has proven to be invaluable for all three stakeholders. The SDG framework has only highlighted the strong collective effort needed to be able to reach sustainable solutions to complex problems. Multidisciplinary WIL learning opportunities, despite the challenges within traditional university structures, are important learning opportunities that need to be further explored and expanded.

REFERENCES

Baichoo, M., Fane, J., Loken, T., & Mahood, A. (2023). Establishing and managing a blended approach to institutional work-integrated learning. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook of work-integrated learning* (3rd ed., pp. 325-341). Routledge.

Bosco, A. M., & S. Ferns. (2014). Embedding of authentic assessment in work-integrated learning curriculum. *Asia-Pacific Journal of Cooperative Education, 15*(4), 281–290.

Burford, S, Cooper, L, and Miller, F (2020). Stolen knowledge: Student knowing in workplace practice. *International Journal of Work-Integrated Learning, 21*(2),163- 176.

CityStudio. (2023). *CityStudio London*. https://citystudiolondon.ca

Dean, B. A., & Campbell, M. (2020). Reshaping work-integrated learning in a post-COVID-19 world of work. *International Journal of Work-Integrated Learning, 21*(4), 355-364.

Ferns, S. J., Lewis, S., Russell, L., Childers, J., Brewer, M., & Alessandrini, J. (2022). Designing and implementing interdisciplinary project-based work-integrated learning. In S. J. Ferns, A. D. Rowe, & K. E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future* (pp. 167-178). Routledge.

Ferns, S. J., & Zegwaard, K. E. (2014). Critical assessment issues in work-integrated learning [special issue]. *Asia-Pacific Journal of Cooperative Education*, *15*(3), 179-188.

Fleming, J., Rowe, A. D., & Jackson, D. (2021). Employers as educators: the role of work placement supervisors in facilitating the transfer of skills and knowledge, *Journal of Education and Work*, *34*(5-6), 705-721. https://doi.org/10.1080/13639080.2021.1969343

Gardner, P., & Perry, A. L. (2023). Adapting to an accelerating, disruptive future: Melding work and learning through the role of the T-Professional. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook of work-integrated learning* (3rd ed., pp. 492-509). Routledge.

Kay, J., Ferns, S. J., Russo, A. M., Smith, J., & Younger, A. (2022). Innovation in work-integrated learning. In S. J. Ferns, A. D. Rowe, & K. E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future* (pp. 133-144). Routledge.

Khoo, E., Zegwaard, K. E., & Adam, A. (2020). Employer and academic staff perceptions of science and engineering graduate competencies. *Australasian Journal of Engineering Education, 25*(1), 103-118.

McNamara, J. (2013). The challenge of assessing professional competence in work-integrated learning. *Assessment & Evaluation in Higher Education* 38(2):183–197.

Nhamo, G., Mjimba, V. (2020). The context: SDGs and institutions of higher education. In: Nhamo, G., Mjimba, V. (eds) *Sustainable development goals and institutions of higher education*. Springer

Trede, F. (2012). Role of work-integrated learning in developing professionalism and professional identity. *Asia-Pacific Journal of Cooperative Education*, *13*(3), 159-167.

United Nations. (2016). *The sustainable development goals report*. United Nations. https://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf

Wingrove, D., & Turner, M. (2015). Where there is a WIL there is a way: Using a critical reflective approach to enhance work readiness. *Asia-Pacific Journal of Cooperative Education*, *16*(3), 211-222.

Zegwaard, K. E., Campbell, M., & Pretti, T. J. (2017). Professional identities and ethics: The role of work-integrated learning in developing agentic professionals. In T. Bowen & M. T. B. Drysdale (Eds.), *Work-integrated learning in the 21st century: Global perspectives on the future* (pp. 145-160). Emerald. https://doi.org/10.1108/S1479-367920170000032009

Wellbeing challenges students encounter during work placement

GAIL ADAMS-HUTCHESON
KARSTEN E. ZEGWAARD
University of Waikato, New Zealand

INTRODUCTION

The higher education sector is increasingly focusing attention on student wellbeing needs and support structures (Konstantinou et al., 2023; Pascoe et al., 2019). This increasing attention is driven by the awareness of changing student wellbeing needs. Hattie et al. (1996) noted within his meta-analysis of factors impacting secondary school student learning that wellbeing was of increasing importance. For students in higher education, additional challenges present, including that students likely have shifted away from home, explore greater (less restricted) freedom, are more financially independent but with limited financial resources, and transition from a controlled learning environment to a more independent learning environment (Hewitt, 2019; Hicks & Swain, 2007).

In New Zealand, recent legislation has driven student wellbeing further to the forefront by the introduction of the Education (Pastoral Care of Tertiary and International Learners) Code of Practice (New Zealand Government, 2021) – commonly known as the Pastoral Care Code. This legislation outlines the legal requirements of higher education institutions to ensure the physical and mental safety and wellbeing of students. Within the wider context of risk management within WIL, an already active area of development (Fleming & Hay, 2021), universities have been reviewing, restructuring, and increasing resourcing of student support services, in addition to furthering understandings of how students access support.

Our research stems from the university's approaches to better understanding student wellbeing, with a particular focus on student experiences during work placement. Wellbeing challenges are already significant for students in higher education (Neves & Hillman, 2019), however, within the context of work placement additional stressors are encountered. Students in work placement programmes experience stress associated with the selection process, possible rejection, possible relocation, new work environments, new colleagues, workplace expectations, and the reality of authentic tasks and their outcomes. Zegwaard (2015) identified significant gaps in the literature around understanding student wellbeing within the context of WIL. Some recent research has explored inclusion (an important aspect of wellbeing) for minority groups (Mallozzi & Drewery, 2019), linking stress during WIL to negative wellbeing outcomes (Cormier & Drewery, 2017; Drewery et al., 2019), how the relevance of WIL tasks enhance perceived wellbeing (Drewery et al., 2016), and that well-designed WIL experiences can enhance students' perception of quality of life (Gillett-Swan & Grant-Smith, 2018) and motivation to complete tasks (Drysdale & McBeath, 2014, 2018).

There has been no research exploring student experiences of stress during work placements or how they seek help. The research reported in this paper is ongoing and explores the stressors students encounter during work placement.

METHODS

The research was undertaken at the University of Waikato, New Zealand. The university offers two broad models of WIL: work placements and non-placement WIL – only the work placement was the focus of this research. Students completed an anonymous 20-minute online survey containing 19 agreement statements, seven open-ended questions, and five demographic questions.

The survey was sent to students nearing completion of their placements in B Trimester, 2022, and C Trimester 2022/2023, with data still being collected for A Trimester 2023. To date, the survey has been sent to 1,408 students with 163 fully completed responses, providing a response rate of 10%. Given the cohort sampling size and response rate, confidence can be held of the reliability of the findings (Fosnacht et al., 2017). Quantitative analysis was undertaken using Microsoft Excel and qualitative data was thematically analysed. This research has ethical approval (HREC(Health)2022#36).

The participants were predominantly female (76%), reflecting the dominance of the teacher education in the sampling cohort. Students identified as European (67%), Māori (17%), and other (16%) of which most were Pacific Islander, British, or South African. Most students were enrolled in teacher education (43.5%), followed by engineering (22.7%), education (13.9%), and business/management studies (14.7%).

RESULTS

Students were asked what stressors they encountered during work placement, being able to select as many as applicable and provide additional stressors if required (Table 1). When asked if students were aware of the various university support structures, over half (58%) were aware of student support services and 41% were aware of the Wellbeing Hub, with lesser awareness of the other support services and 3.4% of students not being aware of any of the support services. When queried if they had needed these support services during their work placement, students provided varied responses (Table 1).

TABLE 1: Sources of stress for students during work placement and the indication of the need for wellbeing support (n=142).

Source of stress		**Need for support**	
Stress indicator	**%**	**Response**	**%**
Financial	94.5	Definitely yes	9.7
Physical health	80.5	Probably yes	21.2
Student peers	75.0	Might or might not	19.4
Work colleagues/supervisors	65.6	Probably no	23.1
Needing to care for a family member	64.1	Definitely no	27.6
COVID-19	63.3		
State of the world	63.3		
Living away from home	62.3		
Other	12.3*		

*These included mentions of assessment, not being able to concentrate, having to work full time, flooding (reference to the February 2023 North Island cyclone event), self-expectations.

During work placement, many students reduced their physical activity (59%), contact with others (56%), and healthy eating habits (45%), whilst increasing alcohol intake (15%), and smoking or vaping (10%) compared to prior their work placement. When asked an open-ended question of what steps students took to manage their stress, students responded broadly around self-discipline to 'get things done', daily exercise, a self-care app, breathing and anti-anxiety exercise, managing work to create personal time, talking with family and friends, and so on.

Questions were asked about students' broader views on life as an indication of their general wellbeing status. Students reported gaining positive feelings from their work placement experience (Table 2), feeling positive about the future (Likert 7.13 out of 10), and feeling they were doing things worthwhile in life (Likert 7.25). Students also reported feeling neutral (neither satisfied nor dissatisfied) about their wellbeing during work placement (Likert 5.57), with 13.5% feeling very dissatisfied (Likert between 0 and 3 out of 10) with their wellbeing.

TABLE 2: Students reporting of positive feelings from the work placement experience.

Sentiment	**%**
A sense of achievement	91
Key work-related skills	90
Self-confidence	90
Confidence with working for organisations	89
A clearer picture of my future career	89
Praise for my work	86
Other	7*

* responses included a view of future challenges, planning abilities, working under pressure, networks.

DISCUSSION

Students reported experiencing a wide range of stressors during their work placement, with many reporting the same stressors, indicating a sense of agreement amongst students on common sources of stress. Financial stress was the most common (94.5%), which may largely be explained by students having greater financial independence but a low capacity to generate financial resources and that 55% of students undertook unpaid placements (such as the teacher education practicums) or receiving alternative remuneration typically below the minimum wage. Unpaid work placements continues to be a contentious issue in the WIL literature (Hoskyn et al., 2023), with arguments around legal entitlements and exploitation (Cameron, 2018), established and accepted practice, and volunteerism-based expectations within some disciplines (e.g., sports, conservation, community work, etc).

Physical health (80.5%), student peers (75.0%), work colleagues (65.6%), COVID-19 (63.3%) were also common sources of stress. The latter likely is a reflection of the ongoing concern for health and required restrictions within the workplace, and the current prevalence of infections in the workplace and wider community. The unexpectedly common stressor of caring for family (64.1%) strongly suggests more students than previously thought are having to manage or contribute towards care for family (e.g., child, elderly parents, sick family members). Albeit, COVID-19 may be a significant contributor for the need to care for family, this finding requires further investigation.

Encountering stress in life is common (Davis & Mantler, 2004), therefore, strategies to manage stress are particularly important (Lupien, 2012). Unfortunately, students reported changes to their activities that long term are known to negatively impact wellbeing. Reducing contact with others, physical activity, and healthy eating habits, and increasing alcohol intake, smoking, and vaping are common responses by students to stress (Canadian Institute for Health, 2005; Stults-Kolehmainen & Sinha, 2014). These behaviours, however, over the long term negatively influence wellbeing and physical health (Kim & Oh, 2017; Papadaki et al., 2018; Parackal & Parackal, 2017). It is, therefore, concerning that many students reported these negative behaviours during work placement.

It is also concerning that, during the work placement, some students definitely needed (9.7%), probably needed (21.2%), and may or may not have needed (19.4%) support for their wellbeing. Of this cohort,

29% did receive help, however, 51% did not. Even though, there will be an element of individual choice within the data, this finding suggests that the wellbeing support services are not utilised to the extent that they should.

Not all changes of behaviour during the work placement were negative. Students also reported actively engaging in activities to manage and improve their wellbeing, such as increasing physical exercise, talking to others, managing their time, and aiming for task completions (i.e., a sense of achievement). Completions and the sense of achievement to manage the effects of stress is a recognised pathway of building resilience for future encounters with stressors. Self Determination Theory argues that successfully overcoming stress can contribute to positive wellbeing (Deci & Ryan, 2012) and stressful experiences can lead students developing new skills, insights, and knowledges (Tedeschi & Calhoun, 2004). For this to be effective, however, students must experience scaffolded experiences of increasing intensity to successfully manage future significant stress.

An indication of students successfully managing their stress can be gained from the responses to their general view of wellbeing. Students reported positive sentiments during their work placements despite the many stressors encountered, including having a positive outlook on life and feeling that the things they were doing were worthwhile. The neutral view of their overall wellbeing during work placement may appear to be a negative finding, and perhaps should not be taken as a positive finding, it is reflective of wider society's general view of wellbeing (Ministry of Business Innovation and Employment, 2022). However, it must be noted that students differed in being able to manage stress, as is evident by 13.5% of students who had a very negative view on their wellbeing.

CONCLUSION

The ongoing research found that students on work placement commonly encounter stress. The findings suggested that most students are, for the most part, successfully managing stress, albeit, there is a cohort of students that are not. In addition, during work placement students are making changes to their behaviours that can negatively impact on their wellbeing. Whether these students return to more healthy behaviours upon completing their work placement is in need for further research. The findings also found that some students were actively managing their stress by introducing activities or mindsets, however, there was a cohort of students who needed additional support for their wellbeing and not all these students found this support. No doubt, student wellbeing will remain a significant challenge for educational institutions in the foreseeable future. It is hoped the insights from this research will inform thinking and planning on how best to support student wellbeing whilst on work placement.

REFERENCES

Cameron, C. (2018). The student as inadvertent employee in work-integrated learning: A risk assessment by university lawyers. *International Journal of Work-Integrated Learning, 19*(4), 337-348.

Canadian Institute for Health. (2005). *Improving the health of young Canadians*. Canadian Institute for Health Information.

Cormier, L. A., & Drewery, D. W. (2017). Examining the effect of co-op non-employment and rejection sensitivity on subjective well-being. *International Journal of Work-Integrated Learning, 187*(3), 213-224.

Davis, C. G., & Mantler, J. (2004). *The consequences of financial stress for individuals, families, and society* Carleton University.

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of Theories of Social Psychology* (pp. 416-436). Sage Publications https://doi.org/10.4135/9781446249215.n21

Drewery, D. W., Cormier, L. A., Pretti, T. J., & Church, D. (2019). Improving unmatched co-op students' emotional wellbeing: Test of two brief interventions. *International Journal of Work-Integrated Learning, 20*(1), 43-53.

Drewery, D. W., Pretti, T. J., & Barclay, S. (2016). Examining the effects of perceived relevance and work-related subjective wellbeing on individual performance for co-op students. *Asia-Pacific Journal of Cooperative Education, 17*(2), 119-134.

Drysdale, M. T. B., & McBeath, M. (2014). Exploring hope, self-efficacy, procrastination, and study skills between cooperative and non-cooperative education students. *Asia-Pacific Journal of Cooperative Education, 15*(1), 69-79.

Drysdale, M. T. B., & McBeath, M. (2018). Motivation, self-efficacy and learning strategies of university students participating in work-integrated learning. *Journal of Education and Work, 31*(5), 478-488.
Fleming, J., & Hay, K. (2021). Understanding the risks in work-integrated learning. *International Journal of Work-Integrated Learning, 22*(2), 167-181.
Gillett-Swan, J. K., & Grant-Smith, D. (2018). A framework for managing the impacts of work-integrated learning on student quality of life. *International Journal of Work-Integrated Learning, 19*(2), 129-140.
Hattie, J., Biggs, J., & Prudie, N. (1996). Effects of learning skills interventions on student learning: A meta-analysis *Review of Educational Research, 66*(2), 99-136.
Hewitt, R. (2019). *HEPI Policy Note 13. Measuring well-being in higher education*. U. K. Higher Education Policy Institute. https://www.hepi.ac.uk/wp-content/uploads/2019/05/Policy-Note-13-Paper-May-2019-Measuring-well-being-in-higher-education-8-Pages-5.pdf
Hicks, H., & Swain, P. (2007). Direct, facilitate, enable - juxtaposition of the duty of care and duty of disclosure in social work field education. *Social Work Education, 26*(1), 235-252.
Hoskyn, K., Cameron, C., Lucas, P. R., Trede, F., Yuen, L., Rae, S., Capocchiano, H., & Eady, M. J. (2023). Paid and unpaid work-integrated learning: Challenges and opportunities. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook of work-integrated learning* (3rd ed., pp. 548-562). Routledge.
Kim, J. S., & Oh, M. K. (2017). The association between cigarette smoking and health-related quality of life among adult smokers. *Korean Journal of Family Medicine, 38*(6), 350-355.
Konstantinou, I., Gerhardt, T., & Miller, E. (2023). Supporting the wellbeing of students: A framework for work-integrated learning programs. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook for work-integrated learning* (3rd ed., pp. 533-547). Routledge.
Lupien, S. (2012). *Wll stressed: How you can manage stress before it turns toxic*. John Wiley & Sons Canada LTD.
Mallozzi, R., & Drewery, D. (2019). Creating inclusive co-op workplaces: Insights from LGBTQ+ students. *International Journal of Work-Integrated Learning, 20*(3), 219-228.
Ministry of Business Innovation and Employment. (2022). *Consumer impacts in a COVID environment: round three report (March/April 2022)*. Ministry of Business Innovation and Employment. https://www.mbie.govt.nz/dmsdocument/22878-covid-19-consumer-impacts-study-wave-3-survey-findings
Neves, J., & Hillman, N. (2019). *Student Academic Experience Survey*. Higher Education Policy Institute and Higher Education Academy United Kingdom. https://www.hepi.ac.uk/wp-content/uploads/2019/06/Student-Academic-Experience-Survey-2019.pdf
Education (pastoral care of tertiary and international learners) code of practice, (2021). https://enz.govt.nz/assets/Education-Pastoral-Care-of-Tertiary-and-International-Learners-Code-of-Practice-2021.pdf
Papadaki, A., Hondros, G., Scott, J. A., & Kapsokefalou, M. (2018). Eating habits of older adults living alone: A survey in four European countries. *Appetite, 120*, 356-364.
Parackal, M., & Parackal, S. (2017). Implication of alcohol consumption on aggregate wellbeing. *Perspectives in Public Health, 137*(4), 220-226.
Pascoe, M., Hetrick, S. E., & Parker, A. G. (2019). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth, 25*(1), 104-112.
Stults-Kolehmainen, M. A., & Sinha, R. (2014). The effects of stress on physical activity and exercise. *Sports Medicine, 441*.
Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1), 1-18.
Zegwaard, K. E. (2015). Building an excellent foundation for research: Challenges and current research needs [special issue]. *Asia-Pacific Journal of Cooperative Education, 16*(2), 89-99.

Weaving the threads of postgraduate work-integrated learning: Experiential learnings from Doctor of Professional Practice mentors

MARTIN ANDREW
Te Pukenga - Otago Polytechnic, New Zealand

INTRODUCTION

As tertiary educators weave together a collective vision for all levels of education frameworks within the new and emerging organisation Te Pūkenga (the New Zealand Institute of Skills and Technology - a merger of sixteen Institutes of Technology and Polytechnics), there are increasing *kōrero* [discussions] around the shape and purpose of postgraduate learning *via* work-integrated learning (WIL). At the doctoral end of the spectrum, the Doctor of Professional Practice (DProfPrac) degree is the first of its kind generated by Otago Polytechnic | Te Pūkenga, grounded in structural and pedagogical principles of long-standing programmes such as Middlesex University's Doctor of Professional Studies (DProf). Such programmes present flexible, bespoke, heutagogically-oriented learning journeys defined by the candidate's particular work context and area of activity and their own unique area of interest. Similarly, the DProfPrac is designed to enable advanced practitioners to achieve a doctoral qualification while making a significant contribution in their organisation, *iwi* [community], *hapu* [group], or professional area. There are expected outcomes not only for the individual as a practitioner researcher, but also for the employer, sponsor or workplace stakeholders and for the broad area of endeavour. The term 'area of endeavour' is used because 'discipline' does not fit in a field that will generally be transdisciplinary in orientation, if only because the process of coming to know will always be emergent.

As ever, we benchmark our practice alongside those of our colleagues in Australia. Across the Tasman, we simultaneously see in Australia an increasing emphasis on our learners partaking in practicum or placement-based research as part of a project of promoting high-level employability and affording transferable skills and industry experience (Valencia-Forrester, 2019). While the Australian government calls for doctoral programmes with a formal internship base, the DProfPrac, approved in 2017 and with its first learners in January 2018, is work-based, meaning an enquiry project at the heart of the doctorate derives from a learning agreement between the sponsoring organisation or locus of work and the individual learner's desired proposal.

In Australia's model, WIL is "an umbrella term encompassing a range of university initiatives that integrate formal learning with practice workplace experiences in order to ease the transition to the workforce" (Valencia-Forrester, 2019, p. 398). According to Baxter and Burden (2008), Australia is left with the conundrum of developing authentic, transferable, work-ready skills in PhD students with WIL almost seen as an add-on. By contrast, the Middlesex and Otago Polytechnic | Te Pūkenga models see leading practitioners within professions or workplaces using the doctorate as a site to leverage transformational change within their practice. At the heart of the research-based, oriented, and informed programme is 'work' as a purposive activity that supports learning through work-based research. Primary among the affordances of such a programme is the emphasis on reflecting and enquiring into work activity, and on developing people as reflective, self-managing and agentive practitioners (Lester & Costley, 2010).

CONTEXT

The DProfPrac is a single cohesive learning journey comprising two courses, the second of which is the practitioner research enquiry (50,000 words). The first, known as Articulating Practitioner Enquiry, focuses first on candidates' experience of learning in the workplace and their describing their identity as a practitioner as a way to evolving an aspirational practice statement. Next, the course guides the learner to proposing an enquiry project utilising an authentic methodology, usually a species of autoethnographic action research, with learning outcomes for the individual, their community, workplace or organisation and for the broader area of endeavour, or discipline, or group of disciplines.

