Evaluating the WIL experiences of engineering and built environment students

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Abstract: This investigation explores the experiences of engineering and built environment students during their work experience programs. The aim was to understand the demands, engagements and outcomes of learning through work experience activities. An internet-based survey was administered to all students in the Faculty of Engineering and Built Environment at the University of Newcastle, Australia. This paper reports on responses to quantitative questions (Qualitative data will be reported on elsewhere). 201 students responded, the majority of whom were construction management students. Only a quarter of respondents were not working, indicating that students have ample opportunity to relate their studies to the world of work. This paper reports on the sources of information students used to find out about their industrial placements and how useful these were. The findings reported here are preliminary and will be supplemented in due course with those of the qualitative data to provide a fuller picture.

Context

This paper describes one of 20 investigations currently being conducted as part of the 2009 ALTC National Teaching Fellowship for Work Integrated Learning. The intention of the fellowship is to "generate, embed and widely disseminate a set of evidence-based approaches for the effective design and enactment of work integrated learning (WIL)" (Billett, 2010). Newcastle University is one of six universities participating in the project, and this paper reports on one of the case studies from the University. It describes the experiences of industrial placements of undergraduate students in the Faculty of Engineering and Built Environment (FEBE) at Newcastle University.

WIL at Newcastle University

Newcastle University has recently embarked on an initiative to provide all students with opportunities to engage in WIL. The University's definition of WIL is that it is "…the term used to describe educational activities that integrate theoretical learning with its application in a workplace, profession, career or future employment." WIL is "being made available for a broad range of undergraduate programs and can be recognised through assessment and credit. The WIL experience can be off or on campus, real or simulated, depending on the discipline area, but must involve clearly stated outcomes, assessment and be consistent with quality teaching and learning." (The University of Newcastle, 2010b)

WIL in the Faculty of Engineering and Built Environment

FEBE offers a comprehensive range of undergraduate degrees in engineering, architecture, building, surveying, industrial design and computer science. Most of these programs require students to complete periods of industrial experience as part of their undergraduate studies. These placements are

mandatory requirements of the professional bodies that accredit these degrees. For example, the Australian Institute of Building requires construction management students to complete 80 days of industrial experience (AIB, 2006) and Engineers Australia (the institution that accredits the engineering professions in Australia) requires engineering students to complete 12 weeks of industrial experience (A. Bradley, 2008). The processes and procedures FEBE currently employs to facilitate these placements are the subject of the survey reported here.

Facilitating and assessing industrial placements

FEBE students identify and arrange their own industrial placements. To assist them, they are encouraged to make use of the University's Careers Service and, depending on their discipline, provided with lists of employers to approach. Students usually complete their placements during University vacations, but some study and work simultaneously (For example, the construction management degree is offered online to distance learners. Many of them are of mature age and in full-time employment). Students may consult university staff about placement opportunities, but staff generally play no further part in placements until students submit evidence of their experiences. A range of documentation is called for in this regard, with some degree programs requiring students to submit formal reports and others simply requiring employers to confirm the duration of placements and the nature of the work students completed.

An exception is students on who obtain UNISS scholarships (The University of Newcastle, 2010a). These students are recruited though advertisements and selected based on interviews. Their industrial experience activities are assessed through a 'Scholar Placement Report' and a 'Scholar Placement Evaluation'. In addition, representatives from sponsoring organizations are asked to complete a 'Sponsor Placement Evaluation'.

Our survey

University wide focus on WIL and participation in the ALTC WIL Fellowship provided opportunities to review the manner in which industrial placements were facilitated, administered and assessed in FEBE. A survey was conducted "to elicit baseline data about FEBE students' experiences of their industrial placements and WIL. These will inform proposals for developing pragmatic and innovative approaches to facilitating these activities, and to improve student learning within them." (Sher, 2010). It was administered between 6th and 24 May 2010 and delivered electronically through SurveyMonkey ("SurveyMonkey," 2010). It comprised 13 quantitative and 7 qualitative questions. Only quantitative data are reported in this paper. An analysis of the qualitative data will be prepared for publication in due course.

3521 students were invited to participate (951 from the School of Architecture and Built Environment and 2570 from the School of Engineering and the School of Electrical Engineering and Computer Science). 210 students responded, a response rate of 6%.

