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Exploring changes in perceived employability in Australian engineering undergraduates: A pilot study

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Abstract

The paper is part of a pilot study exploring how undergraduate engineering students at one Australian university perceive their own employability development over the span of their degree. The paper outlines approaches to defining employability and the individual factors within employability. Students across a range of year levels were surveyed about their perceived employability, which refers to how likely it is that an individual believes they will be able to gain employment. The paper discusses the survey results and finds that perceived employability drops as students progress through the year levels of their degree. The study strengthens previous research in this area, and reinforces the need for universities to ensure that students are supported as they enter the labour market to become the engineering professionals of the future.

Keywords
Employability, perceived employability, engineering undergraduates

Introduction

Feedback from Australian employers suggests that university graduates generally lack skills in three key areas: commercial awareness, communication skills, and an understanding of the employers' organisation (Australian Association of Graduate Employers, 2023). For the engineering industry, employers in the United States and Australia claim that graduate engineers often lack communication skills and the ability to apply their technical understandings to real world practice (Male et al., 2010; Male & King, 2019; Hirudayaraj et al., 2021). At the same time as preparing their students for future careers, universities in many countries are required to demonstrate accountability for their government funding by reporting graduate employment outcomes (Jackson & Bridgstock, 2018).

In Australia, the Graduate Outcomes Survey (GOS) is used to report full-time employment outcomes for graduates four months after graduation (Quality Indicators for Learning and Teaching, 2019). However, the use of graduate outcomes is problematic as the results are known to be influenced by a range of factors including labour market conditions, the reputation of the university, and equity factors within the different student cohorts (Wilton, 2014; Tomlinson, 2017b; Bridgstock & Jackson, 2019). Furthermore, even though it is 'delusional' to use graduate outcomes to compare universities (Marginson, 2019, p. 294), they are often misused to rank university employability, or to trumpet

university success (Christie, 2017; Jackson & Bridgstock, 2018; Baron & McCormack, 2024). Despite these issues, graduate outcomes remain a key metric for governments and universities.

The School of Engineering and Built Environment at Griffith University offers engineering degrees on two campuses in South-East Queensland, Australia. At the time this study commenced in 2019, there were approximately 1400 undergraduate engineering students, with 30% enrolled at Nathan campus in the Brisbane area, and the remaining 70% at the Gold Coast campus. As shown in Table 1, the GOS results for Griffith University engineering graduates have not been as strong as those for other competing universities in the region.

Table 1: Graduate Employment Outcomes for Undergraduate Engineers in the Brisbane Region

University	% in full-time employment	Survey responses
University of Queensland	92.4	487
Queensland University of Technology	86.7	593
Griffith University	80.4	158

Note: Adapted from Quality Indicators for Learning and Teaching (2024)

The variations in graduate outcomes reflect findings from previous research into the influences of university prestige and the nature of the student cohort, where attending an older well-known university from the group of eight research-intensive universities (Go8) can increase the chances a graduate will secure employment (Jackson, 2016b; Jackson & Rowe, 2023). This is reflected in the strong results for the University of Queensland, a Go8 university, and may be due to employer perceptions of the Go8 universities and their graduates, or the ability for those Go8 graduates to harness the reputation of the university. In contrast, students from lower socio-economic or non-English speaking backgrounds have been shown to be disadvantaged in the employment race (Li et al., 2016; Richardson et al., 2016; Harvey et al., 2017; Pitman et al., 2017). As a large proportion of the students at Griffith University are the first in their families to attend university, with many coming from lower socio-economic backgrounds (Griffith University, 2020), these differences may also be influencing the weaker outcomes for engineering students at Griffith.

As part of a wider project to improve employment outcomes for engineering students at Griffith University, this pilot study was driven by the research question: how do student perceptions of their employability change over the span of an engineering degree?

Accordingly, the following section defines key terms such as employability, perceived employability, and outlines an approach to measuring perceived employability.

Literature review

Employment and Employability

One challenge when discussing employability is that the terms ‘employment’ and ‘employability’ have often been used interchangeably even though they have different meanings. Employment describes having a job, yet ‘governments persist in measuring crude employment outcomes and reporting these as graduate employability’ (Bennett, 2018, p. 32). Employability has been defined in terms of ‘possessing’ the skills and personal attributes valued by employers (Holmes, 2013). For example, Yorke (2006, p. 8) defined employability as ‘a set of achievements – skills, understandings and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy’. However, this view has been criticised as there is confusion over the meaning and use of terms such as ‘generic skills’, ‘core skills’, ‘key skills’, ‘transferrable skills’, ‘soft skills’, ‘attributes’, and ‘professional skills’ (Holmes, 2013; Tymon, 2013; Tomlinson, 2017b; Hora et al., 2018). Skills on employer wish lists also

change depending on the employer and industry (Hinchliffe & Jolly, 2011), and it is challenging to keep up with the desired skills needed in an ever-changing world (Cole & Hallett, 2019). Most importantly, the employability as skills approach ignores the influence of demographic and social factors on employment outcomes (Holmes, 2013, 2015; Harvey et al., 2017; Pitman et al., 2017).