The transdisciplinary space is an authentic one for many learners, whose areas of endeavour range from exploring excellence in vocational teaching to evaluating police-initiated programmes for supporting victims of sexual violence, to chronicling the history of iwi governance at a regional marae and generating a resource containing the wisdoms of elders to pass on to future generations. Practitioner enquiries have the potential to take a variety of forms and textualities, as important for the individual's epistemological positions and their perceptions of the most appropriate way to present learners for their communities, organisations or workplaces. The programme, then, is seen as research-based, research-oriented and research-informed (Lester & Costley, 2010).

THE STUDY

This paper is part of a broader enquiry within the College of Work-based Learning at Otago Polytechnic | Te Pūkenga aimed at, amongst other purposes, identifying unique heutagogical and creative affordances of a new generation of doctorates. The college holds that the legitimacy of professional or creative doctorate model gains from the opening up of alternative modes of knowing (Stock, 2011) and the possibility of presenting it across any rigorous and appropriate professional or creative media as well as via the thetic or exegetical models. The sub-study reported here aims at locating ways in which other WIL postgraduate qualifications, more specifically professional doctorates within Australasian contexts, could learn from experience of designing and delivering a work-based learning Doctor of Professional Practice (DProfPrac) degree. This paper, then, presents key discoveries of those involved in the heart of delivering a successful work-based doctorate, which has seen nine completions in its first five+ years of operation.

METHODOLOGY

Drawing on qualitative experiential data from mentors and learners on the former Otago Polytechnic | Te Pūkenga's 6-year-old DProfPrac degree, I present key learnings that organisations considering WIL postgraduate qualifications, including doctorates, might apply. The central methodology applied to the collection and treatment of data is qualitative descriptive analysis, which affords the telling of moments of critical incident knowing or "moments of experience" (Sandelowski, 2000, p. 337). This text is a subjective academic analysis (Arnold, 2015), a form of embodied autoethnography drawing consciously from the corpus represented by professional practice scholars such as Costley and Lester (2010); and unconsciously from everything the author heard or read about professional practice in the manner of all autoethnographers (Sparkes, 2018).

The broader ongoing study involves interviews with mentors (n=20) and learners (n=20) and examines the components of mentoring in professional practice and is covered by Ethics B/87 (2020). My focus in this short paper is on key practice learnings from initial data analysis and may draw indirectly from the stories of other I carry within me as mentor/ researcher/ author.

KEY LEARNINGS

The key learnings introduced here come under the following headings: sustainability in the programme design; alignment with *Te Tiriti o Waitangi* frameworks; levels of mentor support; criticality and reflexivity, and tight assessment structure.

The first distinctive feature of the DProfPrac is its emphasis on sustainability, an integrative construct that supports lifelong learning by catering to today's needs while leaving resources for the future. This is evident in its structure. The first third of the programme structure both audits a candidate's professional learning through a critically reflective work known as a review of learning, and proposes a plan for action and enquiry. Also critically reflective, there is a developmental and summative process known as a learning agreement, a placeholder term for the 'proposal' of traditional doctorates. In these two courses within the programme, learners select and justify sustainable approaches to enquiries, problems, or dilemmas, considering how their work could impact others' capacity as well as their own. Thus, sustainability is considered not only in relation to the emerging professional self, but also to communities which might benefit. Further, considering the nature of our crisis-steeped and ever-changing higher education landscape, we consider that as much as possible practice research requires transformative intervention in such leverage points as reconnecting people to nature, restructuring institutions positively and rethinking the creation of knowledge in light of sustainability (Abson, et al., 2017).

Second, a critically reflective process of considering how the study might involve or benefit *Māori* ensures a rigorous interrogation of alignment with biculturality, and upholds the programme's commitment to *Te Tiriti o Waitangi*. This bicultural requirement, while common throughout professional doctorates in *Aotearoa* [New Zealand], validates indigenous ways of knowing and the representation of knowing (the action) and knowledge (the product) in a rigorous and sustainable way. This should pertain to Australian higher education in 2023 where the Federal Government is deciding whether to change the Constitution to establish an Aboriginal and Torres Strait Islander Voice.

Intersecting with active *Te Tiriti* commitment are the values underpinning the *tuakana* [mentor]: *teina* [mentee] relationship, which borrows from the community focus of the *whānau* [family]. We aim to nurture *āwhinatanga* [mentorship], the quality of caring critical friendship along with cherishing and respecting our learners' *mana* [status] and that of their own *whānau*, through the quality of *manaakitanga* [respect for others]. Because trusting relationships lie at the heart of successful mentoring cohorts, we build *whanaungatanga* [a sense of connection] into all interactions. We activate *kotahitanga* [unity] as a shared understanding of our journey together and mutual respect for our roles on our shared journey of two-way *ako*, knowing and sharing.

A vital learning has been the centrality of mentor peer support to the ongoing sustainability and success of the programme. Each learner has two mentors who support the learner – and each other – on the journey. In addition to the peer support natural to mentoring dyads or teams, the college runs programmes of doctoral education training and sharing of experience and expertise: the professional doctorate mentor community of practice, where experienced and core members share mentoring discourse and knowledge repertoire with the broader group.

Next, being a critical and reflexive mentor is as crucial as ensuring learners unpack, position and unfurl themselves with critical reflexivity. Reflexivity is a strategy in professional practice that elevates professional and experiential accounts into the realms of the critical and the transformative (Lester &

Costley, 2010). Reflexivity is a necessity in so far as it is a means of achieving the rigour required of doctorateness. Reflexivity requires learners to hold up lights and mirrors to themselves and anatomise and deconstruct their prior judgments thoroughly (Pässilä et al., 2015). Among the techniques that engage the learner in reflexivity are analytic memoranda and journalling. These represent the kinds of ways of handling metacognition that enable candidates to demonstrate reflexive capacity and employ it to consolidate their professional practice. Those whose voices were gathered during the research recurrently return to reflexivity as a crucial characteristic of the programme.

While the list extends beyond what we report here, another key learning surrounds the importance of the final assessment process, marked by a final presentation in the manner of the traditional viva voce, but more targeted. Assessors, carefully selected for their epistemological positions and capacity to empathise with as well as understand the learner's project enquiry output (the 'thesis'), provide their questions and wonderings in advance so that the presentation can address them meaningfully. The ethos of the organisation is for mana-enhancing assessment processes characterised by thoughtful feedforward and feedback. While it is nearly impossible for the ethos of all chosen examiners to align with that of the programme or the learner, it is possible to create a culture of assessment informed by the values of *āwhinatanga, manaakitanga, whanaungatanga and kotahitanga.* This process is achieved not only by representatives authorised by the organisation exercising due duty of care, but also by fostering the culture of community within the assessment space.

CONCLUSION

As the space of postgraduate studies emerges in the new organisation of Te Pūkenga, it is valuable to draw on the experiential learnings of practitioners and mentors in the space of professional practice doctorates. There is opportunity, too, for Australian programmes to heed the practice experience of stakeholders in the Doctor of Professional Practice programme, particularly as they enter into a period of indigenous referendum. Ensuring a safe and productive learner journey that aligns with the endeavours and missions of a site or practice or workplace remains the key imperative of the DProfPrac. The characteristics regarded as crucial include its alignment with both sustainability principles and Te Tiriti ways of being. Support for both learners and mentors in the form of critical friendships and communities of practice ensures quality and rigour are maintained but with aroha [love], empathy and compassion. Criticality and reflexivity emerge as essential strategies for assuring rigour and for appropriate understanding and positioning of the self via a vis an emerging research enquiry. The destination proves ultimately as important as the journey, and the final assessment event generates the memory of the doctoral journey experience that lingers the longest. Fostering safety, quality and tikanga [culturally appropriate method] in assessment spaces affords positive learner experience even in the high-stakes space of the final examination.

REFERENCES

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, J., Vilsmaier, I., von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W. & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio, 46,* 30-39.

Arnold, J. (2015). Research as stories: An academic subjective analysis. *Advances in Research, 4*(1), 59–66. https://doi.org/10.9734/AIR/2015/13050

Baxter, J., & Burden, P. (2008). Redefining doctoral programmes as work-integrated learning experiences. In *Work Integrated Learning (WIL): Transforming futures... practice...pedagogy... partnerships* (pp. 28-34). Sydney, Australia: Australian Collaborative Education Network (ACEN).

Lester, S., & Costley, C. (2010). Work-based learning at higher education level: Value, practice and critique. *Studies in Higher Education*, *35*(5), 561-575.

Pässilä, A. H., Oikarinen, T., & Harmaakorpi, V. (2015). Collective voicing as a reflexive practice. *Management Learning*, *46*(1), 67–86. https://doi.org/10.1177/1350507613488310

Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health, 23,* 334–340.

Sparkes, A. C. (2018). Autoethnography comes of age: consequences, comforts, and concerns, In D. Beach, C. Bagley & S. Marques da Silva (Eds.), *The Wiley Handbook of Ethnography of Education* (pp. 479–499). John Wiley & Sons.

Stock, C. F. (2011). Approaches to acquiring 'doctorateness' in the creative industries: An Australian perspective. In L. Justice & K. Friedman (Eds.), *Pre-Conference Proceedings: Doctoral Education in Design Conference 2011* (pp. 1–11). Hong Kong Polytechnic University.

Valencia-Forrester, F. (2019). Internships and the PhD: Is this the future direction of work- integrated learning in Australia? *International Journal of Work-Integrated Learning,* Special Issue, *20*(4), 389-400.

Identifying the profession's view for a co-creation approach for work-integrated learning in architecture

SARAH BRIANT
Queensland University of Technology, Australia

INTRODUCTION

Work-Integrated Learning (WIL) is a complex and risky undertaking involving various stakeholders: students, industry and the professions, Government agencies, and communities (Effeney, 2020). WIL experiences should be a mutually beneficial experience for all stakeholders where learning can occur off campus, on campus and in a range of different settings. Assuring a safe, inclusive learning environment involves resources, risk mitigation strategies and a shared expectation and understanding for the WIL experience. The aim of this current research is to understand the architecture profession's views of WIL and how that perspective can inform a sustainable co-creation approach to WIL strategies for architectural education. University students across most disciplines expect that part of their university education will include acquiring employability skills to be job ready on graduation. Many degrees, particularly professional degrees such as engineering and medicine require a mandatory period of workplace-based learning to meet professional accreditation requirements and therefore all students from these degrees participate. Architectural education has a long history of learning in the workplace and engaging with the profession. Learning on the job is fundamental knowledge to become a professional, however, in Australia, these experiences vary in architectural education programs. While there exists a range of industry engagement and WIL experiences such as live projects, embedded WIL in design studios, and work placements, not all students can or are required to participate in such programs. This outcome potentially creates inequity for some students who are unable to participate in WIL leading to feelings of being underprepared and not aware of the realities of practice (Maroya et al., 2019).

The architecture profession is experiencing rapid change through technology shifts, altered procurement processes, globalisation, digitisation, fabrication, multidisciplinarity, and is faced with resolving more complex environmental and societal issues (Charalambous & Christou, 2016; Jones & Hyde, 2019; Maroya et al., 2019; Oliver, 2015). With increasing demands on industries in a globally competitive world graduates are expected to be work ready and productive. These demands exacerbate a long-standing debate between the academy and the profession regarding how we should prepare architecture graduates for the increasingly complex world of practice and the role that WIL might play (Bates et al., 2015; Boyer & Mitgang, 1996; Ostwald, 2008; Samuel, 2018; Tucker & Elkadi, 2011; Tzonis, 2014;). Universities will often consult with students about their educational experiences and involve them in curriculum design and development, however, for this process industry partners are rarely considered as stakeholders to participate in this process (Ruskin & Bilous, 2020; Effeney, 2020). Ruskin and Bilous (2020) suggest that for co-creation models engaging all stakeholders to be implemented as WIL best practice, they need to be cost effective and embedded as part of a curriculum review strategy.

Research questions:

1. What are the architecture profession's views of work-integrated learning (WIL) programs in architectural education?
2. How can the views of the profession be incorporated in the curriculum design of WIL in architectural education?

This current study identified a gap in knowledge regarding opportunities for the architecture profession to be involved in curriculum design for WIL with their views and expectations as a key stakeholder not included. It examines the opportunity to include the profession as a key stakeholder through a co- creation framework, which extends their input to the curriculum design phase of WIL experiences and discusses the benefits and challenges of this involvement. While this study focuses on the architecture discipline and in particular the architecture profession as a stakeholder in WIL experiences, it has application for other disciplines, particularly those with professional accreditation requirements and mandatory work placement.

LITERATURE

Work-Integrated Learning in Architectural Education

WIL has emerged as a widely accepted term in Australia for a broad range of approaches for student learning and development through the opportunity to apply theory in a workplace environment, and therefore developing work related skills (Bowen & Drysdale, 2017; Cooper et al., 2010; Kennedy et al., 2015). WIL has been researched extensively as an important strategy to assist students to effectively transition from university to the workplace with employability skills (ACEN, 2022; Billett, 2020; Jackson, 2015; Jackson & Bridgstock, 2020; Jones et al., 2019; Rowe & Zegwaard, 2017). However, there is little research specifically about WIL in architecture programs in Australia (Maroya et al., 2019; Ang, 2007; Briant & Crowther, 2020; Savage, 2000; Tucker & Elkadi, 2011). There has been a shorter time of engagement as a discipline in formal models of WIL across the Creative Industries disciplines (Daniel & Daniel, 2015; Tezcan et al., 2020). Internships and placements are the most recognised and utilised models of WIL across programs, with a range of other programs contributing to industry engagement for students through design studios such as live studios, and community engagement. Often these are not formal WIL experiences as part of a design studio experience, but instead can be "hidden WIL" (Jones et al., 2019). Specifically, there is limited information regarding the involvement of the architecture profession in WIL curriculum design.

As long ago as 2010 a major challenge identified for graduates from the built environment was the need to be prepared for an increasing complex and diverse world of practice (Savage et al., 2010). In this study, conversations with key stakeholders, academics, practitioners and graduates, highlighted the importance of quality transition to work experiences where students are exposed to the context and culture of professional practice through a range of learning approaches. A key recommendation was a national dialogue with all stakeholders to develop effective transition to work strategies for graduates, with a need to understand stakeholder expectations, roles and responsibilities in the design of these experiences (Savage et al., 2010). These findings are significant because a decade on, there has been little progress with addressing this issue, particularly for the architecture discipline. In a recent study on architectural education and the profession (Maroya et al., 2019) the most significant challenge identified for architectural education was how rapidly practice is changing with 76% of professionals suggesting graduates require more practical education. The response rate from graduates was 92%

suggesting this issue needs further and urgent attention (Maroya et al., 2019). Practitioners confirmed the importance of work placements and simulated practice experiences with a mean response rate of 4.2 out of 5 (n = 2180), however, how there was no agreement on how this could be achieved, nor any dialogue about opportunities to address this gap.

METHODS

A three round Delphi survey of architecture practitioners involved in WIL across Australasia was undertaken (ethics approval number: 1800000704). The Delphi method was chosen as the preferred survey instrument because it is an iterative process that distils panellist's views from a particular and expert group rather than a random selection of the population typical for other survey methods (Hallowell & Gambatese, 2009; Linstone & Turoff, 2011). It is a systematic procedure used to survey a particular group who are expert in their field and able to supply commentary on new topics that have little empirical evidence and data and require a broader perspective (Ameyaw et al., 2016; Gupta and Clark, 1996; Linstone & Turoff, 1975). Panellists were recruited from the architecture profession across Australasia who are or have been involved in WIL programs in university architecture programs. Detail screening was developed utilising general criteria for a Delphi panel (Skulmoski et al., 2007) and criteria particular to the architecture profession to ensure a representative sample of the profession. The first survey round questions were informed by the literature review, a small pilot study and professional experience. The panel consisted of 27 respondents, which was stable for the successive survey round with the final round panel being 25.

RESULTS

Internships were the most common WIL experience in the profession, with 67% of panellists supervising workplace-based internships. Other types of WIL involvement included studio live projects (15%) and remote (online based) internships (7%). This study reports on particular findings supporting co-creation from a broader study investigating the architecture profession's views of WIL (Briant et al., 2023). The co-creation framework developed by Ruskin and Bilous (2020) analysed data from stakeholders in WIL to understand the roles and examples of contributions for a co-creation process in WIL experiences, identifying that they had similar roles in their contribution (Ruskin & Bilous, 2020). This study adapted the framework concentrating on the architecture profession only to understand their views on involvement in a co-creation process(See Table 1).

TABLE 1: Delphi findings of the architecture profession's contributions to co-creation as a WIL Industry Partner (adapted from Ruskin & Bilous, 2020).

Roles	Types of contribution
Planners	*Industry Partners provide input for topics and ideas of how students might engage and interact in the unit* Survey findings: - "Include a presentation opportunity for students to share an area of passion/interest" (Delphi panellist) - "Students prepare a weekly report to share with the practice and reflect on their learning experience" (Delphi panellist) - "I am working with the profession and some unis to work out how WIL might be used to help progress practices and students' knowledge about embodied energy" (Delphi panellist)
Contributors	*Industry Partners contribute to learning resources for the unit* Survey findings: - "Films could be made to show real situations" (Delphi panellist) - "Arrange regular site visits to buildings and record the experiences" (Delphi panellist)
Creators	*Industry Partners provide their professional perspective* Survey findings: - "Lectures and panel discussions by architects in practice about process and practice" (Delphi panellist)
Reviewers	*Industry Partners review unit content and provide feedback* Survey findings: There were no comments directly relating to this element for co-creation

DISCUSSION/CONCLUSIONS

The need to close the gap between the profession and universities regarding responsibilities for professional education is urgent. The survey findings confirmed the need for education to play a role in helping with the challenges in the profession. Panellists confirmed that the profession recognises the value of WIL to bridge the gap between universities and practice, however they have not generally been involved in curriculum co-creation nor are they aware of the potential for involvement, "communication between universities and the profession is important. There is quite a gulf between academe and commerce, and that needs bridging" (Delphi panellist).

These findings support the literature regarding the criticality of engaging stakeholder in the design and development of authentic, appropriate, and well-designed WIL (Zegwaard et al., 2022). For this study, the architecture profession demonstrated the importance of including their perspective through a range of ideas for contribution types in varying roles for a co-creation framework (See Table 1). A successful co-creation strategy for WIL curriculum design needs to be adequately resourced and part of a sustainable strategy for ongoing curriculum review (Ruskin & Bilous, 2020). The benefits of this approach include enabling programs to be responsive to current needs and contexts of architectural practice. The profession can value add WIL experience through offering their views of knowledge and skill gaps in graduates. Their views reflect the reality of the everyday world of architecture practice and this input will best prepare graduates for contemporary practice environments. This study confirms the value of a co-creation approach that by including the architecture profession's views has potential to create authentic opportunities for rich engagement and learning experiences for all stakeholders, "WIL stimulates and improves both parties, through reflective practice and articulation. A learner will benefit by respectful engagement (ego-free) in this process" (Delphi panellist).

REFERENCES

ACEN (2022), Australian collaborative education network – 2022 summary report for graduate outcomes survey items. https://drive.google.com/file/d/1b9muVwVoNDkMZXOFKNANx6SRm8WmB_3t/view

Ameyaw, E. E., Hu, Y., Shan, M., Chan, A. P., & Le, Y. (2016). Application of Delphi method in construction engineering and management research: a quantitative perspective. *Journal of Civil Engineering and Management*, *22*(8), 991-1000.

Ang, S. (2007). *Chronicles of architectural internships: Student experiences versus practitioner expectations.* ANZASCA 2007: Towards solutions for a liveable future: progress, practice, performance, people. Proceedings of 41st annual conference,

Billett, S. (2020). *Learning in the workplace: Strategies for effective practice*. Routledge.

Bowen, T., & Drysdale, M. T. (2017). *Work-Integrated Learning in the 21st Century*. Emerald.

Boyer, E. L., & Mitgang, L. D. (1996). *Building community: A new future for architecture education and practice. A Special report*. ERIC.

Briant, S., & Crowther, P. (2020). Reimagining internships through online experiences: Multi-disciplinary engagement for creative industries students. *International Journal of Work-Integrated Learning*, *21*(5), 617-628.

Briant, S., Crowther, P., Clifton, J., & Osborne Burton, L. (2023). Work-integrated learning (WIL) as a part of quality education in architecture: the profession's perspective. *Archnet-IJAR: International Journal of Architectural Research*.

Charalambous, N., Christou, N. J. P.-S., & Sciences, B. (2016). Re-adjusting the objectives of architectural education. *Procedia Social and Behavioral Sciences*,*228*, 375-382.

Cooper, L., Orrell, J., & Bowden, M. (2010). *Work integrated learning: A guide to effective practice*. Routledge.

Daniel, R., & Daniel, L. (2015). Enhancing capacity for success in the creative industries: Undergraduate student reflections on the implementation of work-integrated learning strategies. *Asia-Pacific Journal of Cooperative Education*, *16*(3), 199-209.

Effeney, G. (2020). Risk in work integrated learning: A stakeholder centric model for higher education. *Journal of Higher Education Policy and Management*, *42*(4), 388-403.

Ferns, S. J., Rowe, A. D., & Zegwaard, K. E. (Eds.). (2021). Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future.

Fleming, J., McLachlan, K., & Pretti, T. J. (2018). Successful work-integrated learning relationships: A framework for sustainability. *International Journal of Work-Integrated Learning*, *19*(4), 321-335.

Gupta, U. G., & Clarke, R. E. (1996). Theory and applications of the Delphi technique: A bibliography (1975–1994). *Technological Forecasting and Social Change*, *53*(2), 185-211.

Hallowell, M. R., & Gambatese, J. A. (2009). Qualitative research: Application of the Delphi method to CEM research. *Journal of Construction Engineering and Management*, *136*(1), 99-107.

Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, *40*(2), 350-367.

Jackson, D., & Bridgstock, R. (2020). What actually works to enhance graduate employability? The relative value of curricular, co-curricular, and extra-curricular learning and paid work. *Higher Education*, 1-17.

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

Jones, A., & Hyde, R. (2019). *Defining contemporary professionalism: for architects in practice and education*. Routledge.

Kay, J., Ferns, S., Russell, L., Smith, J., & Winchester-Seeto, T. (2019). The emerging future: Innovative models of work-integrated learning. *International Journal of Work-Integrated Learning*, *20*(4), 401-413.

Kennedy, S. Billett, S. Gherardi, & L. Grealish (Eds.), Practice-based learning in higher education: Jostling cultures (pp. 1-13). Springer Netherlands. https://doi.org/10.1007/978-94-017-9502-9_1

Linstone, H. A., & Turoff, M. (2011). Delphi: A brief look backward and forward. *Technological Forecasting and Social Change*, *78*(9), 1712-1719.

Maroya, A., Matthewson, G., & Wallis, L. (2019). *Architectural education and the profession in Australia and New Zealand*. Architects Accreditation Council of Australia.

Oliver, B. (2015). Redefining graduate employability and work-integrated learning: Proposals for effective higher education in disrupted economies. *Journal of Teaching and Learning for Graduate Employability*, *6*(1), 56.

Ostwald, M. J., & Williams, A. (2008). *Understanding architectural education in Australasia*. Australian Learning and Teaching Council.

Rowe, A. D., & Zegwaard, K. E. (2017). Developing graduate employability skills and attributes: Curriculum enhancement through work-integrated learning. *Asia-Pacific Journal of Cooperative Education*, Special Issue, *18*(2), 87-99.

Ruskin, J., & Bilous, R. H. (2020). A tripartite framework for extending university-student co-creation to include workplace partners in the work-integrated learning context. *Higher Education Research & Development*, *39*(4), 806-820.

Ruskin, J., & Bilous, R. H. (2021). Engaging stakeholders in work-integrated learning: A sustainable model for curriculum co-creation. In *Advances in Research, Theory and Practice in Work-Integrated Learning* (pp. 49-59). Routledge.

Samuel, F. (2018). *Why architects matter: Evidencing and communicating the value of architects*. Routledge.

Savage, S. (2000). Using the web to create a community of learners in cooperative education: An example from architecture. Flexible Futures in Tertiary Teaching, Proceedings of 9th Annual Teaching Learning Forum.

Savage, S., Davis, R., & Miller, E. (2010). *Professional education in built environment and design*. Australian Learning and Teaching Council.

Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education: Research*, *6*(1), 1-21.

Tezcan, N., Durakovic, I., Lloyd, E., & D'arcy, S. (2020). Scaffolded, simulated work-integrated learning in design education: Beyond the live project. *International Journal of Work-Integrated Learning*, *21*(5), 521-529.

Tucker, R., & Elkadi, H. (2011). *Teaching in practice: work integrated design learning and practice readiness for architecture students.* Proceedings of the 2011 International Conference of the Association of Architecture Schools of Australasia.

Tzonis, A.. (2014). A framework for architectural education. *Frontiers of Architectural Research*, *3*(4), 477-479.

Zegwaard, K. E., Ferns, S. J., & Rowe, A. D. (2022). Contemporary insights into the practice of work-integrated learning in Australia. In S. J. Ferns, A. D. Rowe, & K. E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future* (pp. 1-14). Routledge

The application of a teaching system for emotional intelligence, wellbeing, and good communication skills to a work-integrated learning course

JEAN CORY-WRIGHT
Te Pūkenga - Ara Institute of Canterbury, New Zealand

INTRODUCTION

All workplaces seek graduates with favourable attributes and for the purposes of this paper these are called Graduate Attributes. The aim of this paper is to share a teaching practice method that has developed Graduate Attributes. It includes a series of reflection assignments which ask the learners to reflect and act to change or grow, their personal attributes. These include attributes for the workplace but also for life in the future, and the challenges this will bring. The paper will first clarify a range of graduate attributes and then describe how these have been incorporated into a student's journey through a degree by the setting of a series of reflection assessment tasks. The details of the whole progression are then explained and supported by reference to literature. Benefits and potential impediments of the system are disclosed, and the paper concludes with a glimpse into the future applications of this practice method.

GRADUATE ATTRIBUTES

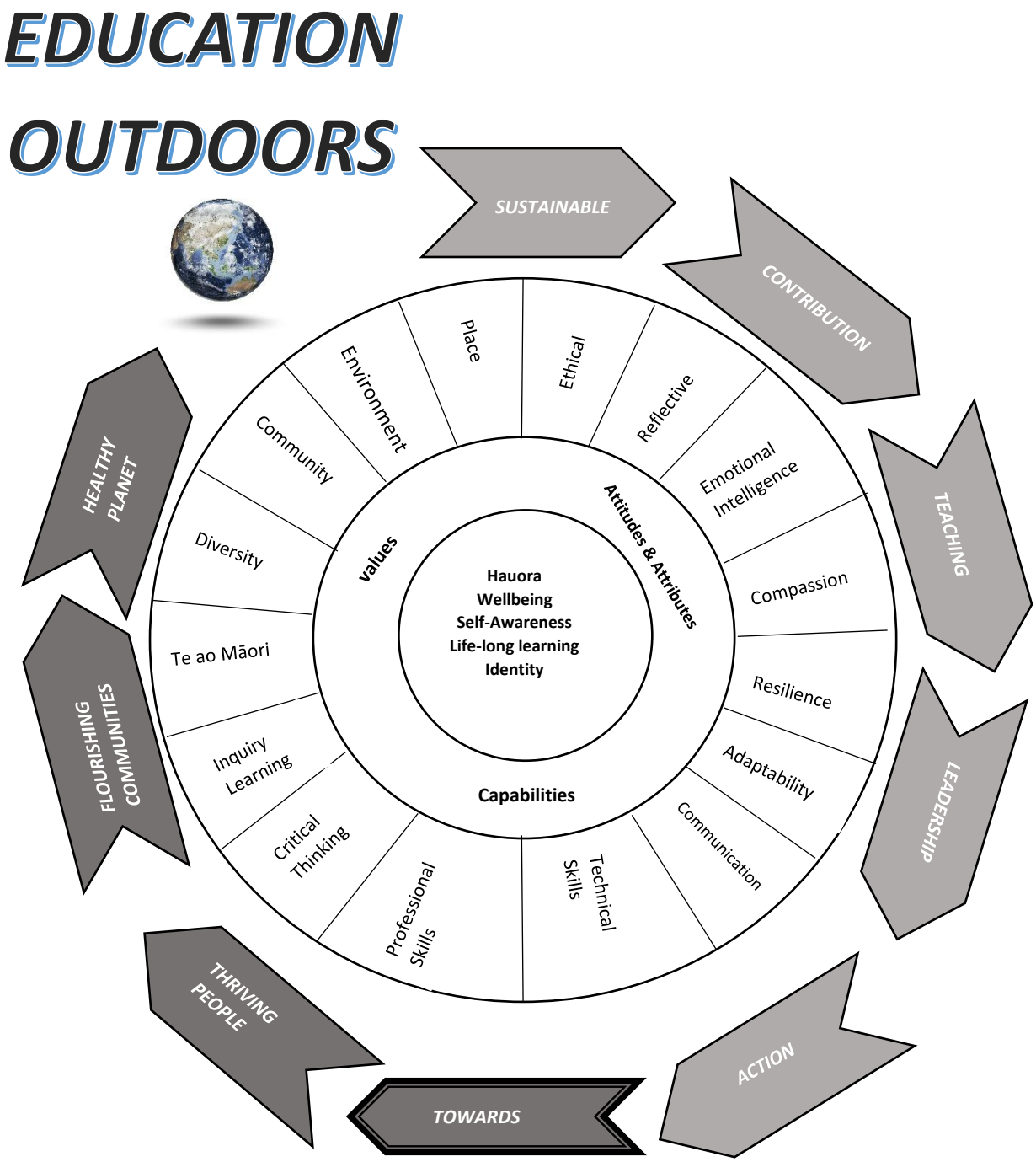
Graduate Attributes include numerous qualities, skills and dispositions that make graduates ready for the work force, but they also give an indication of the level of employability of graduates. Such attributes include learners' Emotional Intelligence (EI) and linked skills such as communication. Other significant attributes valued in the workplace include honesty, integrity, compassion, resilience, and a focussed work ethic. Alongside this, with a challenging future already on the horizon, the attributes of resilience and hauora wellbeing are essential. In Aotearoa New Zealand these attributes resonate with manaakitanga, whanaungatanga and kaitiakitanga. In the past, these attributes were often left in the hidden curriculum and were an assumed outcome of degree study combined with growing up. However, in a programme at the Ara Institute of Canterbury (Christchurch, Aotearoa New Zealand), a series of assignments over the three years of the degree has been put in place, to enable students to monitor their growth, especially in the *Graduate Attributes* seen as most relevant to their subject area. These are called *Checkpoint Assignments* and are based on experiential education methods (Katula & Threnhauser, 1999). This is elucidated further below.

GRADUATE JOURNEY

The programme in which the *Graduate Attributes* assignment series is embedded is the Bachelor of Sustainability and Outdoor Education (BSOE) at Ara Institute of Canterbury (Ara). This programme produces graduates who have a wide range of skills in outdoor related subject areas, which includes teaching outdoor activities but goes beyond this into health, wellbeing, environmental studies, Te Ao Māori, geography, education, and education for sustainability. Graduates move on to a range of jobs in city and regional councils, outdoor centres, or organisations such as Outward Bound or Hillary Outdoors. They also move on to further study such as teacher education or master's degrees. Outdoor

Education as a subject area, has a long history of enhancing personal growth, relationships with others and connection to the environment (Mortlock, 2000) and Ara BSOE graduates are taught to be and live those qualities. The whole programme is designed to foster graduates' personal growth journey towards becoming people that are future focussed, future ready and future enhancing for the community and the planet (Figure 1).

FIGURE 1: Outline of learners' journey through Bachelor of Sustainability and Outdoor Education



The role of Work-Integrated Learning (WIL) in this journey is to provide the learners with an opportunity to apply the skills and attributes covered in the theory and practical classes to a work environment. To further cement this learning and behavioural change, a series of assignments (BSOE Checkpoints) directs the students to reflect on this learning and these are explained in the next section.

CHECKPOINTS

The BSOE Checkpoints embrace the holistic journey through which graduates develop further attitudes, values, and attributes towards becoming people who will survive and strive for a thriving planet and people in the future. Each of the six assignments is embedded in one 15 credit course each semester as a 20% weighted assignment. Each assignment is related to the course it is part of but allows for the integration of learning across the whole semester. The courses that have been chosen to include the BSOE Checkpoints are all core courses and are scaffolded on to each other to allow reflection to involve greater depth as the learner progresses through the degree. The BSOE Checkpoints also require the student to link and reference their learning to various growth and development theories they have learned in classes and demonstrated on field trips. There is a progression from a first-year level self-focussed theme to community in the second year to become more national/global action focussed in the third year. The final checkpoint is worth 50 % of a Work-Integrated Learning course and it involves the student in collating their whole BSOE Checkpoint journey by referring to previous BSOE Checkpoints over the whole 3 years of the degree.

Important factors are included in the assignments, and one is that learners have choice of format, and are encouraged to own this assignment and have pride in it as it is their growth and development towards become actively involved global citizens. The assignment gives them a voice in their own lifelong learning (Jarvis et al., 1998). The next section gives more details of the six assignments and the courses they are linked to and includes supporting references and a summary diagram.

THE BSOE CHECKPOINT ASSIGNMENTS DETAILS AND PROGRESSION

Year 1 Semester 1 Emotional Intelligence and Identity (Teaching and Learning Course BSOE 521)

Teaching and learning are a major part of outdoor education and education for sustainability. This course includes the coaching of personal and interpersonal attributes as part of emotional intelligence development. Emotional Intelligence (EI) was observed by Meyer, Salovey and Caruso (2004) and defined as "the ability to perceive, use, understand, manage, and handle emotions". It was expanded by numerous authors including Goleman (1996), who promoted it as an essential leadership skill. In the context of WIL, EI will set one learner above another in the eyes of the people in the workplace. The course also explores identity (Shaules, Tsujioka, & Iida, 2004), and introduces some basic psychology and links to neuroscience (Damasio, 1999; Hannaford, 1995; Immordino-Yang & Damasio, 2007; Perry, 2019). The learners' reflections look back over the semester and give observations and examples of their own EI skills, where they have developed, and what still needs development.

Year 1 Semester 2 Hauora Wellbeing and Growth (Hauora Course BSOE 527)

Hauora and wellbeing are similar but hauora applies a Māori lens, so both words are used in this context. A course in semester 2 explores this concept in detail, and in relation to outdoor education and education for sustainability. Learners actively participate in activities to enhance their hauora, including tinana (physical), hinengaro (mental), whanau (social) and wairua (spiritual) (Durie, 1998).

The second semester is a good time to introduce this because the group have settled in and are more comfortable with discussing their vulnerabilities by then. They are coached in self-cognitive behaviour therapy skills (Smith, 2018), mindfulness (Hubbard and Ussmar, 2015), and growth mindset (Dweck, 2016).

Year 2 Semester 1 Community and Values (Teaching 2 BSOE 621)

The education thread is continued, and the year two education course embeds the next BSOE Checkpoint. This course expands beyond self into community, participation, leadership and education. A study of educational, sociological and psychological theories gives learners more academic depth in these areas. Values and their place in outdoor education and education for sustainability become a centre focus using the work of various outdoor education authors (Mortlock, 2000; Higgins, 2000, Barnes, 2000). The BSOE checkpoint assignment includes a WIL experience and challenges the learner to reflect on their personality, communication, connection, participation, and contribution, with a view to identifying their key values, and how useful they might be in the future we are facing.

Year 2 Semester 2 Global Perspectives and the Future (Global Issues BSOE 625)

Having learned about values that are conducive to a thriving community, the learners are then guided on a significant step into global issues. At this stage learners have built a clear identity and self-regard, have a healthy approach to study and have understood the value of community through real experiences. At this point, resilience building becomes paramount, and this includes building resilient communities (Liu et al., 2017; Pekrun & Linnenbrink-Garcia, 2014; Seligman, & Csikszentmihalyi, 2000; Siebert, 2005).

Year 3 Semester 1 Action and Influence (Social Environmental Action Course BSOE 725)

The learners are now ready to take on their own project and have influence over wider communities. The Action Project is a real-world change agency course (Hari, 2019). Learners develop the skills of influence (Graziano Breuning, 2016) and start to make a difference to the lives of others or to the environment.

Year 3 Semester 2 Journey Recap and Our Future (Applied Instruction Course BSOE 722)

The last BSOE Checkpoint asks the students to recap on all previous checkpoints and reflect on where they have come in their journey. This includes a comprehensive 120-hour WIL experience over the year. At this stage they are managing self well and being inspiring role models to others by showing interest and passion in many projects (Ainley, Hidi, & Berndorff, 2002).

CHALLENGES

The assessment of attributes, attitudes and values will always be problematic. The assignments involve disclosure of information personal to the learners and giving it a grade is potentially compromising. Also, there is the issue of who is qualified to grade such work. However, these aspects are constantly being reviewed as the scheme is conducted. A useful observation is that outdoor education embeds personal learning in its content and therefore it lends itself to this approach very well. Work needs to be done on how the concept might be transferred to other disciplines.

THE FUTURE

The BSOE Checkpoints are praxis in action for both learners and educators. Feedback is collected and it is adapted each year, and a research project is in the pipeline. Learners have said that they enjoy the assignments and have seen huge changes in their attributes. The act of reflecting on these attributes each semester leads to a more conscious awareness of them and their value in the workplace, but also their value in life. We need to teach *about*, *for*, and *through* the emotions to empower our learners to develop skills for life, and the future.

REFERENCES

Ainley, M. D., Hidi, S., & Berndorff, D. (2002). Interest, learning and the psychological processes that mediate their relationship. *Journal of Educational Psychology 94*, 1–17.

Beard, C., & Wilson, J. P. (2013). *Experiential learning: A handbook for education training and coaching*. London: Kogan Page.

Damasio, A. (1999). *The feeling of what happened: Body and emotion in the making of consciousness.* New York: Harcourt Brace.

Durie, M. H. (1998), *Te Mana, Te Kāwanatanga: The Politics of Self Determination*, Oxford University Press, Auckland.

Dweck, C. (2016). *Mindset, the new psychology of success.* New York NY: Ballantine Books.

Goleman, D. (1996). *Emotional intelligence.* London: Bloomsbury.

Graziano Breuning, L. (2016). *Habits of a happy brain.* Avon, MA: Adams Media.

Hannaford, C. (1995). *Smart moves*. Virginia: Great Ocean Publishing.

Hari, J. (2019). *Lost connections*. London: Bloomsbury.

Higgins, P. (2000). Outdoor education and values education: mission, mandate, or expediency? In P. Barnes (Ed.), (2000). *Values and outdoor learning*. (pp 50–59). Penrith, England: Association for Outdoor Learning.

Hibberd, J., & Usmar, J. (2015) *Mindfulness.* Quercus Editions Limited.

Immordino-Yang, M. H., & Damasio, A. (2008). We feel, therefore we learn: The relevance of affective and social neuroscience to education. In K. Fischer & M.H. Immordino-Yang, (2008). *The Jossey-Bass reader on the brain and learning*. San Francisco, US: Wiley & Sons.

Jarvis, P., Holford, J., & Griffin, C. (1998). *The theory and practice of learning: Experiential learning.* London: Kogan Page Ltd.

Katula, R. A., & Threnhauser, E. (1999). Experiential education in the undergraduate curriculum. Communication Education, 48, 238-255.

Meyer, J.D., Salovey, P., & Caruso, D.R. (2004). Emotional intelligence: Theories findings and implications. *Psychological Inquiry 15*(3), 197–215. Retrieved December 10, 2015, from http://www.jstor.org/stable/20447229.

Mortlock, C. (2000). *Beyond adventure*. Cumbria UK: Cicerone Press.

Liu, J. J. W., Reed, M., & Girard, T.A. (2017). Advancing resilience: An integrative, multi-system model of resilience. *Personality and Individual Differences 111,* 111–118.

Pekrun, R., & Linnenbrink-Garcia, L. (Eds.). (2014). *International handbook of emotions in education.* New York, N Y: Taylor & Francis.

Perry, B. (2019). The neurosequential model: A developmentally sensitive neuroscience informed approach to clinical problem solving. In J Mitchell, J Tucci & E Tronick, (2019). *Handbook of therapeutic care for children: Evidence informed approaches to working with traumatised children and adolescents in foster kinship or adoptive care*. London, UK: Jessica Kingsley Publishers.

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5–14.

Siebert, A. (2005). *The resiliency advantage*. Oakland, C.A., Berrett-Koehler Publishers

Smith, G. (2018). *The book of overthinking.* London, U.K., Allen & Unwin.

Designing interdisciplinarity into undergraduate work-integrated learning components: A review

FIONA HURD
FELICITY REID
Auckland University of Technology, New Zealand

INTRODUCTION

The two-decade long call for higher education to focus on 'relevance' in education (Paton, Burt & Chia, 2014), and 'impact' in research, has focused on bridging the perceived gap between abstract theorising and the practice (Billett, 2009). The practice-turn in higher education, which largely gave rise to the work-integrated Learning (WIL) approach, is now increasingly situated within a context whereby the importance of interdisciplinarity to the development of graduate skills is emphasised (Hains-Wesson & Ji, 2020; Hart, 2019; Parker, 2010). However, within curriculum design and development, the focus remains largely disciplinary, with a prevailing model of single-area 'major' and 'minors' within undergraduate degree programmes. Indeed, the premise of WIL is that students are exposed to real-life experiences 'relevant to their learning' (Lloyd et al., 2022, p. 810), which has often been assumed to need to be linked to this disciplinary knowledge. However, constraining the student in this way may be restricting the opportunities for the development of interdisciplinary skills and understandings (Hains-Wesson & Ji, 2020). This paradox poses questions for those charged with designing capstone WIL components. In order to explore the opportunities for interdisciplinary WIL approaches, this paper reviews the literature on skills required in the future of work, and interdisciplinarity in WIL.

In seeking to define WIL, the concept of integration of knowledge has been central and indeed assumed. A wide definition of WIL is that of a student engaging with workplaces as a formal part of their studies (Smigiel & Harris, 2008) or as a strategy that focuses on knowledge exchange and development in the workplace (McNamara, 2013). Many discussions of WIL refer to the integration of formal learning with practice to create new knowledge (see, e.g., Billett, 2002, 2008: Cooper et al., 2010) or ways of knowing through practice (Johnsonn & Boud, 2010). Orrell (2011) notes that "a commonly expected outcome of these student WIL experiences is gaining new knowledge, understandings and capabilities, and mastering skills considered essential to particular workplace practices. The underlying assumption is that students cannot learn these skills and knowledge in formal classrooms" (p. 6.). For example, Eames and Bell (2005) when discussing placements for science students argued that for learning to occur the placements had to complement classroom learning so that students added to their understanding of what the practice of science means.

Coll et al. (2009) identified the integration of knowledge and skills gained in higher education and the workplace as a key distinction between WIL and workplace learning (which is the learning that an employee would learn anyway just by being in the workplace). Similarly, Orell (2011) noted that integration and transformation of knowledge were what distinguishes WIL from work experience. This discipline-based view of WIL is implicit in the concern some academics have expressed that WIL is not of as much value in disciplines that do not have a defined career path (Lloyd et al., 2022). However, the outcomes of WIL have also been identified as developing and enhancing "soft" or professional skills and navigating ethics (Campbell & Zegwaard, 2011), communication and the ability to work in a team

(Jackson 2015, Lloyd et al., 2022); understanding business and organisational workings and structures and career development (Jackson, 2015). Consistent with this broader approach, the participants (students, employers and higher education WIL practitioners) in Coll et al.'s study (2011) of the integration of knowledge though WIL, more readily identified factors such as career clarification, understanding business and organisational structures and the development of professional skills as the aim and benefits of WIL.