Demographics

83.7% of the respondents were male. The majority (73.8%) was aged between 20 and 29 years with 16.7% (35) being over 30 years of age. About half of them had started their degrees one (22.9%) or three (26.9%) years previously. 11 students (5.5%) had started their degrees six or more years before.

Over a third of respondents (36%) were enrolled in the Bachelor of Construction Management (Building) program (see Figure 1). Most double degree engineering programs, software and telecommunications engineering degrees and industrial design programs had few respondents (under 2%) and these are represented collectively as "Other" in Figure 1. There were no respondents from four engineering programs.

Students industrial experience / WIL

The main exposure of two-thirds (67%) of the respondents to the world of work was as a student rather than as an employee of a company (see Figure 2). However, 30% of respondents were working full-time, either in a field related to (27%) or not related to (3%) their studies, whilst 40% were working

part-time in a field related or unrelated to their studies (27% and 18.5% respectively). A quarter of respondents were not working at all.
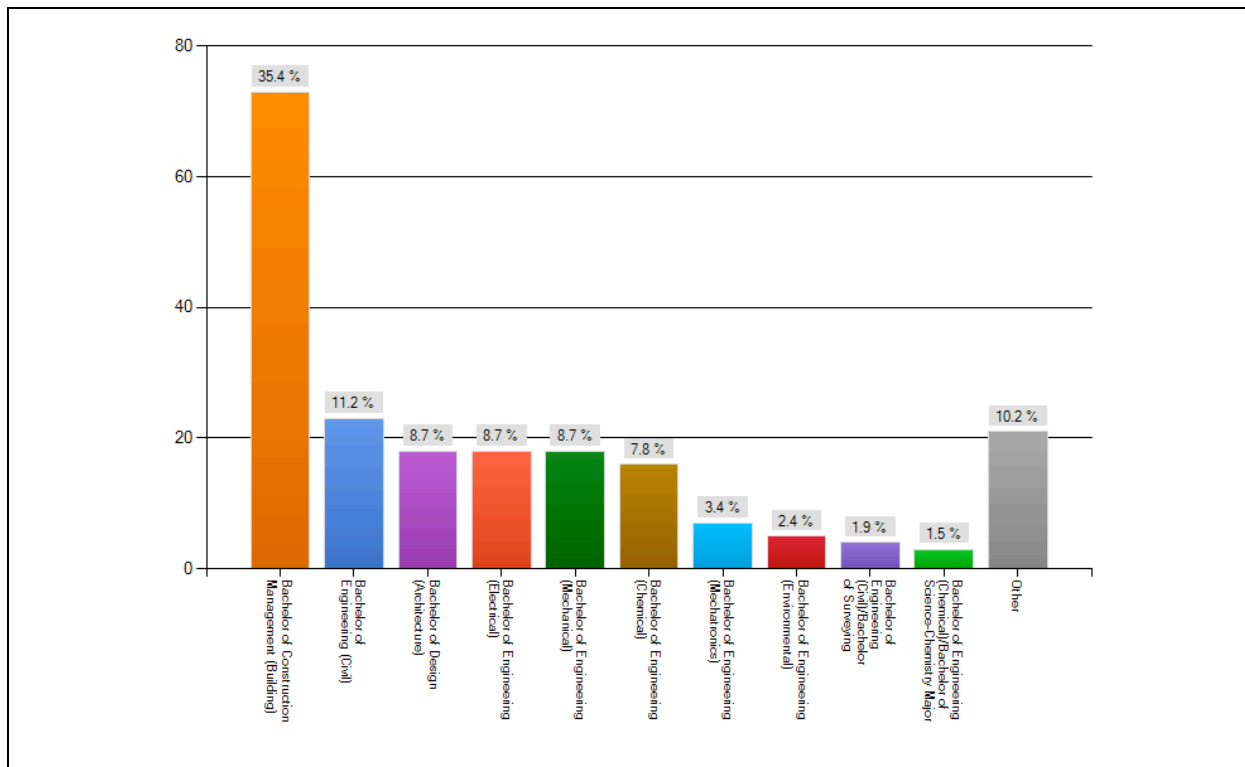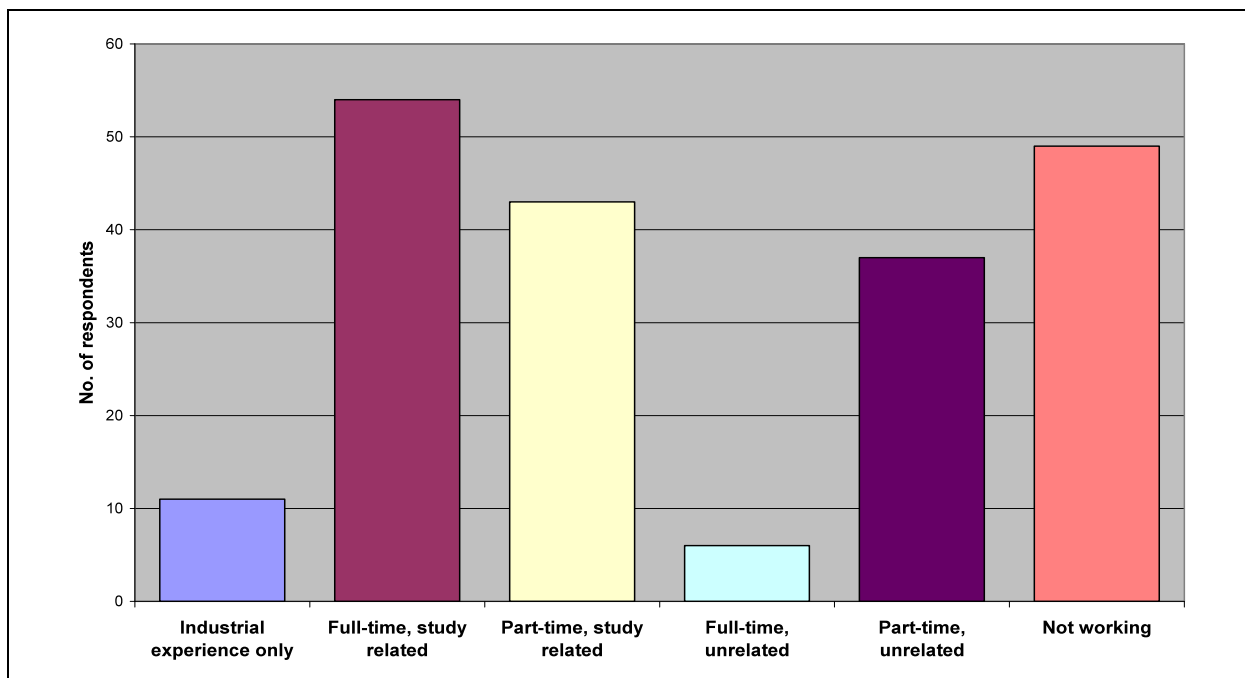