Although employability as the possession of skills is the dominant view within the Australian university sector (Baron & McCormack, 2024), it is 'out of sync with the diverse student body and the demands of contemporary work' (Bennett, 2018, p. 49). The world of work is changing, and graduates are likely to shift through multiple jobs and careers during their lives (Foundation for Young Australians, 2017, 2018). Accordingly, this paper will follow Bennett (2020, p. 1) in defining employability as 'the ability to find, create and sustain meaningful work across the career lifespan.'

Exploring Employability Development

A useful approach to understanding how employability develops revolves around seeing employability as an identity building process where graduates learn to 'act in ways that lead others to ascribe to them the identity of being a person worthy of being employed' (Holmes, 2013, p. 549). In this view, students develop an understanding of the skills, practices, values, and culture of their chosen profession through their studies and experiences, assisting them to form their identities as emerging professionals (Jackson, 2016a; Tomlinson, 2017b; Bennett, 2018; Tomlinson & Jackson, 2019). This identity perspective provides a foundation to understand how employability develops through various forms of capital, where capital refers to 'key resources that confer benefits and advantages onto graduates' (Tomlinson, 2017a, p. 339).

Fugate et al. (2004) proposed that employability has three dimensions: social and human capital, career identity, and adaptability, where social capital refers to an individual's connections or network they can use when searching for employment opportunities, and human capital refers to a range of characteristics such as job experience and education needed to perform successfully in the workplace. Career identity is 'who I am/who I want to be', and adaptability relates to the ability to adjust to the needs of the different situations. As Fugate et al. (2004, p. 27) put it, 'if career identity furnishes the 'who I am' (or want to be), personal adaptability can provide the 'how' that facilitates its realization.'

Williams et al. (2016) grouped employability components into three broad dimensions of capital, career management, and context. The capital dimension is further subdivided into human, social, cultural, and psychological capital. Like Fugate et al. (2004), human capital refers to the skills and knowledge possessed by the individual that would be useful to an employer. Social capital refers to the social connections which an individual might possess that could make them more useful at work, whereas cultural capital refers to the degree to which an individual can fit the social norms and expected behaviours and ideas for those working with a particular employer (Bourdieu, 2002). Psychological capital refers to positive personality traits relevant to the workplace, and 'states such as confidence, hope, resilience, positive self-evaluation' (Williams et al., 2016, p. 890). The career management dimension refers to how an individual might successfully move through the recruitment process, as well as the 'the individual's perception and appraisal of themselves in terms of values, abilities, interests and goals' (Bridgstock, 2009, p. 37). Context refers to the external labour market and the competition for job opportunities within it. Williams et al. (2016) noted that this framing of factors within employability is an attempt to map the dimensions within the literature, and warned that some aspects may not have been empirically tested. However, the broadening of the dimensions of capital from the narrower set proposed by Fugate et al. (2004) is useful to frame the factors which influence individual employability.

Clarke (2018) proposed an integrated model of graduate employability revolving around forms of capital, but used slightly different terminology, with 'individual attributes' instead of 'psychological capital', and 'individual behaviours' instead of 'career management dimensions' (Williams et al., 2016). However, the model explicitly includes the concept of perceived employability, defined 'as the individual's perception of his or her possibilities of obtaining and maintaining employment'

(Vanhercke et al., 2014, p. 594), which is in turn influenced by labour market factors which are outside the control of the individual or their university.

Tomlinson (2017a) placed the various perspectives of capital into one model by conceptualising employability in terms of graduate capital, which is comprised of human, social, cultural, psychological and identity capital. Identity capital is related to the individual's self-concept and their ability to 'articulate a personal narrative which aligns to the employment domains they seek to enter' (Tomlinson, 2017a, p. 345). In contrast to other models, Tomlinson includes career building skills such as preparing as CV within human capital. However, this extended model aligns with the need for graduates to be able to convincingly demonstrate how their identity matches the identity required by an employer (Holmes, 2013, 2015; Jackson, 2016a).