SKILLS AND THE FUTURE OF WORK

It is well recognised that the skills and competencies required for future careers have shifted away from a demand for technical skills, and a move towards complex so-called soft-skills (Rhee et al., 2020, Sathya, 2020). According to the World Economic Forum (2020), key disruption is expected as early as 2025, with the top 10 skills including: analytical thinking and innovation, active learning, complex problem-solving, critical thinking, creativity, leadership, technology use, technology design, resilience, and reasoning. Alongside this movement away from technical skills in employability (Rhee et al., 2020), there is increasing demand for creativity, managing change and the ability for active and ongoing learning. Within this demand is the need to understand and be able to reconcile tensions between different perspectives and fields, in order to address complex problems that are cross-cutting and move beyond traditional disciplinary boundaries (Rhee et al., 2020).

In response, the OECD position statement on the future of education and skills to 2030 emphasised that while disciplinary knowledge remains important as a base for skills development, it is growing the ability to apply this knowledge in 'unknown and evolving circumstances' that will define the higher education experience. Being able to do so includes development of both soft skills, alongside the development of, and articulation of, attitudes and values. Under this typology, disciplinary knowledge becomes just one of three pillars of learning, all of which carry equal importance. Further reinforcing this more complex view of higher education is the significant increase in provision of technical skills within organisations, as part of a burgeoning trend towards work-based and workplace-provided learning (World Economic Forum, 2020). It appears universities are already behind this change in demand, as employers are increasingly noting that graduates have a mismatch of technical/functional skills to interpersonal skills (Attri & Kushwaha, 2018).

Interdisciplinarity in Work-Integrated Learning

It is argued that the development of these complex skills and values/attitudes requires an interdisciplinary approach to education. Indeed, this is recognised in industry, as many organisations now using interdisciplinary organisational structures, both project-based and formal (Westad, Brandshaug & Sjolie, 2020). As such, the world of work is now less defined by strict discipline or profession-based jobs and tasks. WIL researchers have responded to this need through advocating for the 'T-shaped professional model' (Martin & Rees, 2020, p. 365), which looks to move away from the traditional expertise developed in the I-shaped model, to 'linking up different perspectives from different specialities' (p. 365). However, despite these calls, in practice, WIL continues to be largely discipline-specific (Sutherland & Symmons, 2013). Through the WIL typology of authenticity-proximity (Kaider, Hains-Wesser and Young, 2017), the goal of many WIL designers has been to assume the authenticity of the WIL experience will be aligned to the student's disciplinary background. Indeed, for some, for example clinical positions and teacher education, the idea that WIL placements might not be aligned to the profession seems illogical. However, for many students – particularly those across

business, arts, social sciences, and even engineering and art and design, the workplaces graduates are entering will encompass fields far beyond the confines of disciplinary knowledge.

Additionally, aside from the need for graduates to have interdisciplinary skills for employability, there is also the question of whether the purpose of WIL is 'learning *for* work or learning *through* work' (Byromn & Aiken, 2014, p. 272). A close disciplinary focus, even within professions, is more closely aligned to a *for* work approach than a *through* work approach, which better highlights the complex and multi-layered learning that might arise from an interdisciplinary experience. Indeed, Sathya (2020) highlights that multi- or inter-disciplinary experiences can provide a space to develop non-linear thinking, encourage the application of diverse and complementary insights and frameworks to solve problems, encourage students to form linkages between diverse areas of study and facilitate collaborative learning.

Many of the opportunities for learning under this approach arise from the acknowledgement that moving outside of the disciplinary boundaries can be challenging for learners (Westad, Brandshaug & Sjolie, 2020). Students need to be open to feedback from perspectives they may not have previously encountered, to uncertainty, and to failure – as they are placed back in the situation of being a 'novice' within the context they are working within. When faced with this challenge, students are 'forced to change the way they view or do things without them yet knowing how to change' (Westad Brandshaug & Sjolie, p. 408). This situation leads to students entering a liminal space, the uncomfortable space of 'fight or flight' (Meyer & Land, 2005). This space, resulting from being in new environments and facing new challenges, results in feeling 'stuck' (Westad Brandshaug & Sjolie, 2020). However, rather than viewing this space as unsupportive, careful and intentional design of spaces of discomfort are critical to the development of skills associated with learning to manage change and uncertainty (Westad Brandshaug & Sjolie, 2020). Students learning to manage through the process of feeling stuck, finding a way to 'unstick' and then moving to a space of being 'not stuck' is the pathway to deep learning in new environments and the development of skills associated with agility, managing uncertainty and non-linear thinking.

There are few examples of interdisciplinary approaches to WIL provided in the extant scholarship, which poses a challenge to those interested in embedding this approach into curriculum. The few examples include multidisciplinary projects in Social Sciences and Humanities (Sutherland & Symmons, 2014), and interdisciplinary material embedded in single-discipline focused WIL (engineering) (Rhee et al., 2020). Specific examples of interdisciplinary approaches to WIL include team-based consulting and industry projects (West, Brandshaug & Sjolie, 2020, Hayes & Cejnar, 2020). In both of these examples, the interdisciplinary aspect was largely facilitated through having interdisciplinary teams working on a project wide enough in scope to facilitate interdisciplinary insights.

CONCLUSION

On one hand, WIL provides an opportunity to deepen disciplinary knowledge, and to bridge the theory-practice 'gap' (Lloyd et al., 2022). Indeed, often the focus of such activities is constrained to a major discipline. On the other, it also provides an opportunity to create breadth and interdisciplinarity for the student, bridging the major discipline with other areas of practice. The challenges facing the higher education sector, as a result of changes to graduate employability requirements, further reinforce the importance of WIL for the development and application of critical future-of-work skills.

However, to foster these skills will likely require WIL to draw on an interdisciplinary approach. This presents a challenge for curriculum designers, who need to work within the current siloed institutional structure, to produce WIL experiences that are flexible, agile and continue to provide an experience that aligns with the fast-changing environment outside of the university.

REFERENCES

Billet, S. (2002). 'Workplace pedagogic practices: Co-participation and learning'. *British Journal of Educational Studies*, *50*(4), 457–81.

Billett, S. (2008). Learning throughout working life: A relational interdependence between social and individual agency. *British Journal of Education Studies, 55*(1), 39–58.

Campbell, M. & Zegwaard, K. E. (2011). Ethical considerations and values development in work-integrated learning programs. *Refereed Proceedings of the New Zealand Association for Cooperative Education Conference,* April 18–19, Eastern Institute of Technology (EIT), Napier, Hawkes Bay, New Zealand.

Coll, R., Eames, C., Paku, L., Lay, M., Hodges, D., Bhat, R., Ram, Shiu., Ayling, D., Fleming, J., Ferkins, L., Wiersma, C., Martin, A. (2009). An exploration of the pedagogies employed to integrate knowledge in work-integrated learning. *Journal of Cooperative Education and Internships, 43*(1), 14-35

Cooper. L, Orrell, J. & Bowden, M. (2010). *Work-integrated Learning: A guide to effective practice*. New York: Taylor and Francis.

Eames C., & Bell, B. (2005). Using sociocultural views of learning to investigate the enculturation of students into the scientific community through work placements. *Canadian Journal of Science, Mathematics and Technology Education, 5*(1), 153-169.

Hayes, M., & Cejnar, L. (2020). Evaluating alternative work-integrated learning opportunities: Student perceptions of interdisciplinary industry-based projects. *Journal of University Teaching and Learning Practice*, *17*(4). https://doi.org/10.53761/1.17.4.7

Johnsson, M. & Boud, D. (2010). Towards an emergent view of learning work. *International Journal of Lifelong Education*, *29*(3), 359-372.

Kaider, F., Hains-Wesson, R., & Young, K. (2017). Practical typology of authentic work-integrated learning activities and assessments. *Asia-Pacific Journal of Cooperative Education*, *18*(2), 153-165.

Lloyd, G., Dean, B., Eady, M., West, C., Yanamandram, V., Moroney, T., Glover-Chambers, T., & O'Donnell, N. (2022). Academic's perceptions of work-integrated learning in non-vocational disciplines. *Higher Education, Skills and Work-Based Learning, 12*(5), 809-820.

Martin, A. J., & Rees, M. (2019). Student insights: Developing T-shaped professionals through work-integrated learning. *International Journal of Work-Integrated Learning*, 20(4), 365-374-374.

McNamara, J. (2013). The challenge of assessing professional competence in work integrated learning. *Assessment and Evaluation in Higher Education, 38*(2), 183-197

Meyer, J., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*, *49*(3), 373-388. http://doi.org/10.1007/s10734-004-6779-5

Orell, J. (2011). *Good practice report: Work-integrated learning*. Australian Learning and Teaching Council.

Rhee, H., Han, J., Lee, M., & Choi, Y.-W. (2020). Effects of interdisciplinary courses on future engineers' competency. Higher Education, Skills and Work-Based Learning, 10(3), 467-479.

Smigiel, H. & Harris, J. (2008). *Audit of work-integrated learning programs at Flinders University.* Adelaide: Flinders University.

Sutherland, K., & Symmons, M. (2013). Issues and challenges identified in the development of a broad multidisciplinary work integrated learning package. *Asia-Pacific Journal of Cooperative Education*, *14*(4), 295-304.

West Brandshaug, S.., & Sjølie, E. (2021). In liminality: interdisciplinary teams learning through challenges. *Higher Education, Skills and Work-Based Learning*, *11*(2), 406-419.

Reflecting on the impact of the degree apprenticeship pilot project on learners and industry

JAMES MACKAY
HANA CADZOW
Te Pūkenga - Otago Polytechnic, New Zealand

INTRODUCTION

Compared with the trades, where there is an emphasis on practical skills development, degree apprenticeships demand a closer reliance on theoretical knowledge, as work-based academic education is combined with vocational training. While such work-integrated degrees have been widespread in countries like Germany, Austria and Switzerland since the 1960s (Graf, 2016), they have only recently become a strong feature of the tertiary education landscape in the United Kingdom (UK) (Rowe et al., 2016) and even more recently in New Zealand (Goodyer, Poskitt & Mackay, 2017). In both cases, this is attributable to increased demand for skilled workers as well as the need for new skills in a modern economy.

In the UK, degree apprenticeships have been found to provide greater opportunity for mobility both within the workplace as well as in society, allowing greater representation of women and minorities in those occupations where they are traditionally underrepresented (Clarke, 2018). There, higher-level apprenticeships have been shown to provide greater access to higher education study by making it more affordable as well as flexible. Many people returning to or advancing their education require flexibility in their learning environments, and a high number of those returning are women (Fowles-Sweet & Barker, 2018). Bradley et al. (2019) have noted the importance of working collaboratively to raise the status of apprenticeships and use degree apprenticeships to help create skilled individuals in key areas that are important for national economic growth.

In New Zealand, proposals to set up a degree apprenticeship in engineering started in 2015 with a study on UK degree apprenticeships commissioned by the Tertiary Education Commission (TEC) (Goodyer & Frater, 2015). Following from extensive industry consultation, the design of the engineering degree apprenticeship built on the existing Bachelor of Engineering Technology (BEngTech) with delivery including a work-integrated component in Asset Management alongside more traditional engineering courses online. In the design, there was scope for the partial integration of some courses with work-place learning and to ensure consistency of outcomes across company experiences, annual gateway assessment processes have been included. Full time, a three-year degree, the apprenticeship version can be completed in six years part-time. Those entering with a two-year diploma can complete it in two years. Piloting started at the beginning of 2020.

The focus of infrastructure asset management addresses a critical engineering shortage in the country. However, the wider goal was to increase the number of engineering enrolments in particular the number of women as well as Māori and Pasifika in engineering study. In this paper we reflect on the impact this pilot project has had so far on industry, the institution delivering the apprenticeship as well as the apprentices themselves.

METHOD

To measure the impact that the project has had on various stakeholders, both quantitative as well as qualitative data was collected. This started with surveys of both learners (apprentices) and industry mentors followed by interviews with selected participants. These data were then supported with informally collected evidence from conversations and emails with both learners as well as mentors.

The questionnaire was divided into two main focal areas, the workplace experience (questions 7 to 15) and the learning experience. The responses were categorised on a 1-5 Likert scale where 1 was positive and 5, negative. This was followed up by interviews of selected learners. In the survey, 31 learners were surveyed and eight of those were interviewed. Five industry mentors responded to the industry survey and all five were interviewed.[1]

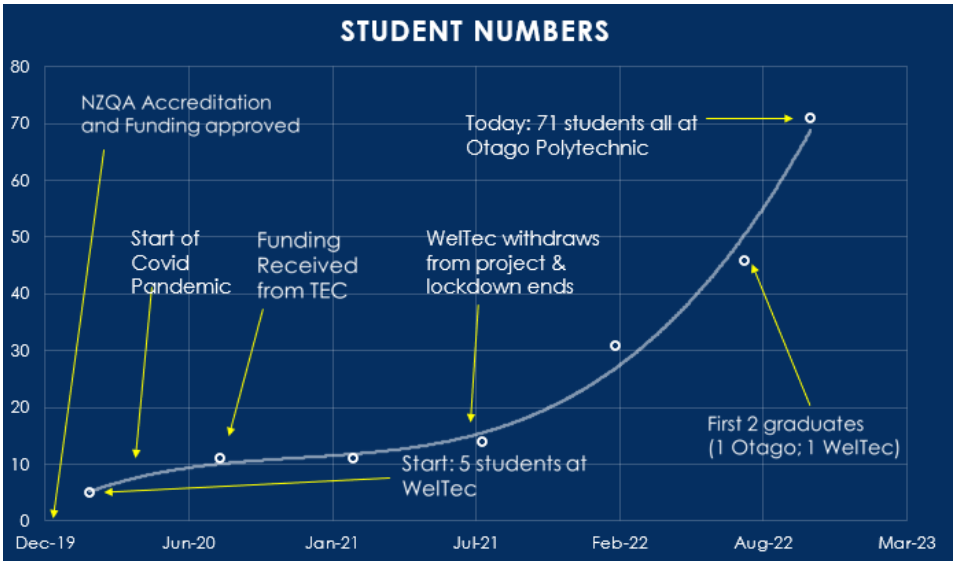
IMPACT ON LEARNERS

There has been a marked impact of the programme on learners, which is reflected in the increased enrolments. Both the Likert scale questionnaire responses as well as the qualitative data gained from more in-depth interviews paint a positive picture of this impact, with a few grumblings about things that did not work in the pilot, but mostly enthusiasm.

Increase in Enrolments.

FIGURE 1 shows the learner enrolment growth of the pilot starting from five and growing to more than 50 by the end of 2022, a tenfold increase in three years. This is a marked growth in numbers and when one looks at this alongside a similar growth in participating companies, (Four in 2020 to 51 now), it is evident that the programme can only expand. Something that was echoed by those interviewed.

FIGURE 1: Learner (apprentice) enrolments start 2020 to end 2022.



The increase in enrolment is largely attributable to word of mouth as no formal marketing of the degree apprenticeship during the pilot phase was undertaken by the institutions involved. There was considerable marketing contact with industry, in terms of workshops and meetings with potential mentors.

[1] Ethical clearance for this research was granted by the Otago Polytechnic ethics committee for this study on 16 August 2021 (Ref No: 889).

Learner Workplace Support and Mobility

Most apprentices felt well supported in the workplace as illustrated by the following quotes: "Workplace colleagues and managers have been very supportive of my studies and actively looking for projects to help with/count towards studies"(Apprentice Surveys, 2022) and "I have been given more responsibility specifically around the asset management space"*Apprentice Surveys, 2022).

However, while confident, they often felt less capable of offering an opinion in the workplace. Related to support in the workplace, is the issue of workplace mobility. There is evidence that learner apprentices are being headhunted for positions in new companies as well as being fast tracked within their own organisations. This is possibly due to the nationwide skills shortage in asset management. Many apprentices also reported salary increases. In the longer term, research on the impact that the programme has on mobility within the organisation as well as within the national workforce will be undertaken.

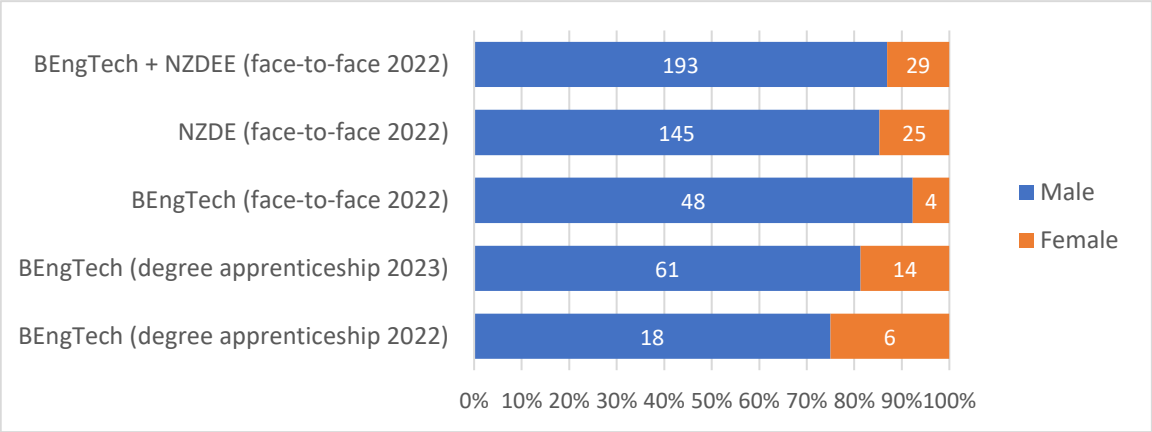
Increasing the Number of Women in Engineering Study

There is a positive impact on the number of women engaged in engineering study, as e seen in Figure 2. In the 2022 face to face cohort of the BEngTech, 7.7% of the enrolment (5/52) were women, compared with 18.7% (14/75) of the 2023 degree-apprenticeship cohort. Employers interviewed, emphasised the fact that they tended to hire women for this apprenticeship and appeared cognisant of the fact that the industry was male dominated.

> The names we have just given you [their apprentices]. They weren't men... and we're in a profession where one in six people in the profession is female. We're in a very, very male dominated profession in NZ. I think this is providing a pathway for woman to have other responsibilities as well. (Source: Employer Surveys, 2022)

FIGURE 2: Comparative Enrolment in engineering programmes by gender (Gorb & Lawson 2022)

While there has been a positive impact on the number of women coming into the programme, the same



cannot be said for Māori and Pasifika learners. When the face-to-face enrolment is compared with the degree apprenticeship for the BEngTech, there was insufficient recorded data to see any significant difference. Both were around 8%.

IMPACT ON INDUSTRY

Response from industry has been positive, despite several teething problems the project has had. They have seen a growth in learner numbers, and they have participated actively in teaching and assessment which has been an important factor in building what is now a robust community of practice. In discussing the impact with industry partners, two themes emerged.

Increased Demand to Participate in the Programme.

There is increased demand for apprentices, across a wider range of organisations and within some organisations. We started with four employers offering places to five learners (beginning 2020). Today we have 51 employers, with at least one apprentice and of those, nine have more than one apprentice. This we see as a reflection of their satisfaction with the programme and their apprentice's performance. One council now has an apprentice for each business unit they have. More companies are finding out about the degree apprenticeship and agreeing to take on apprentices. The quote below sums up what many organisations who have participated feel: "…. our experience is very positive. The learners feel …. much better off financially and they are learning far more skills than just attending polytech alone."(Employer Surveys, 2022).

Programme Strengths and the Benefits from an Industry Perspective

Two benefits were identified by industry. These included the development of the asset management pathway and the in-work training that is integral to the asset management pathway and secondly, the engagement with subject matter experts and the senior industry leadership to both develop and teach the asset management pathway.

DISCUSSION

Research in the UK suggests that women benefit from degree apprenticeships in male dominated disciplines and that in the UK at least, this is the same for minorities (Clarke, 2018). In the design of our degree apprenticeship there was an expectation that there would be significant improvement in the representation of women in engineering, as well as for Māori and Pasifika. While this has happened for women (an increase from 7.6% in the face-to-face version to 18.7% in the degree apprenticeship version of the degree), this was not the same for Māori and Pasifika learners, where the proportions remained around 8% for both versions of the degree. The implication of these data is that we need to make modifications to investigate specific reasons for this particular outcome and make appropriate curriculum changes. A limitation to the study, is that until we have greater enrolment of Māori and Pasifika students, we will not be able to realistically measure the impact the project has on them. This may require a longer-term study, to accumulate data over time.

REFERENCES

Bradley, J., Newhouse, C., & Mirza, N. (2019). Driving social mobility? Competitive collaboration in degree apprenticeship development. *Higher Education, Skills and Work-Based Learning, 9*(2), 164–174. https://doi.org/10.1108/HESWBL-07-2018-0077

Clarke, J. (2018). *Invited presentation for the Tertiary Education Commission on degree apprenticeships at Manchester Metropolitan University* (unpublished).