Figure 1: Degree programs surveyed

Figure 2: Students' work / study balance

41.5% of respondents had already completed the industrial experience requirement of their degrees.

Regarding obtaining a placement, similar numbers of respondents found it difficult (39.3%) or easy (34.1%) to obtain a placement, and, likewise, a similar proportion found it very difficult (12.6%) or very easy (14.1%).

Anecdotal evidence suggested that students found out about their industrial placements in a serendipitous manner. Because these placements are stand-alone activities (i.e. they are not associated with taught timetabled courses) there are few opportunities to ensure that students are comprehensively briefed. Industrial Experience tutors are charged with responsibility to ensure this occurs, but find this difficult to arrange. Consequently some tutors tend to rely on announcements and briefings posted on our University's learning management system. When asked how they became aware of requirements to complete their industrial experience, students identified the most common sources of information to be teaching staff and other students (as shown in Figure 3). Industrial experience tutors and employers were seen to have provided the least information in this regard. Figure 3 also shows that students mostly obtained information from teaching staff, as well as from other students, Blackboard or other unspecified sources.
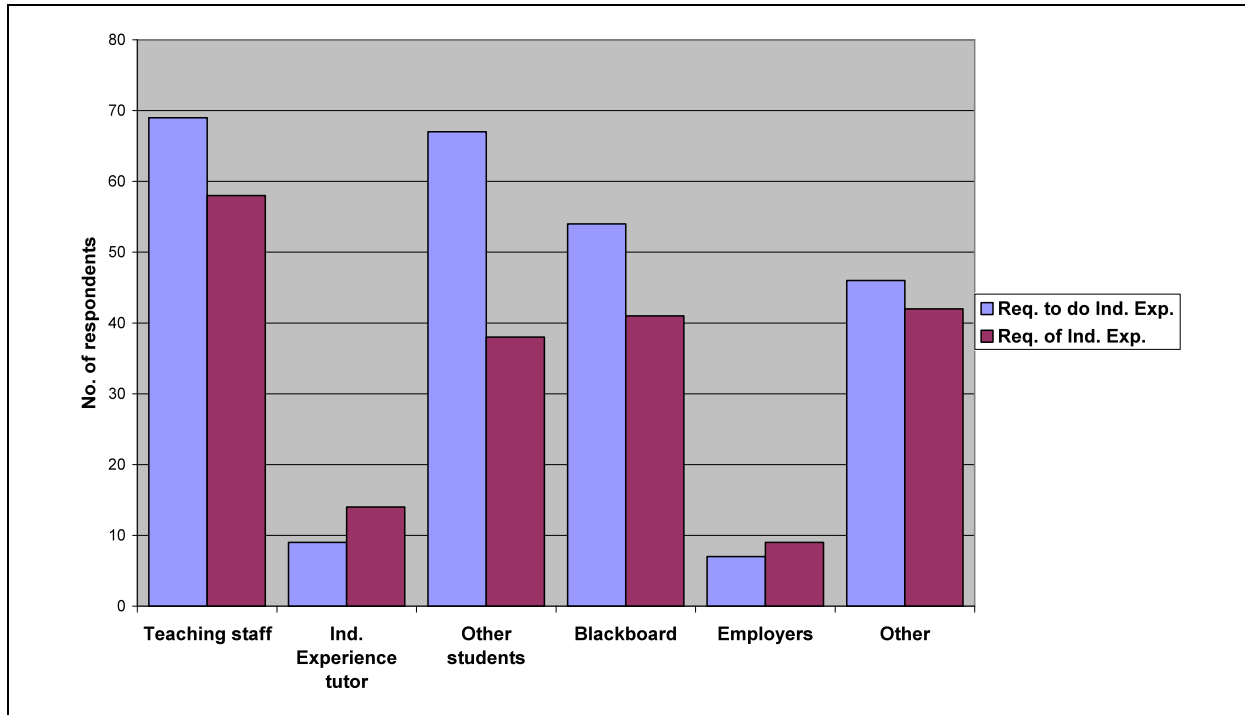

Figure 3: How students found out about industrial experience

Students were also asked about the sources they consulted to find out what was required of them during their placement. They considered advice from other students and teaching staff to have been of at least some help, but previous work experience (gained prior to their industrial placements) was felt to be the greatest source of very helpful or indispensable advice (see Figure 4). Students stated that Blackboard and the industrial experience tutors were not helpful in this regard.

70% of respondents considered themselves either prepared (49.6%) or well prepared (20.4%) for their WIL experience.

Whilst most respondents (61.5%) were not assessed on their WIL experience, those who were either produced a report (33.3%) or gave a presentation (5.2%).

Respondents considered that their industrial experience related either effectively (49.1%) or very effectively (30.2%) to their university courses. A small percentage (3.8%) indicated that there was a mismatch between their industrial experience and their university courses.

The majority of students also believed that their industrial experience was either important (36.5%) or most important (57.4%) to their professional preparation.

Discussion of results

This project used an internet-based survey to gain an insight into the industrial placement experiences of students enrolled in the Faculty of Engineering and the Built Environment and how this relates to