Table 2 summarises the various approaches to the role of the capital in employability, with some explicitly including the influence of labour market factors. Although there are some naming variations across the models, the Tomlinson (2017a) graduate capital model is a powerful way to conceptualise the relationship between employability and the different forms of capital. Overall, all the models support the view that employability is more than just skills or human capital, and that universities can influence employability development in their students by ensuring students develop the skills to manage their careers and make the 'transition from the identity of a student towards that of a graduate worker' (Artess et al., 2017, p. 7).

Table 2. Summary of Factors Within Employability Across the Selected models

Authors	Career Management	Social Capital	Human Capital	Psychological Capital	Cultural Capital	External Factors
Fugate et al. (2004)	Career Identity = Who I am or who I want to be	Networks	Skills, Knowledge, Experience	Personal Adaptability		
Williams et al. (2016)	Career Management = Ability to navigate the labour market + Self-management (Values, Abilities, Interests, Goals)	Relationships, Connections	Skills and Knowledge	Adaptability, Flexibility, Self-efficacy	Fit with the employer's ideas, social behaviours	Context = Influence of Labour market
Clarke (2018)	Individual Behaviours = Career self-management (Values, Abilities, Interests, Goals) + Career Building Skills (Ability to navigate the labour market)	Networks, Social Class, University reputation	Skills, Competencies, Work Experience	Individual Attributes = Personality, Adaptability, Flexibility		Influence of Labour market
Tomlinson (2017a)	Identity capital = Self-concept, Ability to articulate relevant personal narrative	Relationships, Connections	Skills and knowledge Career Building Skills	Adaptability, Resilience, Self-efficacy	Fit workplace culture and expectations	

Perceived Employability

In one of the first empirical studies of perceived employability, Qenani et al. (2014) surveyed engineering and agricultural majors in the United States finding that internship experiences and career self-management behaviours were the two most crucial factors linked to higher perceived employability. Other factors such as gender and grade point average (GPA) were important, although they were not as influential as internship experiences and career self-management. Students with higher GPAs were generally more confident of their employability, and female students generally saw themselves as less employable than their male peers. Interestingly, perceived employability decreased as students moved through the year levels, with final years less sure of their own employability as they approach graduation. This finding could be related to the location of the study, although Qenani et al. (2014) noted that students did not see the state of the economy at the time as impacting on their employability. Qenani et al. (2014, p. 211) concluded that universities must 'promote, guide, and facilitate' employability development in their students.

Jackson and Wilton (2017) reported on a study on perceived employability among business students in the United Kingdom (UK) and Australia. In contrast to Qenani et al. (2014), Jackson and Wilton (2017) found no significant differences in perceived employability between genders, and there were mixed findings regarding changes in perceived employability in students from different year levels. In line with Qenani et al. (2014), final year students in the UK had lower levels of perceived employability, however there were no significant differences by year level for the Australian students. Jackson and Wilton (2017) suggested that one reason for these differences could be due to student perceptions of the status of the labour market in the different countries, although no data was presented quantifying the actual state of the labour market in either country. Like Qenani et al. (2014), Jackson and Wilton (2017, p. 759) argued that universities should provide 'opportunities and support structures that enable exposure to the world of work and develop both the hard and soft attributes associated with employability.'

Donald et al. (2019) surveyed British students in the penultimate year of their degrees across a range of majors to explore their perspectives of the role of capital, career behaviours, and individual differences. They found that the various forms of capital influenced perceived employability, and that students were aware of the crucial importance of managing their own career development. However, students did not see receiving advice from the careers service as useful to improve their employability. Donald et al. (2019) suggested that this finding is more related to different patterns among the students in usage and awareness of the careers service, concluding that students need contact with careers advice throughout their studies to gain the maximum benefit to develop their employability. With regards to gender, unlike Jackson and Wilton (2017) but similar to Qenani et al. (2014), males generally saw themselves as more employable than females. Due to these mixed findings, the different genders many need different approaches to support employability development.

Donald et al. (2018) provided further support for the role of the labour market in influencing perceived employability in their study of final year students across a range of majors in a British university. While final year students saw themselves as more employable due to a range of personal factors and increases in their human and social capital, they also felt less employable at the same time as they became increasingly aware of the need to compete in the labour market. This is a more nuanced view of how perceived employability might change between the penultimate and final years within a degree, and implies that students do need guidance in how to best navigate through recruitment processes.

Although the labour market factors may be different in the UK and Australia, the university systems in both countries share similar challenges and the need to report graduate outcomes to their governments (Jackson & Wilton, 2017). Accordingly, it seems clear that universities have an important role in supporting employability development in the student cohort.