Fowles-Sweet, W., & Barker, J. (2018). Widening participation and social mobility: Encompassing and integrating learning opportunities. *Widening Participation and Lifelong Learning, 20*(2), 69–95. https://doi.org/10.5456/WPLL.20.2.69

Goodyer, J. E., & Frater, T. G. (2015). *Stepping into one another's world: Apprenticeships-transforming engineering technologist education in Aotearoa NZ*. Tertiary Education Commission. Retrieved from https://engineeringe2e.org.nz/assets/e2e/discoveriespdfs/13b1e323d9/Stepping-into-one-anothers-world.pdf

Goodyer, J., Poskitt, J. & Mackay, J. (2017). *A pilot study of the application of degree apprenticeships in Aotearoa NZ: A focus on infrastructure asset management*. https://mro.massey.ac.nz/bitstream/handle/10179/11773/Degree%20Apprenticeship_Infrastructure%20Asset%20Management%20FINAL.pdf?sequence=

Gorb, E. & Lawson, J. (2022). *Evaluation of New Zealand's first Degree-Apprenticeship in Infrastructure Asset Management.* (unpublished)

Graf, L. (2016). The rise of work-based academic education in Austria, Germany and Switzerland. *Journal of Vocational Education and Training, 68*(1), 1–16. https://doi.org/10.1080/13636820.2015.1107749

Rowe, L., Perrin, D., & Wall, T. (2016). The chartered manager degree apprenticeship: Trials and tribulations. *Higher Education, Skills and Work-Based Learning, 6*(4), 357–369. https://doi.org/10.1108/HESWBL-05-2016-0034

What does excellent external moderation look like and how does it support work-integrated learning: A new approach to quality assurance

DAVID MARR
SAARA, New Zealand
KĪNGI RĀKETE-TANE
MARIANNE FARRELL
LESTER HOARE
Muka Tangata Workforce Development Council, New Zealand

INTRODUCTION

In 2020 the government implemented reforms of the vocational education sector (the Review of the Vocational Education Sector (RoVE) to create a strong unified, sustainable vocational educational system that is fit for the future of work and delivers the skills that learners, employers and communities need to thrive. Workforce Development Councils (WDCs) were established as part of this reform. Their role is to ensure the vocational education system meets industry needs and gives a stronger voice to Māori business and iwi development. Muka Tangata is one of six WDCs who each have their own areas of responsibility. Muka Tangata supports the food and fibre sector which consists of Dairy, Sheep and Beef, other livestock, Arable, Horticulture, Fishing, Seafood Processing, Winemaking, Aquaculture, Livestock farming, Sports Turf Management, Silviculture & Harvesting.

With a quality assurance lens, Muka Tangata is legislated to carry out external moderation of providers (universities, Te Pūkenga, Private Training Establishments [PTEs] and schools) delivering and assessing industry standards (unit and skill standards) within and outside of programmes leading to New Zealand qualifications and micro credentials. A further quality and legislated function is the endorsement of programmes developed by providers leading to New Zealand qualifications. Other Muka Tangata functions include the development of standards, New Zealand qualifications and micro credentials; providing Skills Leadership and Advice to partners; and engaging and partnering with industry and government.

The vast majority of vocational learning provision in the food and fibre sector is carried out on-job or work-integrated. This is an earn-as-you-learn approach which came about with Industry Training Organisations and the NZ Apprenticeship scheme. These learners are generally employed and then undertake training. The employer or company will provide much of the knowledge and skill acquisition, supported by an adviser from Te Pūkenga (formerly from Primary Industry Training Organisation) who will connect regularly with the learner and employer and provide goal setting, further learning opportunities, pastoral care and in many cases act as the assessor – assessment may also be carried out by the employer who is trained and registered by Te Pūkenga. Whilst some off-job training may be undertaken by another provider through block course or site visits, the majority of learning is carried out on-job.

Assuring on-job learning and assessment has its own challenges, risks, and opportunities. As a new organisation Muka Tangata wanted to take a new approach to the Quality Assurance and Moderation

function; supporting providers to develop and deliver quality programmes that meet the skill needs of industry, learners, and their whanau.

RESEACH - SAARA

Muka Tangata engaged an organisation (SAARA) to complete an independent review of quality assurance and moderation activities. The review consisted of four phases:

1. Research national and international external best practice.
2. Survey stakeholders on current knowledge and understanding of external moderation in the food and fibre sector.
3. Interview the survey participants regarding current and future external moderation.
4. Workshop with new partners on survey and interview key findings.

A key component of the review was the engagement with partners from the multiple industries in the food and fibre sector. Participants included education providers, industry, learners and the public sector. Some key findings (and more can be found at National-External-Moderation-Review.pdf (mukatangata.nz)):

- Programme endorsement is a new WDC lever that will support the intent of RoVE and can support provider and learner success.
- The needs of ākonga Māori in programme development, assessment and moderation are recognised as very important by partners but not well understood, and there is uncertainty on how to address those needs.
- Partners (industry, providers, learners) value external moderation
- Cluster workshops and professional development opportunities are highly valued by industry and providers for upskilling and networking.
- The provision of education on assessment and moderation best practice is desired by industry and providers, to enhance consistency in judgements and learner outcomes.
- Both research (NZQA) and providers indicate a need and want for a 'partnership' approach to best practice moderation
- Providers want moderation to focus on the whole programme or both (unit standards), keeping it at a high level. The majority of industry were very interested in moderating the whole programme as a holistic approach.
- Moderation tools were rated for effectiveness – Providers rated 'on site-moderation' top (best), and 'checking assessor judgements' bottom (worst). Industry rated 'checking with learners what could be improved' top, and 'visiting a training provider' next to bottom.
- The preference for post-moderation to be seen as a systematic approach was supported by several providers and industry, rather than getting too granular and pedantic.
- Current NZQA National External Moderation principles for WDCs detail moderation should focus on improving assessment practices that include supporting teaching and learning. Current moderation levers for WDCs focus more on assessment and less on teaching and learning.
- The cohort of industry that were interviewed felt strongly that moderation ensures training is robust, that graduates have the skills they need, and moderation improves provider materials and practices.

- Risk-managing for providers was very important to industry, with time and resources to support non-performers, while continuing to work with high performers.

RESEARCH – TE WHAKATŌNGA

Simultaneously Muka Tangata had been conducting research to support Māori learners through Muka Tangata quality assurance levers. Te Whakatōnga outlines, identifies, and recommends a bespoke approach to deliberately incorporating mātauranga Māori and te ao Māori values into Muka Tangata National quality assurance planning. It complements aspiration to have better outcomes for Māori ākonga (learners), iwi, businesses, and employers engaged in the food and fibre sector. The research Te-Whakatonga-digital-versionlow-res.pdf (mukatangata.nz) details four common findings:

- Māori ākonga look at success holistically, and tend to succeed when programme delivery, providers, organisations and tutors build values and systems that align with their ideas of success.
- When providers have common tikanga (practices), reo Māori, uara (values), and ethics as their foundation, Māori ākonga outcomes and needs are met through a shared understanding. This is supported through the day-to-day application and the way these tikanga and uara are fostered and practiced.
- Organisations where pastoral care is demonstrated as working effectively often have Māori kaimahi (staff) in teaching and support roles. Successful pastoral care is not merely applied as a standalone service function, but instead is embedded in the fabric of the organisation where all kaimahi embrace this approach. Pastoral care is connected to their uara and ethics and is at the core of the organisation's operations.
- Providers and tutors from non-kaupapa Māori organisations are at different stages of their te ao Māori development. Those who deeply understand and apply mātauranga Māori into their practices bring that knowledge through life experience. It is not always through the programmes or the culture of the organisations delivering in the food and fibre sector.

ACTIONS

Much of the two pieces of research reinforced Muka Tangata's direction of travel and gave confidence in our approach with partners. And there is new information. Recommendations have been incorporated into moderation planning, systems, and ways of working. Other recommendations will form future workstreams.

Muka Tangata has a focus on building strong relationships, support and collaboration with providers and schools who deliver food and fibre standards, programmes, and qualifications. Muka Tangata will continue our whakawhanaungatanga approach where we engage with providers regularly and not just at the time of calling for moderation. The recently legislated WDC requirement to endorse provider programmes is an additional tool that gives industry and learners a strong voice. The six sets of considerations are focused around content, equity, consultation, and engagement, te ao Māori, Pacific peoples and languages, and People with disabilities.

Muka Tangata has increased our professional development workshops for provider kaimahi. Having them on-line will enable the team to better support providers around delivering and assessing food and fibre programmes. Providing feedback verbally and in writing when a provider submits materials for moderation, and during provider site visits help to strengthen relationships. Our organisation will

continue to take a risk-based approach to managing moderation activities – focus areas ensure we are targeting the right industries and areas. Improving use of technology and access to metrics and information is supporting this.

Muka Tangata will use moderation tools and levers that are the most effective. For example, a greater focus on relationship building, professional development, and on-site visits; less focus on desk based (paper) moderation. The learnings from Te Whakatōnga will help our and other Muka Tangata teams in supporting providers around Māori learner success. Maintaining and further building a culture that supports te ao Māori will be key to our success. Having a moderation focus on Māori learners is new to the team for 2023. Muka Tangata has been working with the Food and Fibre Centre of Vocational Excellence, industry and providers to better understand and support pastoral care, delivery and assessment models (mix of provision) that supports predominantly on-job or work-integrated learning. And that mahi will continue.

Historically, Standard Setting Bodies have called for samples from providers from individual unit standards, based largely around a schedule. For example, moderating all unit standards within a five-year period. This in itself is not a risk-based approach, nor does it provide a holistic viewpoint of the quality of the provision of the programmes leading to qualifications. Muka Tangata is focusing moderation at a programme level – calling for standards within a particular programme. This extends to engaging with providers around the provision of Muka Tangata endorsed programmes once implemented, where currently, endorsement is a snapshot at the point of submission.

There is further mahi to be done from the recent research and Muka Tangata forward thinking. We have and are working collegially with the five other WDCs to nurture innovation and support consistency for providers that supports quality provision in the food and fibre sector.

An institutional approach to risk mitigation in work-integrated learning: Sharing lessons learned

CLARE MURRAY
University of Canterbury, New Zealand
JENNY FLEMING
Auckland University of Technology, New Zealand

INTRODUCTION

Driven by the demands of key stakeholders, students and employers, as well as New Zealand's Tertiary Education Commission's focus upon work-ready graduates, the expectation upon New Zealand universities to include work-integrated learning (WIL) as a strategic priority has increased. WIL practitioners celebrate this because they understand the value of WIL to students in enhancing skill outcomes, employment prospects and students' understanding of the world of work (Campbell, et al., 2022). However, realising such benefits does not come without significant risks. In the context of WIL, risk can be defined as, "any issues that might affect, either positively or negatively, the achievement of WIL objectives for students, host organisations and the university" (Fleming & Hay, 2021a, p.177).

Cameron (2017) claims that the strategic opportunities that WIL presents for universities are unachievable without universities taking on unavoidable risk. A plethora of regulatory requirements in New Zealand continues to require universities to ensure effective institutional risk management. The Education (Pastoral Care of Tertiary and International Learners) Code of Practice 2021 (the Code) increases legal risk for tertiary education providers. Simultaneously, the Health and Safety at Work Act 2015 (HSWA) imposes upon both host organisations and universities the requirement to safeguard students who are hosted by them whether such students are paid or unpaid. The purpose of this paper is to share University of Canterbury's (UC's) story of the development of a pan-University WIL risk mitigation strategy.

Risk management in education can fall into four approaches: risk avoidance, risk control, risk transfer and risk acceptance (Cameron, 2020). For universities, where WIL is integral for student learning, risk avoidance is not an option. Similarly, a university will rarely wish to accept risk. Within WIL literature, shared responsibility for risk is propounded (Fleming & Hay, 2021b) rather than risk transfer (which is neither discussed nor seems appropriate in the higher education sector). Risk control (management) therefore became the principal focus for the development of UC's risk mitigation strategy.

CONTEXT

Te Whare Wānanga o Waitaha | University of Canterbury (UC), established in 1873, is in Ōtautahi Christchurch in the South Island of New Zealand. With 21,000 enrolled students, a staff of over 5,000, UC has 7 faculties (Science, Business, Arts, Health, Engineering, Law and Education).

WIL at UC occurs in degrees requiring students to meet professional standards of practice in accordance with an external accreditation body (such as clinical placements within health programmes). WIL also occurs in degrees introducing students to practices of work relevant to their discipline (such as industry-related projects within a business degree). A further elective suite of WIL

courses known as the PACE Programme, available to any student across UC, offers a range of interdisciplinary WIL projects and internships focusing on developing students' employability skills.

In 2022, UC created a centralised WIL Hub, Ako ā-Mahi ("learning through working") within the office of the Deputy-Vice Chancellor Academic (the Hub). Its role is to provide education, training, technology and resources (based upon WIL research) to support staff, students and host organisations in experiencing high-quality WIL. The Hub's work was divided into 10 interrelated workstreams including, amongst others, strategy, risk and smart systems.

The Hub's creation was also an intentional component of UC's WIL risk mitigation strategy as it has been suggested (Cameron et al., 2020) that having such a dedicated unit may minimise operational risk as well as improve the legal literacy of WIL practitioners.

WIL RISK MITIGATION PROCESS

The 'risk workstream' of the Hub developed a risk mitigation process for WIL at UC. The key phases of the process included:

- analysis of current literature,
- analysis and evaluation of risk from an institutional perspective,
- creation of a Legislative Risk Matrix and associated WIL Safeguards,
- setting up a WIL Risk Working Group,
- preliminary consultation with WIL practitioners, and
- drafting a WIL policy and procedures.

These phases were not linear, often occurring concurrently. Together, they formed the process towards creating a risk management framework.

An analysis of the WIL risk literature was an essential starting point. Six risk categories pervade the literature: legal, strategic, operational, reputational, ethical and financial risk (Cameron & Orrell, 2021; Fleming & Hay 2021a). Recent WIL risk literature is also informed by enterprise risk management (ERM) (Ackley et al., 2007), a comprehensive, institution-wide approach to risk. In accordance with an ERM approach, the Hub's next task was to identify risk. Identifying external 'legal risk' was prioritised not only because it exposes UC to the immediate possibility of liability (Cameron, 2020) but also because it was expedient in the process to start with an analysis of mandatory provisions as opposed to analysing more complex risks, such as ethical risk. A thorough review of relevant legislation including the Code, the associated NZQA Guidelines, the HSWA, the Privacy Act 2020 and the Children's Act 2014 was completed. Each separate provision that might pertain to a WIL activity was documented in a Legislative Risk Matrix.

Table 1 shows a curated excerpt of UC's Legislative Risk Matrix which includes examples of both the relevant legislation and identified safeguards (listed in Table 2).

TABLE 1: Curated excerpt from the Legislative Risk Matrix

ID	Legislation	Legislative/Report Element	1. UC Health and Safety Policy	2. Operational Plan for supporting the wellbeing and safety of UC staff and students	3. WIL Policy	4. Partner onboarding	5. Supervisor (Partner) onboarding	6. Partner handbook (for supervisor)	7. Student induction	8. Student handbook	9. Risk assessment
1	Education (Pastoral Care of Tertiary and International Learners) Code of Practice 2021	Part 3, Process 1: Strategic goals and strategic plans (1) Providers must have strategic goals and strategic plans for supporting the wellbeing and safety of their learners across their organisation... (2) Providers must- regularly review their learner wellbeing and safety goals and strategic plans...	1	1	1	0	0	0	0	0	0
2	Education (Pastoral Care of Tertiary and International Learners) Code of Practice 2021	Part 3, Process 2: Self-review of learner wellbeing and safety practices (2) Providers must review their learner wellbeing and safety practices using- (a) Input from diverse learners and other stakeholders (b) Relevant quantitative and qualitative data...	0	0	**1**	0	0	**1**	0	**1**	**1**
3	Education (Pastoral Care of Tertiary and International Learners) Code of Practice 2021	Part 3, Process 4: Responsive wellbeing and safety systems (1) Providers must gather and communicate relevant information across their organisation (including student accommodation) and from relevant stakeholders to accurately identify emerging concerns about learners' wellbeing and safety or behaviour and take all reasonable steps to connect learners to culturally appropriate social, medical, and mental health services.	0	0	1	1	1	1	1	1	1

Note: Legislative Risk Matrix created by the WIL Hub (2022)

The next step in the process was to set up a WIL Risk Working Group to analyse and evaluate WIL risk from an institutional perspective. Comprised of the Director of WIL, a Business Analyst, a Code contractor and an expert from the Health and Safety team, the group analysed how each of the legal provisions currently were, or should be, complied with. At the end of that process, an "Agreed Approach" was reached in respect of each legal risk. The Agreed Approach comprised of 14 possible mitigants which were referred to as "WIL Safeguards". Example safeguards include artefacts such as WIL Agreements, or good practices such as effective Student Induction and Host Onboarding. These safeguards (Table 2) were consistent with many of the WIL risk management strategies identified by Fleming and Hay (2021b) in their research of NZ universities. The safeguards and related commentary (at the time) are shown in Table 2.

TABLE 2: Work-integrated learning safeguards

14 WIL Safeguards	**Mitigants commentary at the time**
Health and Safety Policy	In existence
Operational Plan re supporting student wellbeing & safety	In existence
WIL Policy	To be developed
Host Onboarding	Various practices in faculties; WIL Procedures to standardise expectations (WIL Procedures to be developed)
Supervisor (host) onboarding	To be included in WIL Procedures (to be developed)
Host handbook (for supervisor)	Various practices; standardised offering to be developed for faculty
Student Induction	WIL Procedures to be developed
Student Handbook	Pan-UC handbook developed and available for all students
Risk Assessment	In existence; but clearer usage guidelines to be developed in WIL Procedures
WIL Agreements	Pan-UC and faculty specific agreements used; review usage and standardised agreements to be developed
Student Check-ins	To be included in WIL Procedures (to be developed)
Supervisor (host evaluation)	To be included in WIL Procedures (to be developed)
WIL Feedback	To be included in WIL Procedures (to be developed)
Placement management reporting (using UCPlacements)	Roll-out in faculties to inform bespoke faculty reporting including UC-wide minimum expectations

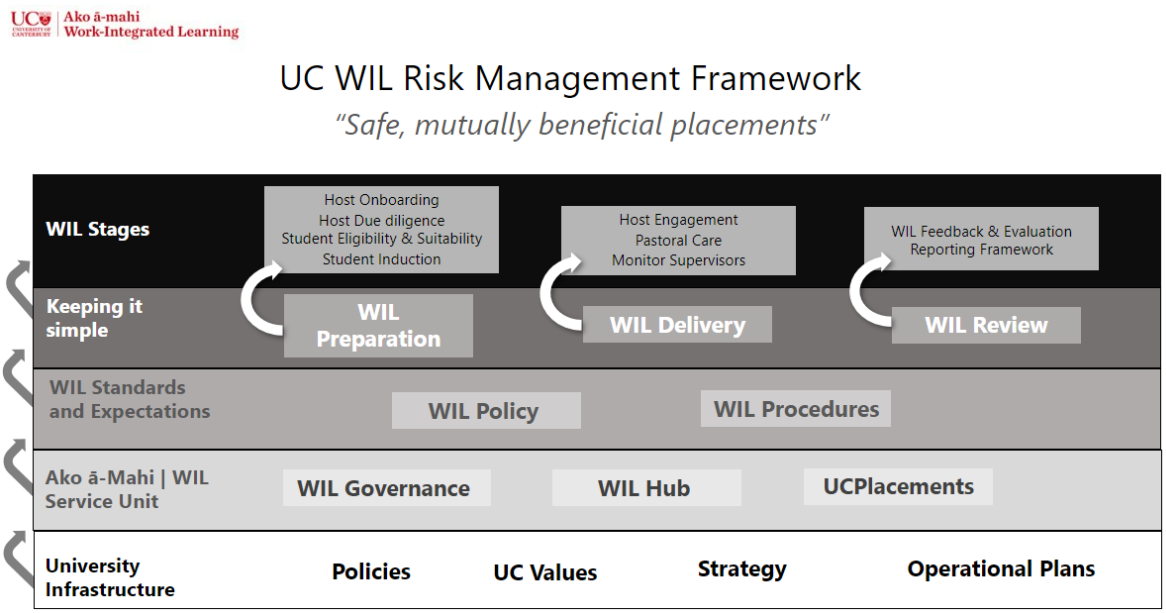
Preliminary consultation with WIL Practitioners across UC as well as with professional staff in the central departments of Legal, Risk and Insurance provided further endorsement that new safeguards would need to be created, such as pan-UC WIL Procedures and placement management reporting. Consultation ranged from one-on-one meetings to larger online risk workshops with a variety of stakeholders including faculty representatives where a variety of risk mitigation practices and a lack of consistent standards across the institution became clear.

Concurrently with the completion of the Legislative Risk Matrix, a preliminary draft of UC's WIL Policy and Procedures was created which included comprehensive expectations of staff in respect of existing and new WIL Safeguards. The detailed nature of the new policy and procedures, proving difficult for staff to engage with, resulted in the creation of a visual framework to explain the contextual importance of risk mitigation of WIL at UC. A more condensed version of the Policy and Procedures was also revisited.

WIL RISK MANAGEMENT FRAMEWORK

The UC Framework (Figure 1) is not only derived from the key phases of the risk mitigation process described above, but also acknowledges the underpinning of all WIL activities by 'UCPlacements' (the new software placement management system), the WIL Hub itself as well as broader UC infrastructure.

FIGURE 1: WIL Risk Management Framework for University of Canterbury



The Risk Management Framework (Figure 1) illustrates that WIL does not happen in a vacuum. Successful WIL and associated risk mitigations build upon pre-existing university infrastructure, values, and strategy (in UC's context, its dedication to student engagement and employability). Building on this, a centrally located WIL unit (comprised of a mix of professional, academic and technical staff), committed to the student outcomes that WIL engenders, supports faculty staff to deliver quality WIL. The team understand that for optimum WIL experiences, (whether that be staff operational efficiencies, student safety and wellbeing or host organisation engagement), all staff are expected to adhere to a WIL Policy (which sets institutional expectations) and WIL Procedures (which clarify how those expectations might be met). At the coal face however, a WIL Practitioner can consume the understanding of their responsibilities into activities that are categorised into WIL Preparation, WIL Delivery and WIL Review.