their university courses. 210 students responded to both quantitative and open-ended questions; however, only the quantitative results are discussed in this paper.
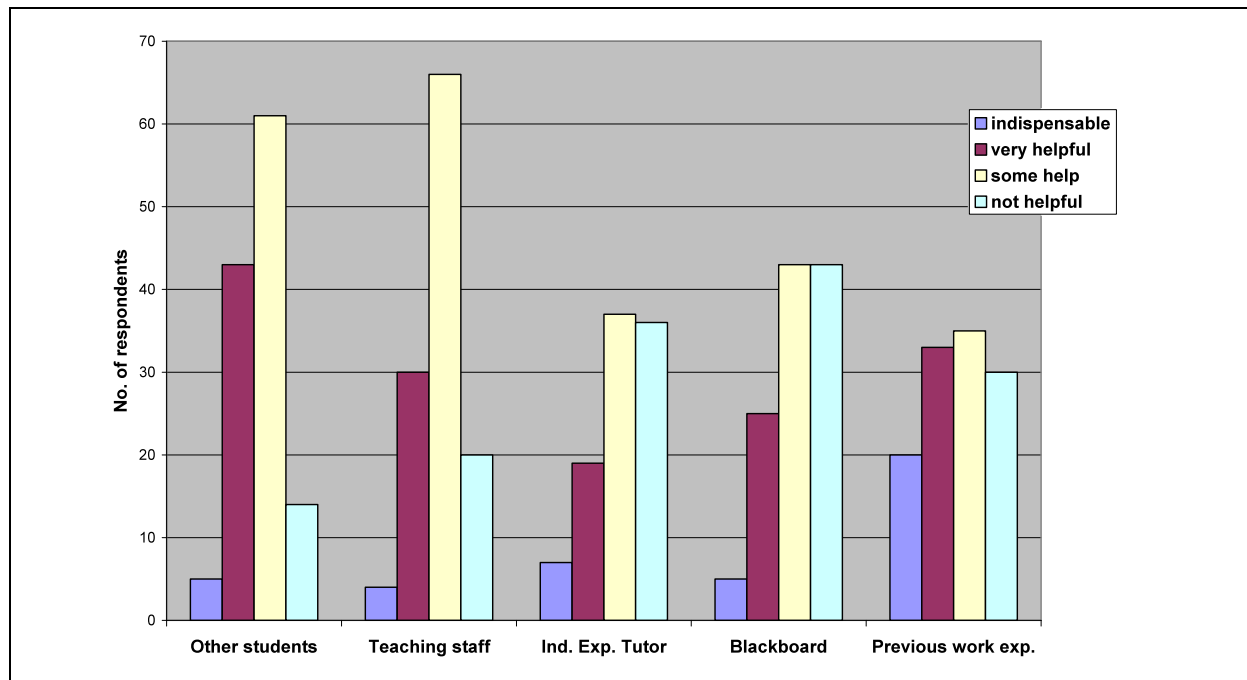

Figure 4: Sources of advice on industrial placements

At face value, the response rate of 6% appears low. Although it is below the average email survey response rate of 33% (Shih & Fan, 2009), it does fall within the expected range of between 5 and 85. In addition, our response rate falls well within the "liberal conditions" response rate put forward by Nulty (2008). Although a higher rate of response would have been desirable, there is considered to be no "magic formula by which a response rate can be identified as 'acceptable'" (Bennett & Nair, 2010, p. 359). Although a number of factors may have contributed to the lower response rate (see discussion below), the results from the 210 students taking the survey may be considered to be indicative of the factors that concern them.

Surveys with low response rates are not necessarily biased, according to Bennett and Nair (Bennett & Nair, 2010). Nonetheless, it is apparent that this survey is more representative of students enrolled in programs within the School of Architecture and the Built Environment (with a response rate of 9.7% of students) rather than the two Schools of Engineering (response rate of 4.32% of the student enrolments). Furthermore, students enrolled in the Bachelor of Construction Management (BCM) had a response rate of 7.7%, compared to Architecture and Industrial Design students with a response rate of 2%. The high rate of response from the BCM students may reflect the fact that one of the authors teaches these students and anecdotal evidence suggests that students respond to emails from staff they know and with whom they have a rapport. Other relevant factors are that this is the only undergraduate program offered by FEBE which can also be studied solely online by distance learners. These distance students may be more responsive to online surveys because of their online learning experiences (Nulty, 2008).

The age and gender details of the respondents were as expected for these degree programs. Most students at the University of Newcastle enter their studies directly from school or within a few years of completing schooling, although the BCM recruits a higher proportion of mature age students than other degrees (possibly because it is offered online). Gender in all programs within FEBE continues to be biased in favour of males (with the exception of Architecture, where females make up approximately 50% of cohorts). Poor participation of females in engineering and construction has long been a problem, and several initiatives have sought to improve enrolment of females over the years. (J. Mills, 2010; Engineers Australia, 2010; NAWIC, 2010).

The extent to which students currently engage in work (whether part- or full-time) is high (75.5%), and aligns with other discipline related surveys (Lingard, 2007; A. Mills, Lingard, & McLaughlin, 2007; O'Leary, 2006). This trend is in common with other Australian Universities, and is arguably representative of a worldwide shift in the ways students engage in tertiary level education (Darmody & Smyth, 2008; Ford, Bosworth, & Wilson, 1995; McInnis & Hartley, 2002; Moreau & Leathwood, 2006). For those students working in positions unrelated to their degree program (21.5%), the practical (time, financial) demands of an industrial placement may place additional demands on them. In such circumstances, they would have to interrupt their present employment to take on (possibly unpaid) work. The James et al. (2007) student finances report (cited in D. Bradley, 2008) found that "students were very concerned about the impact engagement in paid employment was having on their studies. Over half of undergraduate and postgraduate part-time students indicated that their work commitments adversely affected their performance at university, causing them to miss classes." (p. 50). Those students working in discipline-related employment have a considerable advantage in that their usual, paid employment can provide them with easily-accessible industrial experiences.

