Chapter 2
Beyond Discipline-Based Work-Integrated Learning Placements in Engineering and Science

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ABSTRACT

Drawing on the work-integrated learning (WIL) literature, particularly that which is STEM-related (science, technology, engineering, and mathematics), and on the Australian census data, it was found that many Australian engineering and science graduates from Generation Y (and prior) work outside of their fields of study, and that many of them will have had to if they wished to work at all. For Generation Z (and beyond) students, it is proposed that a broader conception of WIL in science and engineering is needed if they are going to be adequately prepared for post-graduation employment. This chapter details a program example of how an out of field WIL placement, offered as an elective unit, can be implemented for engineering, science (and other contexts) without requiring major changes to existing curricula. This chapter also contributes to the very limited existing literature on out-of-field WIL.

INTRODUCTION

It is largely an article of faith that work-integrated learning (WIL) offers a range of benefits to STEM (science, technology, engineering and mathematics) students, including enhanced academic performance, improved graduate employability, and increased likelihood of employment (Artess et al., 2017; Surridge, 2009; Wilton, 2012). Similarly, there are many examples in the literature offering advice on how to address the supposed particular needs of different generation cohorts (X, Y, Z, etc.) of students in higher education, including in relation to WIL activities (Pilgrim, 2011; Rothman & Sisman, 2016; Visser et al., 2017). This chapter is not an assessment of the fundamental value and purpose of WIL in

DOI: 10.4018/978-1-7998-6440-0.ch002

STEM education, nor is it a critique of the concept of generations; both of these things can be found elsewhere in the research literature.

Instead, in this chapter, a pragmatic approach is taken as to how WIL can best prepare students from generation Z for the world of work. The focus is on the two STEM disciplines in Australia with the largest numbers of graduates – engineering and science. Recent national and international investigations relating to WIL in STEM are considered and the importance of WIL in engineering and science education is acknowledged. The evidence regarding where generation Y bachelor graduates from these programs actually work is examined. The Australian national census, which includes information about the educational qualifications and occupation for virtually the entire population provides a key reference point in this regard. Understanding this offers valuable insights for those with a responsibility for aspects of university curriculum design, including the purpose and place of WIL in STEM field study programs for those generation Z students currently at university, or who will arrive to study in the next decade.

Responding to the finding that many Australian engineering and science graduates work out of the discipline that they studied, this chapter makes the case for a broader conception of WIL in STEM that encompasses out of field WIL placements as inherently valuable. This chapter presents the details of one possible model for how an out of field WIL placement, offered as an elective unit, can be implemented for engineering, science (and other contexts), without requiring major changes to existing curricula. The description includes details of the rationale, implementation, assessment and student take-up of the out of field WIL placement option. Participation in WIL is a significant undertaking for all parties involved – students, industry and universities. This chapter also proposes methods for the evaluation of the contribution of WIL to both student employability and graduate employment. Additionally, as this chapter looks forward to the career prospects of generation Z students currently at or approaching university study, some consideration is given to emerging issues related to WIL.

The central aim of this chapter is a critical reconsideration of the WIL types that STEM programs traditionally endorse, for the purpose of suggesting a revision of the conception that traditional, discipline-specific placement-based WIL experiences are the only viable and valuable theory-to-practice model of work-integrated learning valued in engineering and science education. Finally, at the time of writing, it is impossible to ignore the context of the Covid-19 pandemic in matters relating to higher education. Many aspects of university education have been transformed almost overnight. The practicalities, and even possibilities, of different forms of learning and teaching have been crystallised through necessity, including WIL. The circumstances of Covid-19 add an urgency to the need to reconsider the perception of what counts when it comes to WIL placements.

THE IMPORTANCE OF WIL IN ENGINEERING AND SCIENCE

Graduate employability is now a key strategic concern for universities in many countries, and particularly in Australia (Collis, 2010; Johnson et al., 2019; Rayner & Papakonstantinou, 2015). Employability is defined in a multitude of ways (Mason et al., 2003), with many common definitions featuring a set of skills that will enhance the labour market success of graduates, e.g., "A set of achievements – skills, understandings and personal attributes – that make individuals more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy" (Yorke & Knight, 2006, p.3). Smith (2016) notes the emergence of the concept of graduate employability from the graduate attributes agenda that held sway in Australian higher educa-