And finally, in order to ensure UC students on placement are flourishing in a workplace learning environment, the WIL Stages outlined at the top of the Risk Management Framework (Figure 1) are a useful reminder of the stages which students, staff and host organisations go through to ensure a safe and fulfilling placement with effective learning outcomes. Each of those stages have key tools associated with them which are either produced by the faculties and/or the Hub, for example, Student Handbooks, Risk Assessments and WIL Agreements.

DISCUSSION AND SUMMARY

Developing a clearly structured risk management strategy for WIL is essential for universities (Cameron et al., 2020; Cameron & Orrell, 2021). A distinguishing feature of an ERM approach to managing risk is that all stakeholders share responsibility for risk management (Ackley et al., 2007). While host

organisations have a significant role, under the Code, the need for universities to take responsibility for risks related to WIL has clearly become more important.

Within universities, WIL stakeholders range from the Vice-Chancellor, to Executive Deans, to Heads of School, Course Coordinators, WIL Hub representatives as well as students themselves. The Risk Management Framework (Figure 1) acknowledges the multiple stakeholders that need to be involved in the process. However, a challenging aspect, particularly related to drafting the WIL Policy and Procedures, has been establishing an understanding of what shared responsibility means and ultimately who is responsible for ensuring student safety. The danger in that, is that no-one focuses on the key issue. The draft WIL Procedures have elicited a continuing discussion as to accountability and responsibility. Whilst those on the ground (WIL practitioners) are taking responsibility, there's an argument to say that Executive Deans in Faculties are accountable for compliance by staff with university policy and procedures in respect of WIL. This is an area for ongoing conversation and clarification.

Whilst the focus to date has been on legal risk, the associated operational risk analysis is occurring on a daily basis. The concurrent creation of a WIL Hub in order to develop central resources in respect of risk, process and associated tools has been helpful in de-mystifying a risk mitigation strategy. In addition, having a centralised software placement management system (UCPlacements) implemented across the university, will prove to be an essential tool in managing risks for all stakeholders.

The implications for WIL practice are clear. As the multitude of risks related to WIL cannot be avoided, ensuring that institutional risk mitigation strategies are developed and implemented is essential to maximising student and host experiences, reducing the reputational risk to a university, and ensuring the strategic value of WIL to universities is realised.

REFERENCES

Ackley, S., Adams, M., Crickette, G., Eick, C., Finch, L., Freeman, R., Bonney, H., Langsdale, G., Lark, C., Shew Holland, E., & Unks, R. (2007). *ERM in Higher Education*. University Risk Management and Insurance Association.

Campbell, M., Cooper, B., Smith, J., & Rueckert, C. (2022). The framing of employability policy and the design of work-integrated learning curriculum. In S. J. Ferns, A. D. Rowe and K.E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future*. Routledge.

Cameron, C. (2017). The strategic and legal risks of work-integrated learning: An enterprise risk management perspective. *Asia-Pacific Journal of Cooperative Education, 18*(3), 243-256.

Cameron, C. (2020). Risk management by university lawyers in work integrated learning programs. *Monash University Law Review, 45*(1), 29-69.

Cameron, C., Ashwell, J., Connor, M., Duncan, M., Mackay, W., & Naqvi, J. (2020). Managing risks in work-integrated learning programmes: A cross-institutional collaboration. *Higher Education, Skills and Work-Based Learning, 10*(2), 325-338.

Cameron, C., & Orrell, J. (2021). Governance and risk management. In S. J. Ferns, A. D. Rowe and K. E. Zegwaard (Eds.), *Advances in research, theory and practice in work-integrated learning: Enhancing employability for a sustainable future*. Routledge.

Fleming, J., & Hay, K. (2021a). Understanding risks in work-integrated learning. *International Journal of Work-Integrated Learning*, 22(2), 167-181.

Fleming, J., & Hay, K. (2021b). Strategies for managing risk in work-integrated learning: A New Zealand perspective. *International Journal of Work-Integrated Learning*, 22(4), 553-564.

Developing Work-Integrated Learning predictive models using the BERT language model: A working machine learning study

HANNAH C. PARSONS
PRADEESH PARAMESWARAN
KAREN A. MURPHY
Queenstown Resort College, New Zealand

INTRODUCTION

The purpose of this study was to explore the efficacy of applying a machine learning technique, sentiment analysis, to a data set of work integrated learning progress reports. Machine learning (ML) is a branch of artificial intelligence (AI) that allows computers to determine and understand patterns within given data, without requiring humans to provide specific rules (Parameswaran, 2023). Large language models (LLM) such as ChatGPT have shown promise in understanding natural language descriptions in various scenarios such as summarising text, generating poetry, understanding sentiment, stance, and opinion (Ouyang et al., 2022). The specific ML transformer model used was the Bidirectional Encoder Representations from Transformers (BERT) language model. While ChatGPT was developed to generate human-like text, BERT was designed to better understand the context of given texts. BERT was applied to a data set of progress reports generated from two cohorts of student WIL placements, occurring between the years of 2020-2022. Data comprised both self-assessed and employer-assessed progress reports of Adventure Tourism Management (ATM) students at Queenstown Resort College in Queenstown, New Zealand, from placement with their WIL employers. Despite the widespread use of LLMs, these models have not yet been widely applied to the Work-Integrated Learning (WIL) context. Here within, the application of a LLM, BERT, to WIL is investigated.

LITERATURE

Work-integrated learning is an educational approach that uses students' relevant work-based experiences to facilitate an integration of theory with the "meaningful practice of work," as an intentional component of the curriculum (Wood et al. 2020, p. 331). The learning happens in a real, working environment and has been recognised as an effective strategy to promote the quality and relevance of both vocational training and education (Bahl & Dietzen, 2019). The exposure to relevant practical work during WIL affords learners work experience which cannot be gained through purely school-based vocational education training (Rayner & Papakonstantinou, 2015). The study examined herein considers the potential impacts of ML on WIL.

BERT, or Bidirectional Encoder Representations from Transformers, is a ML model which is designed to aid in prediction of language, sentiment analysis, and logical connections between sentences – it is capable of analysing language with a relatively human-like "common sense" (Lutkevich, 2020). The BERT model has arisen as a popular state-of-the-art machine learning model that is able to cope with multiple natural language processing (NLP) tasks such as supervised text classification without human supervision (Garrido-Merchán et al., 2023). The benefits of machine learning, artificial intelligence, and

specific predictive models like BERT include their neutrality in analysis, the removal of human bias, and far more accurate and powerful capabilities for forecasting, among others (Medeiros et al., 2021).

The BERT model operates in two steps: pre-training, and fine-tuning. During pre-training, the model was trained on large-scale unlabelled corpus - large sets of electronic text considered to be representative of a language, or language variety. The BERT model was pre-trained on extensive data sets such as English Wikipedia and BookCorpus to convey general knowledge (Devlin et al., 2019). For fine-tuning, the model is initialised with the pre-trained parameters, and these parameters are subsequently fine-tuned using labelled data (such as the WIL progress report data used within the current study) to initiate specific tasks, such as sentiment analysis (Garrido-Merchán et al., 2023).

Sentiment analysis, or opinion mining, is an approach to NLP that can identify the emotional tone behind a body of text (Nandwani & Verma, 2021). The technique is a form of text analytics that determines whether text is positive, negative, or neutral. A confidence score is assigned to the text between 0-1, with 0 equating to a negative response and 1 to positive.

METHODS

Since WIL contributes to a qualification, it must be structured with defined durations and assessments (Hondonga et al., 2022). Assessments of students during their WIL in the QRC Adventure Tourism Management course included submission of progress and final reports generated by both student interns and their industry supervisors. Data were obtained via progress reports generated during the WIL placements of two student cohorts between 2020-2022 from students that had completed their course at the time the research was conducted. Consent for the pilot was obtained verbally at the conclusion of the WIL placements. It was explained that the application of BERT is existing work undertaken by the Internship Managers and the intent was to determine the efficacy of this tool. Progress reports assessed eight criteria of student interns' conduct and task performance during placement and include the following: knowledge of role and products, time management, appearance and grooming, professional communication with clients, professional communication with colleagues, task performance, attitude and stress management, and customer service. A 3-point Likert scale was applied to each criterion, ranking from unsatisfactory, to satisfactory, to outstanding; additionally, qualitative data were gathered against each criterion, allowing for nuanced expansion on the given ranking.

Likert rankings and qualitative data were extrapolated from the progress reports and anonymised, with each intern/employer pair matched with an alphanumeric code for reference. These data were then fed into to the BERT model, and a sentiment analysis conducted to compare the qualitative data of the intern self-reports against the employer-generated reports.

To assess any potential disparities between the sentiment scores of employers and interns, the researchers conducted a paired t-test. The t-test revealed no statistically significant differences ($p < 0.05$) across the eight criteria, indicating that the sentiments of both employers and students align. However, given the small sample size ($n = 30$), the study lacks sufficient statistical power to substantiate these claims. Consequently, to evaluate the accuracy of the algorithm, the researchers randomly selected 10 instances from the dataset for a comparative analysis to gauge the degree of agreement, utilizing inter-annotator agreement (IAA) as a measure, which refers to the concurrence on a label among two or more annotators (Artstein, 2017). To accomplish this, two of the authors independently evaluated the

randomly chosen samples of text for positive or negative sentiments, yielding a kappa score of 0.612. Based on the research of McHugh et al., (2012) the agreement score is in substantial agreement. The considerable agreement among the authors corroborates the sentiment classification by BERT, suggesting the efficacy of the machine learning analysis. This lends further empirical support to the applicability of BERT's results to larger datasets, an aspect the researchers intend to explore in future studies. The discussion now turns to intriguing patterns observed within the data.

RESULTS

Agreement in sentiment analysis across intern/employer pairs was widespread (appearing green in Figure 1). Across the eight criteria and within both cohorts only four instances of divergent sentiments were identified, wherein the interns' scores deviated from those expressed by the employers. The four disagreements will now be expanded upon, beginning with the contrasting sentiments that were upheld by the researchers (appearing in the figure as dark red negative signs), occurring within the 'professional communications with clients', and 'task performance' criteria, and both stemming from the same intern/employer pair, BB. This is followed by a discussion of the two false negatives identified in the analysis and disregarded by the researchers (appearing in the figure as light pink negative signs).

FIGURE 1: Sentiment analysis of agreement across employers and interns

A sentiment disagreement detected by BERT indicated a discrepancy between an intern and an employer's perception of the intern's actions relating to professional communication with clients. The employer's assessment stated, "*[Intern BB] was quiet and wouldn't instigate a conversation with a client,*" (ranking a negative score on the sentiment analysis) while the intern's assessment stated, "*I got better and better at talking to clients and engaging with them [...] I have learnt a lot about communicating with customers. [...] it has become easier and more enjoyable to talk to clients,*" (earning a positive sentiment score).

It is possible that the intern's self-perception of progress along a developmental trajectory may have contrasted with the employer's potentially higher expectations concerning their employee's behaviour.

The additional disagreement detected by BERT occurred within the assessment of task performance. Employer BB stated, "*Tasks weren't done consistently. When shown, [intern BB] indicated they understood, but the tasks weren't being done to full capacity or regularity. More effort in this area is required,*" (ranking a negative score on the sentiment analysis) while the intern's assessment stated, "*I would help out as needed for any jobs around the facilities, especially on quiet days,*" (earning a positive sentiment score). In the context of both disagreements identified by BERT and examined by the researchers, there was a need for better communication and alignment between employer BB's expectations and the intern's self-perception.

Lastly, within the four divergent sentiments, the researchers identified two false negatives, wherein the data had been misclassified. Though BERT is robust to misspellings, in one false negative case, the typo 'outsanding' (sic) was identified as a negative sentiment. In the other, a backslash '/' was identified as a negative sentiment. Both the language and the context of the language used in the fine-tuning datasets are important to sentiment analysis, and the short, contextless entries may have been misclassified for several reasons. This is deserving of further investigation, though it falls outside of the purview of the current study, it is an area the researchers intend to examine in future.

DISCUSSION

The objective of the study was to conduct a cross-analysis of positive and negative feedback sentiments used within the progress reports, to generate a comparison and to determine potential gaps and discrepancies between the responses. While analysis of this kind has typically been the purview of a work-integrated learning manager, (and will largely remain so) introduction of AI technology to aid in deepening analysis through the training of feedback sentiments represents a step forward for the work-integrated learning manager, and WIL research paradigm in general. The application of ML has additional opportunities when considering the challenges, stresses, and burnout of WIL administrators and staff identified in the literature (Akerman, 2020; Haski-Leventhal, 2020; Wheeldon et al., 2023)

For example, this could be utilised as a tool to rapidly ascertain differences – is there is a key skill or attribute that many employers are not rating as highly compared to students, or alternatively where students are underrating themselves? Either scenario could trigger an intervention during the WIL placement to better support the students' WIL experience or be used for preparing students yet to go out on a WIL placement.

Once trained, this technology creates various opportunities for education providers in the context of data management and has future implications for predictive modelling of WIL placement outcomes, based on trained feedback sentiments obtained via self-assessed and employer-assessed progress reports. The generation of the false negatives within the data set (and their subsequent identification by humans) does however reinforce the importance of human verification of machine learning outputs. Machine learning neural networks are not infallible; they are subject to weaknesses, limitations, and flaws, like myriad other analytic tools researchers may use.

The application of LLM to WIL represents an innovation in data analysis, as well as predictive models which may identify language and semantics that correlate with a) improvements in student progress in employer reports; b) declines in student progress in employer reports; c) accuracy in student self-analysis compared to employer reports, among various others.

REFERENCES

Akerman, K. (2020). Invisible imposter: Identity in institutions. *Perspectives: Policy and Practice in Higher Education*, *24*(4), 126-130. https://doi.org/10.1080/13603108.2020.1734683

Artstein, R. (2017). Inter-annotator agreement. *Springer EBooks*, 297–313. https://doi.org/10.1007/978-94-024-0881-2_11

Bahl, A., & Dietzen, A. (Eds.). (2019). Work-based learning as a pathway to competence-based education. A UNEVOC network contribution. BIBB.

Devlin, J., Chang, M., Lee, K., and Toutanova, K. (2019). BERT: Pre-training of deep bidirectional transformers for language understanding. In J. Burstein, C. Doran, and T. Solorio (Eds.), Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, NAACL-HLT 2019, Minneapolis, MN, USA, June 2-7, 2019, Volume 1 (Long and Short Papers), 4171–4186. Association for Computational Linguistics.

Garrido-Merchán, E. C., Gozalo-Brizuela, R., & Gonz´alez-Carvajal, S. (2023). Comparing BERT against traditional machine learning models in text classification. *Journal of Computational and Cognitive Engineering*. *2*(2), 1-5. https://doi.org/10.47852/bonviewJCCE3202838

Haski-Leventhal, D. (2020). *The purpose-driven university: Transforming lives and creating impact through academic social responsibility*. Emerald Group Publishing.

Hondonga, J., Chinengundu, T., & Maphosa, P. (2022). Examining assessment tools and procedures for work-based learning in pandemic times. *IGI Global EBooks*, 213–229. https://doi.org/10.4018/978-1-7998-8275-6.ch013

Lutkevich, B. (2020, January 27). BERT language model. Enterprise AI. https://www.techtarget.com/searchenterpriseai/definition/BERT-language-model/

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia medica*, *22*(3), 276-282.

Medeiros, M. C., Vasconcelos, G. F., Veiga, Á., & Zilberman, E. (2021). Forecasting inflation in a data-rich environment: the benefits of machine learning methods. *Journal of Business & Economic Statistics*, *39*(1), 98-119.

Nandwani, P., & Verma, R. (2021). A review on sentiment analysis and emotion detection from text. *Social Network Analysis and Mining*, *11*(1), 81. https://doi.org/10.1007/s13278-021-00776-6

Ouyang, L., Wu, J., Jiang, X., Almeida, D., Wainwright, C. L., Mishkin, P., Zhang, C., Agarwal, S., Slama, S. J. K., Ray, A. K., Schulman, J., Hilton, J. K., Kelton, F., Miller, L. P., Simens, M., Askell, A., Welinder, P., Christiano, P. F., Leike, J., & Lowe, R. J. (2022). Training language models to follow instructions with human feedback. *ArXiv (Cornell University)*. https://doi.org/10.48550/arxiv.2203.02155

Wheeldon, A. L., Whitty, S. J., & Van Der Hoorn, B. (2023). Burnt out by underinvestment: Why university professional staff suffer amidst the Australian work-integrated learning system. *International Journal of Work-Integrated Learning*, *24*(1), 99–115. https://www.ijwil.org/files/IJWIL_24_1_99_115.pdf

Wood, Y., Zegwaard, K. E., and Fox-Turnbull, W. (2020). Conventional, remote, virtual and simulated work-integrated learning: A meta-analysis of existing practice. *International Journal of Work-Integrated Learning 21*(4), 331-354.

Complementary learning linkages between theory, project and practice in engineering education

SIJU JOSEPH THOMAS
WENDY FOX-TURNBULL
KARSTEN E. ZEGWAARD
The University of Waikato, New Zealand

INTRODUCTION

Engineering is a field of study where technological, scientific, mathematical, and technical concepts are applied to understanding, design, manufacturing, innovation, and use of tools and machineries to address real-world engineering problems (Bokova, 2010). Engineering education is a learning platform where students develop engineering knowledge, technical skills, and non-technical skills, which leads to an experience-enhanced degree (Backa & Wihersaari, 2015) that enables students to integrate conceptual knowledge, techniques, processes, and tools, to solve interdisciplinary engineering problems (Craig (2017). Felder et al. (2000) and Borikov et al. (2016) suggest that engineering education should promote active or discovery-based learning in the classroom environment to aid the development of curiosity, initiative, and interest in the subject, thereby favouring students' self-learning, enhancing problem-solving, critical thinking capabilities, and development of intellectual growth. To supplement and apply theory-based learning in classroom learning, contemporary teaching and learning approaches are Project-Based Learning (PBL) and Work-Integrated Learning (WIL).

PBL in engineering education works by giving an engineering problem to a group of students to solve. Students conduct research, extend their previously acquired engineering knowledge, and apply that learning in order to define, design, and develop a solution to the problem (Dahms, 2014; Hitt, 2010; Loyens et al., 2015). PBL provides engineering students an authentic learning opportunity to apply their classroom-developed theoretical engineering knowledge and concepts to practical application, which thereby enhances their understanding of previously acquired engineering knowledge and develop technical and non-technical skills (Guzelis, 2006; Mills, 2003).

WIL is a learning approach, where students work under expert supervision in real work environments, and thereby merge theoretical understanding with practice-based learning (Dressler & Keeling, 2011; Ferns et al., 2014; Fleming & Eames, 2005). According to Stirling et al. (2018), through WIL, students get an opportunity to combine theory and practice in an authentic work-learning environment, which helps to deepen their classroom-developed theoretical understandings and develop work-related competencies. In engineering education, WIL takes the form of two 400-hour work placements within an engineering related organisation.

WIL and PBL can be considered as approaches where learning happens as a social process, within a community of practice, where people are engaged in an activity, in a socially and culturally structured work environment. The learning process of WIL and PBL resembles Vygotsky's Sociocultural Theory (Vygotsky, 1978) as the learning of the mind, mental processes, human activities takes place at the social level, which leads to the overall learning process of the students.

METHOD

This study drew on sociocultural theory to investigate the combined learning linkages of engineering projects and work placements in engineering education in New Zealand. The research reported here is one outcome from a PhD project investigating learning relationships between WIL and PBL Data from both learning approaches was collected to investigate the development of engineering knowledge, technical, and non-technical skills, and employability skills in students.

Participants were the students from the School of Engineering at the University of Waikato, specializing in mechanical engineering. In order to obtain detailed views of the participants, an explanatory sequential mixed method (ESMM) research design was used, in which quantitative data collection occurred first followed by the qualitative data (Creswell, 2012). The qualitative data facilitated detailed explanation and understanding of the findings from the quantitative data.

Surveys were used as quantitative method (n=122), and interviews, observations, and document analysis as qualitative methods (n=10). The survey data was subject to descriptive analysis followed by inferential analysis. The interview data was subject to thematic analysis, which involved generating initial codes, followed by creating and reviewing themes. The study was granted ethics approval from the university's ethics committee (FEDU065/18).

FINDINGS AND DISCUSSION

The perceptions of participants indicated that engineering projects and work placements collectively provide and build engineering knowledge across each of the specific approaches. Engineering projects and work placements allowed students to apply and practice their classroom-developed theoretical knowledge in these approaches, which further enhanced their engineering knowledge and aided in development of various skills. These are best evidenced from the quotes present in Table 1.