Measuring Perceived Employability

Rothwell et al. (2008) developed an initial scale to measure self-perceived employability in undergraduates, noting that the scale was developed and tested in business undergraduates in the UK. Rothwell et al. (2008, p. 2) defined self-perceived employability as 'the perceived ability to attain sustainable employment appropriate to one's qualification level'. This is very similar to concept of perceived employability described earlier by Vanhercke et al. (2014), with the only difference being the reference to 'qualification level'. Therefore, for undergraduates hoping to become graduate professionals working in their chosen career, perceived employability and self-perceived employability should have the same meaning. The scale has 16 items (see Appendix) and is derived from the interaction between four components: perception of university reputation, self-belief, field of study, and state of the labour market. Vargas et al. (2018) noted that the scale has been tested in a diverse range of countries and shows promise as a useful tool. Accordingly, we have chosen to use the Rothwell scale to measure perceived employability in this pilot study.

Methodology

After receiving university ethics approval, the study used a survey approach as they are widely used to gain an understanding of opinions and attitudes within a population (Creswell, 2008). The survey consisted of a series of basic questions to capture demographics, coupled with the 16-item perceived employability scale (Rothwell et al., 2008). Respondents were asked to indicate their level of agreement with each statement on the scale using a Likert-type scale ranging from Strongly Disagree (1) to Strongly Agree (5).

The survey was delivered online via the Lime Survey tool and used a purposeful sampling approach (Creswell & Clark, 2017) to take a cross-section of student perspectives on their perceived employability at key points in the degree. The survey was conducted in two stages, with the first stage targeting third- and fourth-year engineering students during Trimester Two (T2), 2019, as this was when the researcher was first ready to collect data. The second stage targeted first- and second-year students during Trimester One (T1), 2020, aiming to explore student perceptions of their employability closer to commencement of their studies in the earlier years of the degree.

An announcement inviting students in the first stage to complete the survey was posted in a series of courses taken by third- and fourth-year engineering students across the range of majors on both campuses. The survey documentation indicated that students needed to be in their third-year or higher of an engineering degree to be eligible to complete the survey. The survey commenced in the final teaching week of the term, and was open for a period of four weeks during October, 2019. To encourage survey participation, an additional reminder announcement was posted in the relevant courses during that time. From the 50 survey responses received in Trimester Two, 2019, six were invalid as the first page was not completed, and one response from a student ineligible to complete the survey was removed. This left 43 valid survey responses from the 374 eligible students enrolled in the sampled courses for a response rate of 11.5%.

The second stage was completed during Trimester One, 2020, with the first- and second-year students having access to the same survey for four weeks from the fifth week of the term in late March 2020 onwards. The fifth week was chosen as it is after the census date, and the students who had remained enrolled after the census date would have committed to the degree for the remainder of the trimester. The documentation indicated that only first or second-year engineering students were eligible to complete the survey. From the 79 survey responses received in Trimester 1, 2020, four were invalid as the first page was not completed, and five responses from students who were ineligible to complete the survey were removed. This left 70 valid survey responses from the 468 eligible students enrolled in the sampled courses for a response rate of 15%.

Data Analysis

While some have argued that non-parametric statistics are the only suitable approach to analysis of Likert scale data (Jamieson, 2004), others have proven that use of parametric statistics is valid and robust (Carifio & Perla, 2008; Norman, 2010). As per recommendations for analysis of Likert scale data (Boone & Boone, 2012), the scores from the 16-item perceived employability scale responses were summed to produce a mean score for each participant. SPSS 26 was used as part of the analysis process, with a Cronbach's alpha of 0.85 indicating good internal consistency (Gliem & Gliem, 2003).

The distribution of responses for each category was checked for normality using the Shapiro-Wilk Test. When normally distributed, statistical techniques as appropriate such as T-testing and ANOVA were used to check for significant differences in the data. In cases where the results were not normally distributed, the Mann-Whitney and Kruskal-Wallis tests were used instead as appropriate. Kendall's Tau test was also used to check for correlations between year level and perceived employability, and age group and perceived employability.

Results

Table 3 displays the demographic and enrolment characteristics of valid survey respondents from both waves. In wave one, there were 43 valid survey responses from 374 eligible students in the sampled third- and fourth-year courses for a response rate of 11.5%. In wave two, there were 70 valid survey responses from 468 eligible students in the sampled first- and second-year courses for a response rate of 15%. In total, there were 113 valid responses from 842 eligible students, an overall response rate of 13.4%. Although the number of responses is low, the demographic characteristics of the survey respondents is similar to the demographic characteristics of the undergraduate engineering student profile at Griffith, including the distribution of student numbers across the two campuses.