Responses provide no clear-cut indication of how difficult or easy it was for students to obtain their placements. Indeed, similar numbers of students observed that this was easy as did students who said it was difficult. It is not yet clear what particular factors facilitated or hindered students obtaining placement: the responses to the open ended questions should provide more information about this.

Students are initially notified about the need to complete periods of industrial experience during lectures. Additional information (e.g. briefing documents describing the reasons for industrial experience, the type of employment students should secure, the records they should keep, insurance arranged by the university etc) is provided electronically on various Faculty and School webpages. Notwithstanding these formal sources, Figure 3 indicates that students found out about this from staff and other students. This situation is not altogether unexpected as the role of industrial experience tutor is loosely defined and the tutor may rely too heavily on Blackboard to disseminate his instructions. With respect to the requirements of their industrial experience, students indicated that the formal information provided by the industrial experience tutor and on Blackboard is at best sketchy. Students appear to be consulting teaching staff on a seemingly ad hoc basis, and approaching other students and unidentified 'others' for advice. Clearly students are finding it difficult to find out about the formal requirements to complete their industrial placements as well what this entails.

Despite some students having difficulty obtaining information about placements, as well as obtaining the placements themselves, it is heartening to note that most students considered themselves prepared for their industrial experience. It is pertinent to note that University staff assist students in other disciplines to obtain placements (e.g. nursing, speech pathology, social work etc). There is a clear need to further investigate issues relating facilitating and securing placements as the data elicited so far are inclusive.

Around 80% of respondents also found that their experiences related effectively to their university courses. It is possible that students may have provided answers that they felt the researchers hoped for to this question. Students have verbally questioned whether some of the university courses they take relate to what they experience on site; the qualitative findings should provide additional insight into this aspect.

Limitations

This paper reports on responses to quantitative questions asked. Responses to open-ended questions are currently being analysed and are likely to provide a richer understanding of some of the issues noted above.

The modest response rate we achieved was despite several best practice approaches we used. For example, we structured the survey to elicit constructive criticism, we reminded students about the survey, and we offered ten cinema tickets to be awarded at random to those completing the survey (Nulty, 2008). Factors contributing to the low rate include timing (as the survey was administered towards the end of the semester) as well as the gender and age profile of the students. Women are reportedly better at responding to email surveys than men (Sax, Gilmartin, Lee, & Hagedorn, 2008);

the relative preponderance of males not only enrolled in the programs, but also responding to the survey, may reflect this.

Generally, although students are familiar with the internet and emails, they do not necessarily respond better to email surveys (Sax et al., 2008). Furthermore, Shih and Fan (2009) observed that postal surveys achieved higher rates than email surveys. Although the response rate achieved was indifferent, it was predictable and to be expected.

Despite these limitations, these quantitative results have provided useful data on the experiences of these students, as well as insight into their attitudes and rates of responding to internet-based surveys. The qualitative responses will provide an additional understanding of the issues raised here.

Conclusions

This paper provides preliminary indications of the factors that affect engineering and built environment students engaging in periods of industrial experience. These include the provision of information about placements, difficulties obtaining placements, the extent to which students feel prepared for their placements and the value they place on them. Placements are a mandatory accreditation requirement for the vast majority of degree programs offered in FEBE, making this an issue of considerable importance to the majority of students in this faculty.

This survey provides a robust overview of relevant issues. It has highlighted the relative efficiency of the current approach to administering placements, considering the modest burden it places on the faculty and its staff. The study has also pinpointed those aspects of industrial placements (e.g. briefing documents, lists of potential employers, health and safety briefings) which appear to be in need of overhauling and upgrading. The needs of those students who are not working or who are working in unrelated employment may need particular consideration. Although the data are weighted in favour of the construction management students, it is likely that the issues raised by these respondents are similar in nature to those of the engineering students.

The University of Newcastle is working to provide students in all faculties with opportunities to engage in WIL. This survey is thus timely and can provide a baseline on which to judge future changes to the effectiveness and efficiency of the process.

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