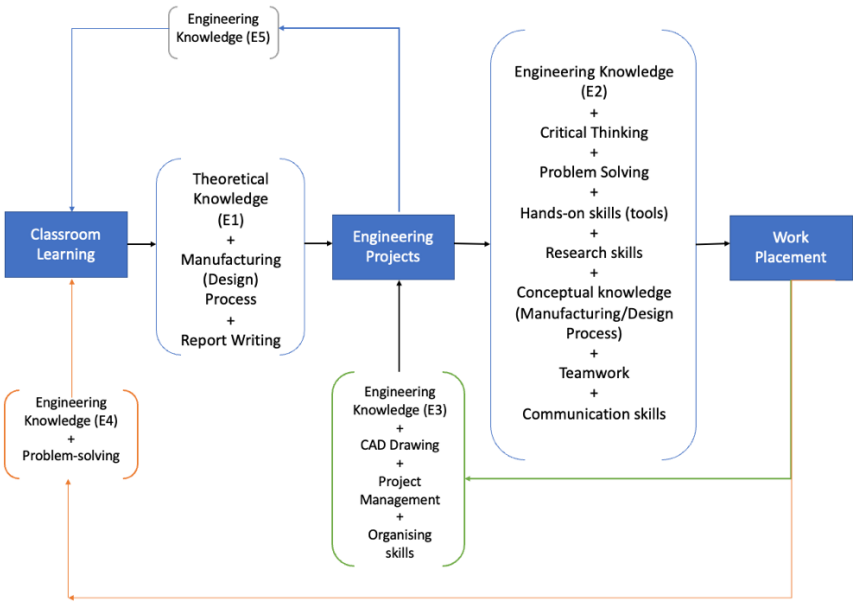
TABLE 1: Students quotes on engineering projects and work placements

	Engineering Projects	**Work Placements**
1.	The design project was very interdisciplinary, that is, it involved many mechanical aspects, electronics, and software aspects, and we had to integrate them all to make the machine work. This project helped us gain interdisciplinary knowledge and related practical experience (I.3E.3)	Work placement enhanced my time management, teamwork, basic and advanced tools skills, and developed my knowledge around health and safety observations (I.4E.2)
2.	Engineering projects in university are critical, as they help the students build initial relations between classroom-learned engineering knowledge and real-world working applications. I believe that projects did help a lot to bridge theory with practice (I.5E.3)	My work placement allowed me to work on designing materials via Solid Works and AutoCAD software. I enhanced my manufacturing and fabrication process knowledge. I worked on several projects during my placement there, which helped me enhance project management, critical thinking, and problem-solving skills. I was able to apply these learning outcomes from work placements onto my projects at university (I.4E.1)
3.	In the Research and Development project, I studied how to do research, look, and find solutions that already exist. This aided in the development of problem-solving and critical thinking skills. It even helped me in my work placement, as we also needed to solve a problem, and for that, we had to do intense research and apply problem-solving and critical thinking (I.5E.1)	In terms of skills, I developed time management, communication, critical thinking, and problem-solving skills, as we were subject to fabrication and design tasks, so that covered all these aspects which were not included in the university studies (I.4E.3)

Table 1 shows that engineering projects aided in the enhancing the previously develop classroom engineering knowledge through problem-solving the engineering problems, as evidenced by Participants I.3E.3, I.5E.3, and I.5E.1. This aligns with the study of Ruiz-Gallardo et al. (2011), Tse and Chan (2003), and Zhou (2012) who stated that engineering projects aided in the development of both theoretical and practical engineering knowledge, by problem-solving engineering problems with the help of classroom learned theories along with engineering practice. Similarly, Participants I.4E.2, I.4E.1, and I.4E.3 indicated that work placements aided in development of previously developed engineering knowledge, technical, and non-technical skills by working under supervision. This relates with the study of Mackaway et al. (2014) who indicates work placements offer a wide variety of knowledge that may enhance previously developed classroom knowledge, knowledge outside learning scope of classroom studies as work placements are mostly interdisciplinary in engineering.

These findings suggest students develop basic engineering knowledge from classroom learning that they then apply in their engineering projects, which further enhances their engineering knowledge and skills. These learning outcomes from engineering projects are then taken to their work placements, where students further develop their engineering knowledge and skills. These learning outcomes from work placements then flow back to students' classroom learning and engineering projects in their further study. As a result of analysis of these findings, the learning process between classroom, engineering projects, and work placements can be represented as shown in Figure 1 below.

FIGURE 2: Learning linkages between classroom, engineering projects, and work placements



Note: E1 – knowledge from classroom learning to engineering projects;
E2 – knowledge from engineering projects to work placements;
E3 – knowledge from work placements to engineering projects;
E4 – knowledge from work placements to classroom learning; and
E5 – knowledge from engineering projects to classroom learning.

In the classroom learning, students developed basic theoretical engineering knowledge (E1) and specific design and manufacturing knowledge. With this knowledge, students proceeded to their engineering project, where they applied classroom learned concepts and knowledge onto their projects. In engineering projects, students applied past engineering knowledge to real-world applications and thereby, linking engineering concepts and practical examples. This further enhanced their understanding of classroom learned engineering theories and their practical engineering knowledge. Additionally, students also developed specific engineering conceptual and procedural knowledge through these projects. This was in some cases additional to previously learned engineering knowledge. Figure 1 shows foundational engineering knowledge E1 was transferred from the classroom to engineering projects, and knowledge E5 such as 3D technical drawing that was taken back to classroom learning.

In engineering projects, students develop additional engineering knowledge E2 and E5, which included enhanced design and manufacturing knowledge, 3D drawing knowledge, and interdisciplinary engineering knowledge – electrical, electronics, and computer science.

Students were able to apply engineering knowledge E2 from engineering projects to work placements. The engineering knowledge E2 when applied onto work placements, enabled students to develop new engineering knowledges E3 and E4 through the use of workplace supervisors, colleagues, projects, tools, equipment, and machinery. The engineering knowledge E3 and E4 were then taken back to classroom and applied to engineering projects, building further understanding, applications, reflections, and experience.

Classroom theoretical learning provided foundational engineering knowledge, which students applied and reflected in their engineering projects. On the other hand, engineering projects provided new engineering knowledge that may not have been covered in classroom learning, but was dependent upon the interdisciplinary nature of the projects. This new engineering knowledge was then transitioned to classroom learning by students, for further application, reflection, and experience-building.

The engineering projects not only enhanced students' prior classroom knowledge and also developed practical and interdisciplinary engineering knowledge, and technical skills by performing problem-solving via practical experiments. These project outcomes may not be developed from classroom learning as the classroom lacks this aspect of practical learning. The challenge to provide a practical learning environment is overcome by engineering projects, where students develop practical engineering knowledge and skills. Seeing this relationship, the researcher interprets that engineering projects provided complementary learning support to classroom learning.

In addition, students took project-developed engineering knowledge and skills to their work placements, where they applied it to real-world applications. Thus, while working in an authentic engineering work environment, with authentic tasks and outcomes, under expert supervision and with help from professional colleagues, students further developed their engineering knowledge and skill development. Depending upon the interdisciplinary nature of the work placement, students may develop new engineering knowledge to which they were not exposed in their classroom learning nor engineering projects.

Students further developed technical and non-technical skills from work placements as indicated by Participants I.4E.3, I.4E.2, and I.4E.4 in Table 1. Engineering knowledge and skills that students did not

develop through classroom and engineering projects, were developed by undertaking work placements, thus work placements through authentic practise, aided in the development and enhancement of students' overall engineering knowledge and skills, thus work placements provided complementary learning support for students in addition to their engineering projects and classroom learnings.

CONCLUSION

This study concludes that there are aspects of complementary learning support between engineering projects and work placements. The classroom learning provides the basic foundational engineering knowledge to students, which is then applied into engineering projects. Engineering projects designs inter-disciplinary engineering problem based on the previous classroom learnings and accordingly encourages students to apply their previously developed engineering knowledge in problem-solving the project. Accordingly, engineering projects aided in developing necessary engineering knowledge, inter-disciplinary engineering knowledge, technical and non-technical skills. Therefore, engineering projects provide complementary learning support to classroom, by covering the learnings that may not be available in classrooms. The learning outcomes from engineering projects then is applied to work placements, where students apply their previously developed engineering knowledge to authentic work practices. Accordingly, students develop engineering knowledge, technical, and non-technical skills by applying engineering practice in work placements. Therefore, work placements provide complementary learning support to classroom and engineering projects, by providing learnings not available in classrooms and engineering projects. Additionally, engineering projects develops the necessary engineering knowledge and skills required for the work placements. Therefore, engineering projects appears to provide scaffolding of learning to work placements, by developing required knowledge and skills for successful shift for students to work placements. Overall, there are complementary learning linkages between theory, projects, and practice.

REFERENCES

Backa, L., & Wihersaari, M. (2015). Future engineering education: What competences are energy companies looking for when recruiting graduates with a Master of Science (Technology) Degree? *Engineering Education, 9*(1), 2-17. https://doi.org/10.11120/ened.2014.00022

Bokova, I. (2010). *Engineering: Issues, challenges and opportunities for development*. UNESCO. Retrieved 20th of Aug from http://unesdoc.unesco.org/images/0018/001897/189753e.pdf

Borikov, V. N., Kuimova, M., Burleigh, D., Trofimova, A., Dolgih, A. G., Ivanova, V. S., & Ignatovskaya, A. A. (2016). Problem-based teaching in engineering education. *MATEC Web of Conferences, 48*. https://doi.org/10.1051/matecconf/20164806006

Craig, K. (2017). *Transforming engineering education*. College of Engineering, Marquette University. Retrieved 18th August from http://www.ceri.msu.edu/wp-content/uploads/2010/07/Transformational-Engineering-Education.pdf

Creswell, J. W. (2012). Mixed methods designs. In P. A. Smith (Ed.), *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed., pp. 536-577). Pearson Education.

Dahms, M. L. (2014). *Problem based learning in engineering education* (Engineering Education, Issue. A. University.

Dressler, S., & Keeling, A. (2011). Benefits of cooperative and work-integrated education for students. In R. K. Coll & K. E. Zegwaard (Eds.), *International handbook for cooperative and work-integrated education* (2nd ed., pp. 261-276). World Association for Cooperative Education, Inc.

Felder, R. M., Woods, D. R., Stice, J. E., & Rugarcia, A. (2000). The future of engineering education: Teaching methods that work. *Chemical Engineering Education, 34*(1), 26-39.

Ferns, S., Campbell, M., & Zegwaard, K. E. (2014). Work-integrated learning. In S. Ferns (Ed.), *Work integrated learning in the curriculum* (pp. 1-6). Higher Education Research and Development Society of Australia (HERDSA Inc).

Fleming, J., & Eames, C. (2005, 03 November). Student learning in relation to the structure of the cooperative experience. *Asia-Pacific Journal of Cooperative Education, 6*(2), 26-31.

Guzelis, C. (2006). An experience on problem based learning in an engineering faculty. *Turkish Journal of Electrical Engineering, 14*(1), 67-76.

Hitt, J. (2010). *Problem based learning in engineering* (Teaching Excellence, Issue. USMA.

Loyens, S. M. M., Jones, S. H., Mikkers, J., & van Gog, T. (2015). *Problem-based learning as a facilitator of conceptual change* (Vol. 38). https://doi.org/10.1016/j.learninstruc.2015.03.002

Mackaway, J., Winchester-Seeto, T., Peach, D., Ferns, S., Campbell, M., Wallace, K., Ford, L. M., & Prior, J. (2014). *Inclusive practice in WIL [Work-integrated learning in the curriculum, HERDSA Guide: Ferns S (Ed)]* Research and Development society of Australasia - HERDSA, Australia.

Mills, J. E. (2003). Engineering education, is problem-based or project-based learning the answer? *Australian Journal of Engineering Education, 3*(2), 2-16.

Ruiz-Gallardo, J.-R., Castano, S., Gomez-Alday, J. J., & Valdes, A. (2011). Assessing student workload in problem based learning: Relationships among teaching method, student workload and achievement. A case study in Natural Sciences. *Teaching and Teacher Education, 27*, 619-627.

Stirling, A., Kerr, G., Banwell, J., MacPherson, E., & Heron, A. (2018). *A practical guide for work-integrated learning*. Higher Education Quality Council of Ontario.

Tse, W. L., & Chan, W. L. (2003). Application of problem-based learning in engineering course. *International Journal of Engineering Education, 19*(5), 747-753.

Vygotsky, L. S. (1978). *Mind in society: The development of higher mental processes.* Harvard University Press.

Zhou, C. (2012, 01/30). Learning Engineering Knowledge and Creativity by Solving Projects. *International Journal of Engineering Pedagogy (iJEP), 2*(1), 26-31. https://doi.org/10.3991/ijep.v2i1.1873

Advancing the development of literacy and numeracy within the work-integrated learning context

DAMON WHITTEN
Ako Aotearoa, New Zealand

INTRODUCTION

Developing the literacy and numeracy (LN) capabilities of adult learners has been a national strategic objective for New Zealand for two decades. The basis for this lies in a growing body of international and national data indicating that adults with low literacy and/or numeracy skills are increasingly disadvantaged in modern society (OECD, 2016), and that a substantial portion of New Zealand adults have low literacy and/or numeracy skills (MOE & MBIE, 2016). To meet this objective New Zealand developed a three-part LN infrastructure designed to integrate LN provision into a variety of adult education settings including foundation education, vocational training, and workplace training. The infrastructure included the New Zealand Adult Learning Progressions (TEC, 2008), a corresponding literacy and numeracy assessment, and a range of resources designed to support educators and learners. These three components were broadly categorised within professional development packages as 'Know the demands', 'Know the learner' and 'Know what to do' respectively.

The Adult Learning Progressions (ALPs) provided the framework for the infrastructure and were designed to be used in several ways. The first was to support the identification of learners' existing skills and knowledge. The second was to identify a learning trajectory that informed the design and delivery of learning sequences. A third feature was to "identify the numeracy (or literacy)-related demands of a specific workplace, community or personal task… "(TEC, 2008, p.4). Identifying the demands of a workplace required unpacking the LN skills and knowledge that were required to complete specific workplace tasks and then use these as objectives for teaching and learning sequences. This aspect, 'knowing the demands' has considerable good practice potential to inform LN provision in work-integrated learning (WIL) and therefore this paper focuses on this aspect. An example of analysing the demands of mixing two-stroke fuel is used drawing on data collected as part of a doctorate (Whitten, 2018).

THE BENEFITS OF IDENTIFYING THE LN DEMANDS OF WORKPLACE TASKS

There are four benefits of identifying the LN demands that link with good practice recommendations for the provision of literacy and numeracy in work-integrated learning environments (Whitten, 2020).

First, analysing the LN demands provides the basis for structured LN instruction rather than ad hoc approaches. Ad hoc LN activities are observed in New Zealand vocational environments (Whitten, 2018) and may be connected to a lack of clear curriculum expectations. In contrast to the compulsory sector there are no curriculum documents outlining the required literacy or numeracy skills learners require to competently perform specific tasks in a workplace context. Instead, a LN analysis enables programme designers and educators to analyse specific workplace tasks, unpack the required underpinning LN skills, identify constraints and opportunities for learning, and develop a sequenced learning plan with a hierarchy of outcomes.

The second benefit of a LN analysis is that it provides learners with a specific context for LN instruction. A context in which to posit LN provision is essential to engagement (Bakker & Akkerman, 2014). Without clear reasons for learning, many adult learners see topics such as LN as irrelevant (Dalby & Noyes, 2015). For example, Whitten (2018) found that many adult learners saw their numeracy lessons as unpleasant and disconnected from the vocation they were training for. However, once learners understand that the LN skills they are learning will equip them to complete a specific and important workplace task the learning takes on a meaningful purpose.

Third, a LN analysis enables tutors to appropriately sequence their instruction from simple to complex. Observations of vocational lessons find that tutors tend to teach 'how to do the task' rather than developing the learners' underpinning LN skills (Whitten, 2018). In general, less trained educators start instruction at too high a level rather than beginning instruction at a conceptually appropriate level and sequencing instruction (Coben et al., 2007). Beginning a lesson at too high a level has a disastrous effect on many adult learners who have experienced learning difficulties and developed negative beliefs. LN instruction often leads to anxiety, even fear, and can result in a range of avoidance strategies and disengagement (Whitten, 2018).

Fourth, a LN analysis can identify whether the tools and resources used to teach or carry-out a task act as affordances or interfere with the conceptual development of the learner. A resource that provides an answer to a problem, but offers no opportunity to develop LN skills, may interfere with learning unless introduced at the correct time. For example, the introduction of algorithms before the development of conceptual understanding interferes with the development of number skills (Pesek & Kirshner, 2000).

AN EXAMPLE OF IDENTIFYING THE LN DEMANDS OF A TASK

A review of employers and training providers revealed that horticulture trainees frequently had difficulties mixing liquids in ratios, and specifically mixing petrol and oil for two-stroke engines such as chainsaws and weed eaters. Not all workplace tasks are worth analysing due to their rarity or ease. The method used to identify this task for analysis was to observe a wide range of tasks being completed and interview those involved, and then organise the tasks by their complexity, frequency (daily, weekly or monthly), and the frequency with which they cause problems. This approach revealed that incorrect mixing of fuel for two-stroke engines was not particularly frequent (weekly) but was a complex numeracy task and the cause of much expense when incorrect. Recurring problems around staff incorrectly mixing two-stroke fuel mixes made it a prime area to address.

Once the workplace task had been identified as worth analysing, it was analysed using the Adult Numeracy Learning Progressions (TEC, 2008). The task of mixing a fuel mix required reading and understanding a ratio (e.g., 50:1) and therefore mapped on the Proportional Reasoning Strategy Progression. In terms of what step on the progression it sat, the task required the use of multiplicative strategies to ensure the correct amount of oil was added to various quantities of petrol. Unsurprisingly it sat at the highest step, step six. The task also required an understanding of volume and converting within measurement systems (litres and millilitres), placing it at step five of the Measurement Progression.

Further analysis revealed more complexities. The ratio of petrol and oil mixes are 'commensurate', in that they are expressed as the same unit, such that 50:1 refers to 50 millilitres of petrol to 1 millilitre of

oil. Adult interactions with rates and ratios are often in contexts in which the units differ in type, or are non-commensurate (Chelst, Özgün-Kocaet & Edwards, 2014). For example, a car's fuel efficiency is measured as kilometres travelled per litre of petrol. Even more problematic is that most pesticides and herbicides use different units to measure the same attribute, liquid; for example, 10ml of weed killer to 1L of water. Chelst et al. noted this confusion and posited commensurate ratios, specifically liquids as the most complex.

Interpreting fuel mix ratios as having different units accounts for most of the errors in fuel mixes. For example, a fuel ratio of 50:1 is often misinterpreted as 50ml of oil to 1 litre of petrol, rather than as 50ml of petrol for every 1ml of oil. For example, these responses were taken from Whitten's (2018) observation of agriculture learners when asked what 25:1 means:

> *Harley*: Twenty-five mls to a litre…If it's wrong, then God bless my soul.
> *Andrea*: Two parts. And that one there, [points to 25:1] is like twenty-five mls to one litre.

Both Harley and Andrea interpreted the ratio incorrectly as expressing different units, millilitres and litres. Mixing the fuel in this ratio would result in 25ml of oil being added to each litre of petrol rather than 40ml. This is only 62% of the required amount and enough to damage or destroy equipment.

Knowing that the misinterpretation of the ratio as representing different units was causing errors, the next step was to review the resources used to support learners (see Figure 1). The two-stroke table was widely used in the sector as a teaching tool and has obvious benefits for completing the task. Yet it reinforces the unit misunderstanding by representing fuel mix ratios as different units. For example, a learner will look at how many petrol litres are required and add millilitres to this, thus reinforcing the misunderstanding that the numbers in a fuel mix ratio represent different units.

It should be emphasized that the table should not be eliminated from instruction; instead, it should be introduced at the appropriate phase in a learning sequence once conceptual understanding has been established.

FIGURE 1: Chart used to teach two-stroke fuel mixes.

Ratio petrol-oil	Litres of fuel					
	1L	2L	5L	10L	15L	50L
15:1	66	133	335	670	1,000	3,340
20:1	50	100	250	500	750	2,500
25:1	40	80	200	400	600	2,000
30:1	33	67	165	335	500	1,700
40:1	25	50	125	250	375	1,250
50:1	20	40	100	200	300	1,000
	Millilitres of oil to add to fuel					

Once the analysis was complete a learning sequence was designed that followed the learning trajectory presented in the numeracy ALPs with the starting point informed by learners' assessment results. Beginning concepts addressed what a ratio represented at a level able to be visualised, for example 2:1 means for every two of these items we add 1 of another. This was represented with manipulatives (paper squares and coloured cubes) and advanced until learners were creating their own ratios and increasing these multiplicatively to find values. Coloured cubes set the conceptual groundwork for volume and

eventually led to one litre being represented as 1,000 millilitres (a litre was represented as cube made up of 1,000 smaller cubes as a visual support).

Following sessions explored 50:1 as 50ml of petrol to 1ml of oil, how many 50mls are in one litre, and therefore how many ml of oil needs to be added to 1litre. In this way, all learners developed an understanding of ratio and were able to describe their own process for finding the quantity of oil to add to various litres of petrol. When the learners were presented with the fuel-mix chart they checked to see whether the quantities were correct (it turned out some were not).

CONCLUSION

Adult learners with literacy and numeracy needs are entering the WIL environment and numerous studies suggest the trend may be increasing. The WIL community has an opportunity to create an effective learning environment that addresses these requirements. One approach is to incorporate effective aspects of the NZ literacy and numeracy infrastructure, specifically analysing the literacy and numeracy demands of workplace tasks. A thorough task analysis enables the required literacy and/or numeracy concepts, skills, and knowledge to be identified, developed into an effective learning sequence, and be embedded within a meaningful context. Additionally, common errors and potentially interfering resources can be identified and sequenced effectively into the learning design. By focusing on the development of this practice, WIL programmes can equip learners with the specific skills they need to thrive in their chosen vocations.

REFERENCES

Bakker, A., & Akkerman. S. (2014). A boundary crossing approach to support students' integration of statistical and work-related knowledge. *Educational Studies in Mathematics, 86*, 223-237.

Chelst, K., Özgün-Kocaet, A., & Edwards, T. (2014). Rethinking ratios, rates and percentages. *Mathematics Teaching, 240*, 26-28.

Coben, D., Brown, M., Rhodes, V., Swain, J., Ananiadou, K., Brown, P., ... Storey, V. (2007). *Effective teaching and learning: Numeracy*. London: National Research and Development Centre for Adult Literacy and Numeracy.

Dalby, D., & Noyes, A. (2015). Connecting Mathematics Teaching with Vocational Learning. *Adults Learning Mathematics: An International Journal, 10*(1), 40-49.

Ministry of Education and Ministry of Business, Innovation and Employment. (2016). *Skills and Education: Survey of adult skills*. Wellington, New Zealand: Author.

OECD. (2016). *Skills Matter. Further results from the Survey of Adult Skills*. Paris: OECD Publishing.

Pesek, D. D., & Kirshner, D. (2000). Interference of instrumental instruction in subsequent relational learning. *Journal for Research in Mathematics Education, 31*, 524–540.

Tertiary Education Commission. (2008). *Learning progressions for adult numeracy*. Wellington, New Zealand: Author.

Whitten, D. R. (2018). *Understanding and enhancing adult learners' beliefs about mathematics*. Doctoral Thesis. University of Waikato: Hamilton, New Zealand.

Whitten, D. (2020). *Adult Literacy and Numeracy Effective Practice Model*. Research report: Wellington: Ako Aotearoa.

Threads of the past informing the future: Alumni perspectives

YVONNE I. WOOD
Auckland University of Technology, New Zealand
The University of Waikato, New Zealand
KARSTEN E. ZEGWAARD
WENDY FOX-TURNBULL
The University of Waikato, New Zealand

INTRODUCTION

Ka mua, ka muri—walking backwards into the future—is to let the past guide the future. Taking a student centric view of work-integrated learning (WIL), this research focuses on the need to understand students' perceptions of quality WIL. WIL is inherently authentic as a "pedagogical approach that situates learning tasks in the context of future use" (Herrington et al., 2014, p. 401), in a learning context that is real to both the student and the professional context (Turnbull, 2002). Recent alumni have the unique position of being able to reflect on their recent student experiences whilst also understanding industry perspectives. This paper presents one phase of initial findings from a larger study that will inform hospitality and tourism WIL practice and may have wider applicability. According to alumni, curriculum-wide industry-connected WIL learning and development would support students' pursuit of satisfying WIL experiences.

METHODS

The research reported here is an initial analysis of the phase one alumni data, derived from a larger research project designed with four participant cohorts (alumni, students, industry mentors, and academic supervisors). The research used a mixed methods approach with two phases (an alumni phase, followed by a student phase with industry mentors and academic supervisors targeted for triangulation). The tools used to gather data were a survey, semi-structured interviews, and document analysis. The 219 alumni survey responses were used to purposefully select the four interview participants, applying the 'preliminary quantitative input design' or 'participant variant design' of mixed methods research (Creswell & Plano Clark, 2018).

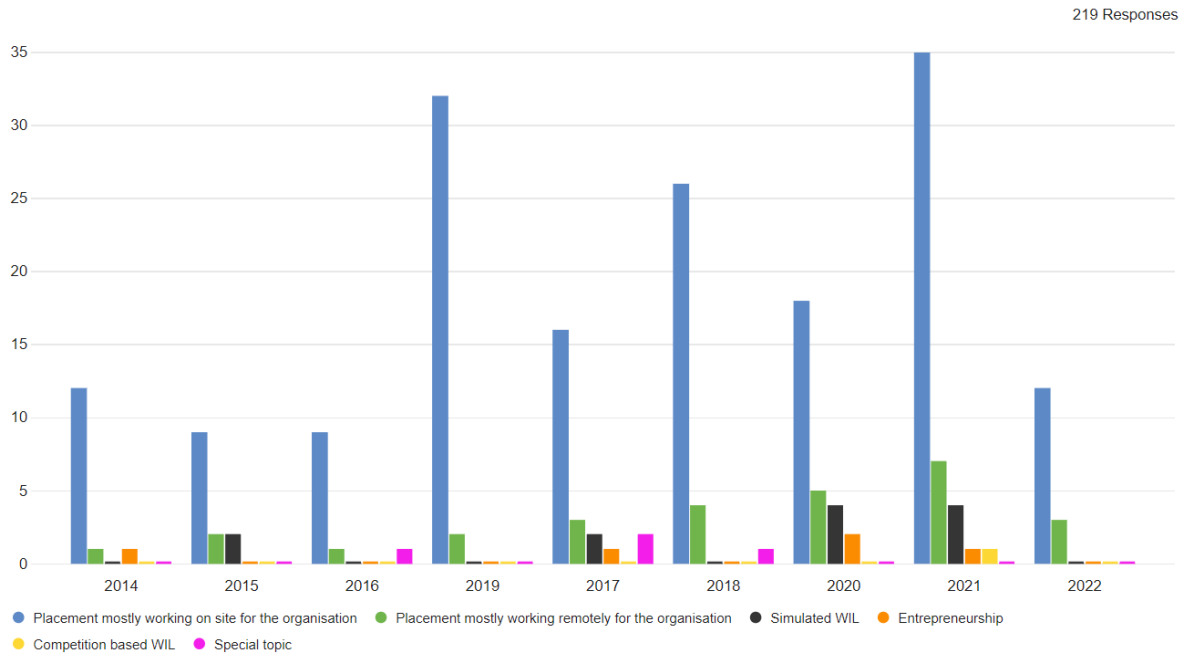
The survey questions build on previous research focused on WIL preparation and quality learning (Cox, 2015; Kaider et al., 2017; McRae et al., 2018; Smith et al., 2014). Ethical approval was obtained from both the University of Waikato Education Research Ethics Committee (ref: FEDU034/21) and the Auckland University of Technology Ethics Committee (AUTEC Reference number 21/275).

RESULTS AND DISCUSSION

The results from the initial alumni data analysis are presented together with the discussion to show the developmental stage of this research. Preliminary analysis found; alumni identify with a broad range of WIL experience types (from 2014–2022), high satisfaction with the WIL experience (7% low satisfaction), and a positive correlation between overall satisfaction and general WIL preparation.

Additional types of WIL experiences were offered during the first two years of the COVID-19 pandemic between 2020–2022. Interestingly, pre-COVID alumni (from 2014–2019) also self-reported a range of WIL experiences. Of the 219 participants, the majority 77% (n=169) had placements where most of their work was on-site with the organisation, with remote placements accounting for 13% (n=28), followed by 2% (n=5) simulated WIL, and special topic and competition based WIL accounting for the final 2% (n=5) shown in Figure 1

FIGURE 1: Distribution of WIL type reported by alumni from 2014 to 2022.



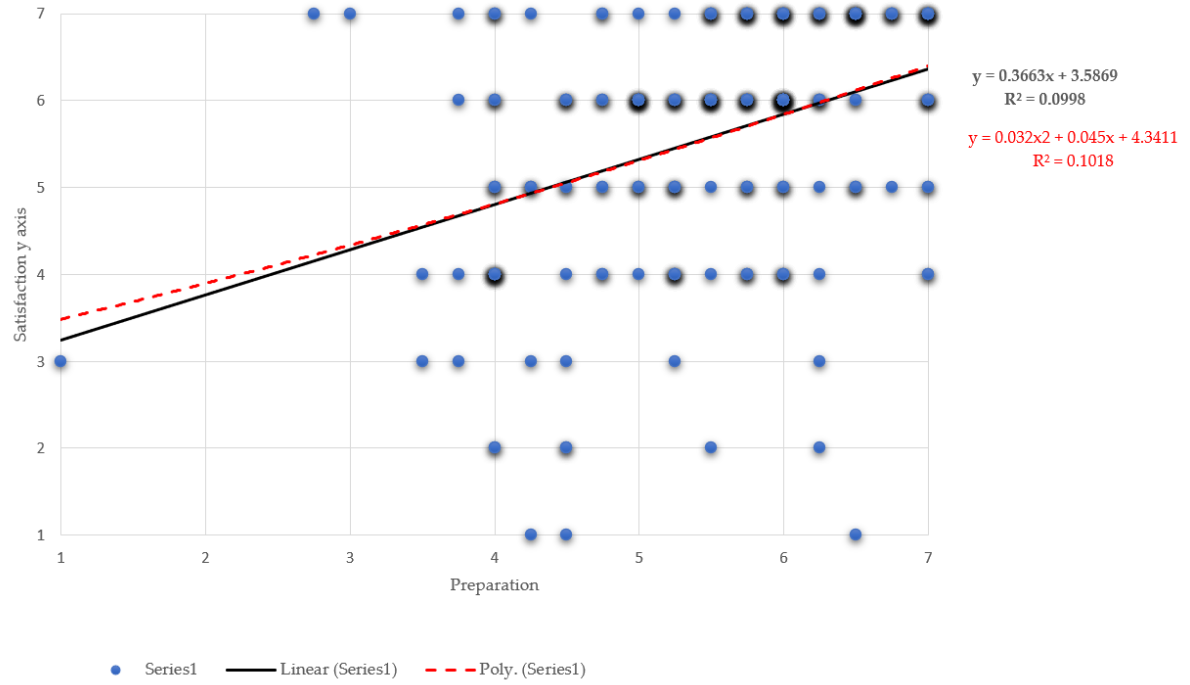
Several factors may have influenced the way in which this question was answered, including the potential inconsistency of results from self-administered questionnaires (Cohen et al., 2017) and the need for clear WIL definitions (Sachs et al., 2016; Wood et al., 2020) focused on the practice rather than the intentions of WIL (Zegwaard et al., 2023). One participant captured the essence of this challenge by stating "I had no idea what simulation was [A152]". This participant further described challenges surrounding WIL including uncertainty and the desire for a WIL opportunity that would be well aligned to the learning outcomes. Although there has been steady growth in different models of WIL, the need for clarity for all stakeholders is vital (Wood et al., 2020; Zegwaard et al., 2023; Zegwaard & Rowe, 2019).

Satisfaction and Preparation

Satisfaction with the WIL experience and WIL preparation from the alumni perspective may provide insights into quality WIL learning experiences. Overall WIL satisfaction was reported by 217 participants on a 7-point Likert (very poor to very good) with 170 (78%) positive results, 31 (15%) at the mid-point, and 16 (7%) below average satisfaction. The more in-depth preparation questions showed reasonably consistent results. WIL preparedness was rated on the same 7-point Likert (across the four domains of professional, personal, academic, and procedural preparation). These four preparation results had similar trend lines, and were subsequently averaged and analysed collectively in relation to

satisfaction (Figure 2). The correlation between preparation and satisfaction, shows a weak positive regression ($r^2 = 0.09$, $p = <0.001$).

FIGURE 2: Correlation of alumni's average preparation by overall WIL satisfaction.



From the qualitative data alumni shared insights about WIL preparation ranging from noticing the last-minute nature of "students struggling to find a place to work to do their WIL [A056]", to challenges that arose even with prior planning "I thought I had it secured because I had this job [A204]" or the desire to gain different industry experience beyond their current job "I do remember one day just being like, oh my God, this is starting in a month or two and I don't have anywhere to go [A003]." The pressure and timing to secure a placement also impacted students during COVID:

> I was still undecided on which one to do, because my initial plan was to go in and get into the work with a [local] travel agency. But then they didn't come through. I was still holding on to that [A152].

This pressure highlighted challenges in preparing for WIL during uncertain times, especially from traditional placement-based industries (Bilsland & Nagy, 2020). Alumni also reported a sense of security when there was a strong connection between the university and their organisation, feeling reassured because they knew their assessments would align with academic requirements.

Alumni encouraged students to "remember that it's not a job, it's a learning experience [A003]". That learning from the environment is paramount: "I genuinely feel there was so much to learn once you're in the placement… if you're constantly stressing about your assignment… you're missing out potentially on what's actually happening right there [A204]". Learning during WIL can be expanded by talking to people more broadly and "not just within tourism [A152]" thereby expanding transferable skills awareness prior to graduation (Jackson, 2015; Pennington & Stanford, 2019).

Satisfaction as a measure of WIL success is not without challenges. Ruhanen et al. (2013) noted that while students had differences in satisfaction with new types of WIL, many reported it as their most valuable learning experience. In this study, the survey respondents may have been skewed towards being satisfied with their experience overall. The mixed methods 'preliminary quantitative input design' or 'participant variant design' approach (Creswell & Plano Clark, 2018) was used to purposefully select interview participants from a range of different experiences, to gain insights into positive, negative, and overall learning insights during WIL, exemplified in the following participant statement "it would have been better to go in unpaid … I should have gone in and really just shadowed her when she was doing the management side of things [A003]".

The overall survey preparation question was followed with an in depth set questions of reduced 4-point Likert (never, seldom, sometimes, often) for each domain (Table 1).

TABLE 1: Summary of satisfaction, general preparation, and preparation items with the lowest mean.

Question	Min	Max	Mean	Std Dev	Median	Count
How would you rate your satisfaction with your WIL experience?	1	7	5.58	1.38	6	217
Thinking about your preparation for WIL [across the four domains] how would you rate your:						
professional preparation (career skills focus)?	1	7	5.44	1.19	6	217
participation in the WIL preparation process?	1	7	5.59	1.15	6	217
personal preparation (strengths & confidence)?	1	7	5.45	1.23	6	217
academic preparation (theories & concepts)?	1	7	5.47	1.19	6	217
How often did you have the following taught experiences during the degree?						
classes with workplace site visits or field trips	1	4	2.21	1.07	2	219
classes teaching industry focused software	1	4	2.64	0.96	3	217
How often did you put into practice your university learning:						
in simulated settings	1	4	2.74	0.9	3	217
in simulated settings that were authentic	1	4	2.86	0.9	3	217

The results across the 4-point Likert preparation questions followed a similar response pattern with a mode of 'sometimes', followed by 'often', and the negative rated options of 'seldom' and 'never' being less than the sum of 'often', indicating the strength of the positive reporting. The questions that showed an increase in negative responses were "classes with industry specific software" and the general "use of simulated settings to practice university learning", these questions had the same mode of 'sometimes', but was followed by the negatively weighted 'seldom'. In contrast, classes with site visits showed a clear negative trend with 'never' being the most common response (Figure 3).

FIGURE 3: Negative trend data example.

Preparation and Classes with Site Visits

Participants articulated the need for workplace site visits and greater industry knowledge:

> I think that the university does not realise how unaware we are as students about the industry … not once did I see a SWOT analysis… I feel like we're being told all these theory things, but not the actual things that are happening out there [A204].

Industry awareness was encouraged: "get them [students] out into the field [A152]" and that any part of the industry could provide learning, "realistically, what they [5-star] do is pretty much exactly the same as what other restaurants will be doing just down the road [A056]".

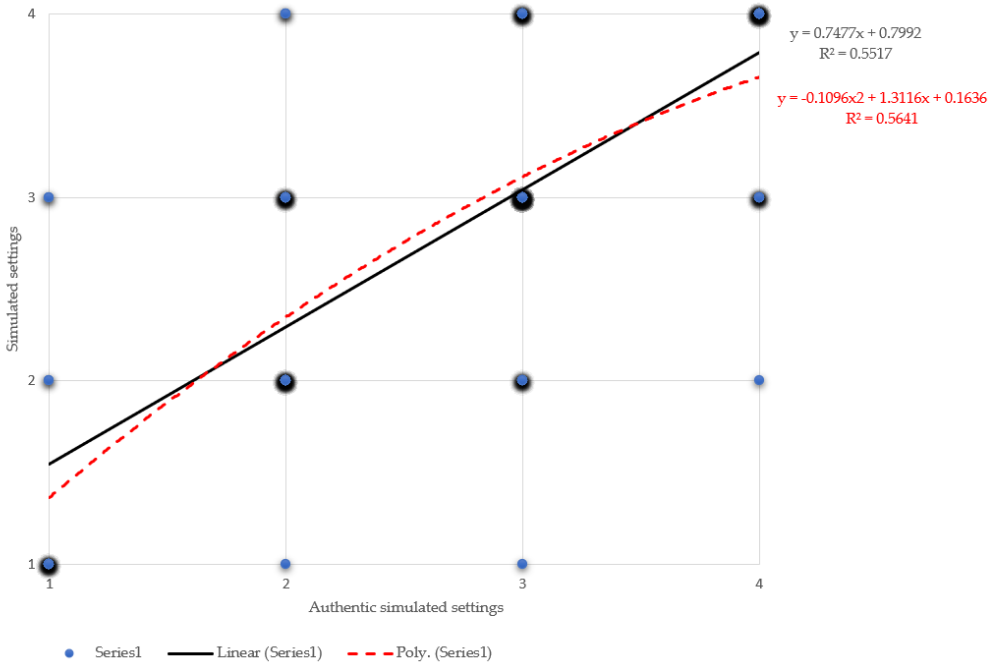
While there are different factors that may have limited student industry exposure, there is scope to create more overt industry connections with authentic classroom experiences (Kaider et al., 2017). Alumni also encouraged students take independent extracurricular action to connect with industry:

> since my first year here, we were always told, to get out there, get a part time job and do something, you know, experience the workforce. It would not only benefit you and also benefit your studying at the same time, it would make you understand how the industry works [A056].

Preparation and Simulated Settings to Practice University Learning

While not all students experienced simulated learning prior to WIL, the data shows that when simulation was used, it was considered an authentic learning experience (Figure 4). This aligns with simulation being a technique "to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion" (Gaba, 2004, p. i2) connecting to the earlier point that students would benefit from greater awareness of actual workplace settings to support their preparation for WIL. The facets of authenticity can only be recognized by students when they have personal knowledge of professional practice norms and workplace awareness (Turnbull, 2002).

FIGURE 4: Correlation between frequency of simulated learning by authentic simulated learning.



CONCLUSION

Alumni valued knowing more about the industry and recommended making stronger connections between learning tasks and industry throughout the curriculum, prior to WIL. Furthermore, learning would be enhanced by declaring relevant in-class activities as WIL preparation. With the broad range of majors and non-linear progression into industry, some students were unaware of specific courses that could have been beneficial for their careers, questioning why such courses were not offered. Alumni that had prior industry experience noted the usefulness of making connections throughout their study. Whereas students without experience, questioned the lack of explicit explanations.

With hindsight, alumni recommend creating a tighter weave of WIL enhancing activities throughout the curriculum, suggesting WIL preparation starts in Year One, Semester One. A greater understanding of industry in context through site visits or prior work was endorsed, the need for which was identified by a clear negative trend. In addition to learning about management theory, there is a need to explicitly learn about the day to day and entry level realities of industry.

It was noted that more satisfying WIL experiences were created when strong industry partnerships with the university were evident, consequently students felt more confident and reassured. Increased industry awareness could facilitate students developing a clearer professional identity, leaning into the whakataukī - to know who you are and where you are from, then you will know where you are going - Inā kei te mohio koe ko wai koe, i anga mai koe i hea, kei te mohio koe. Kei te anga atu ki hea.

REFERENCES

Bilsland, C., & Nagy, H. (2020). Virtual internships and work-integrated learning in hospitality and tourism in a post-COVID-19 world. *International Journal of Work-Integrated Learning*, *21*(4), 425–437.

Cohen, L., Manion, L., & Morrison, K. (2017). *Research methods in education*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/aut/detail.action?docID=5103697

Cox, S. (2015). *What makes a successful hospitality graduate in New Zealand? Key stakeholder perspectives* [Doctoral thesis, Auckland University of Technology]. https://openrepository.aut.ac.nz/handle/10292/9278

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (Third edition). SAGE Publications, Inc.

Gaba, D. M. (2004). The future vision of simulation in health care. *BMJ Quality & Safety*, *13*(suppl 1), i2–i10. https://doi.org/10.1136/qshc.2004.009878

Herrington, J., Reeves, T. C., & Oliver, R. (2014). Authentic learning environments. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (pp. 401–412). Springer. https://doi.org/10.1007/978-1-4614-3185-5_32

Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, *40*(2), 350–367. https://doi.org/10.1080/03075079.2013.842221

Kaider, F., Hains-Wesson, R., & Young, K. (2017). Practical typology of authentic work-integrated learning activities and assessments. *International Journal of Work-Integrated Learning*, *18*(2), 153–165.

McRae, N., Pretti, T. J., & Church, D. (2018). *WIL quality framework: A white paper*. University of Waterloo. https://uwaterloo.ca/centre-advancement-co-operative-education/research-publications/wil-quality-framework

Pennington, A., & Stanford, J. (2019). *The future of work for Australian graduates: The changing landscape of university-employment transitions in Australia* (p. 107). The Centre for Future Work at the Australia Institute.

Ruhanen, L., Robinson, R., & Breakey, N. (2013). A tourism immersion internship: Student expectations, experiences and satisfaction. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *13*, 60–69. https://doi.org/10.1016/j.jhlste.2013.02.001

Sachs, J., Rowe, A. D., & Wilson, M. (2016). *2016 good practice report—Work integrated learning (WIL)*. Australian Government. http://nla.gov.au/nla.obj-398424186

Smith, C., Ferns, S., & Russell, L. (2014). *The impact of work integrated learning on student work-readiness. Final Report*. http://hdl.handle.net/20.500.11937/55398

Turnbull, W. (2002). The place of authenticity in technology in the New Zealand curriculum. *International Journal of Technology and Design Education*, *12*(1), 23–40. https://doi.org/10.1023/A:1013056129283

Wood, Y. I., Zegwaard, K. E., & Fox-Turnbull, W. (2020). Conventional, remote, virtual and simulated work-integrated learning: A meta-analysis of existing practice. *International Journal of Work-Integrated Learning*, *21*(4), 331–354.

Zegwaard, K. E., Pretti, T. J., Rowe, A. D., & Ferns, S. J. (2023). Defining work-integrated learning. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge International Handbook of Work-Integrated Learning* (3rd ed., pp. 29–48).

Zegwaard, K. E., & Rowe, A. D. (2019). Research-informed curriculum and advancing innovative practices in work-integrated learning. *International Journal of Work-Integrated Learning*, *20*(4), 323–334.

.

Work-Integrated Learning New Zealand
2023 Refereed Conference Proceedings

ISBN: 978-0-473-67576-9