Table 3: Demographic and Enrolment Characteristics of the 113 Participants

Variables	Values	*n*	%
Campus	Gold Coast	79	69.9
	Nathan	34	30.1
Gender	Male	93	82.3
	Female	20	17.7
Language	English as a first language	88	77.9
	English as a second language	25	22.1
Age Group	<18	8	7.1
	18-20	53	46.9
	21-26	38	33.6
	26-30	6	5.3
	31+	8	7.1
Year Level	First Year	31	27.4
	Second Year	39	34.5
	Third Year	19	16.8
	Fourth Year	19	16.8
	Fifth Year	5	4.4
Engineering Major	Mechanical	38	33.6
	Civil	32	28.3
	Electrical (Gold Coast)	19	16.8
	Electronic (Nathan)	11	9.7
	Undecided	7	6.2
	Environmental	3	2.7
	Software	3	2.7

Perceived Employability Scale Results

The perceived employability (PE) scale produces a score ranging between one and five, where a score of one would indicate a respondent has very low perceived employability, and a score of five would indicate a respondent has very high perceived employability. Table 4 provides an overview of the mean perceived employability scale results grouped by the demographic and enrolment characteristics of the survey respondents.

Table 4: Perceived Employability Results by Demographic and Enrolment Characteristics

Variables	Values	*n*	PE	*SD*
Campus	Gold Coast	79	3.55	.49
	Nathan	34	3.52	.44
Gender	Male	93	3.54	.47
	Female	20	3.58	.49
Language Background	English as a first language	88	3.56	.45
	English as a second language	25	3.48	.57
Age Group	<18	8	3.61	.64
	18-20	53	3.59	.40
	21-26	38	3.53	.46
	26-30	6	3.22	.94
	31+	8	3.49	.40
Year Level	First Year	31	3.63	.51
	Second Year	39	3.64	.31
	Third Year	19	3.42	.40
	Fourth Year	19	3.30	.69
	Fifth Year	5	3.70	.22
Engineering Major	Mechanical	38	3.52	.59
	Civil	32	3.68	.40
	Electrical (Gold Coast)	19	3.42	.32
	Electronic (Nathan)	11	3.47	.47
	Undecided	7	3.72	.38
	Environmental	3	3.13	.49
	Software	3	3.36	.29

The PE Scale results in Table 4 were checked for normality using the Shapiro-Wilk test due to the small sample size (Ghasemi & Zahediasl, 2012). Significant differences from normality were found for all categories except Year Level as shown in Table 5. Inspection of the survey results identified one respondent who had selected Strongly Disagree (1) for almost every single item on the PE scale. As a result, all statistical tests were conducted with the one specific response included, and with it removed. As including or removing the single response did not appear to have any difference on the statistical significance results, it remains included in the data.

Table 5: Results for Testing for Normal Distribution Across the Different Variables

Variable	Normality	Category	Result if significant
Campus	Not normal	Gold Coast campus	$W(79) = 0.93$, $p = .001$
Gender	Not normal	Female Male	$W(20) = 0.90$, $p = .038$ $W(93) = 0.94$, $p < .001$
Language	Not normal	English as a second language	$W(25) = 0.86$, $p = .002$
Age Group	Not normal	<18 18-20	$W(8) = 0.81$, $p = .038$ $W(53) = 0.95$, $p = .018$
Major	Not normal	Mechanical	$W(38) = 0.91$, $p = .004$
Year Level	Normal		

Campus

Due to the non-normal distribution within the campus responses, the Mann-Whitney test was used to compare the campus results. Students on the Gold Coast campus had very similar mean perceived employability (3.55, $n = 79$, $SD = 0.49$) to students at Nathan (3.52, $n = 34$, $SD = 0.44$), and the slight difference is not statistically significant.

Gender and Language

Due to the non-normal distribution within the gender and language background groups, the Mann-Whitney test was used to compare the results. Although female students had slightly higher mean PE (3.58, $n = 20$, $SD = 0.49$) than male students (3.54, $n = 93$, $SD = 0.47$), there are no statistically significant differences for gender. PE results for language background are similar with no statistically significant differences found between students with English as a first language (PE 3.56, $n = 88$, $SD = 0.45$) and those who have English as a second language (PE 3.48, $n = 25$, $SD = 0.57$).

Age Group

Kendall's tau-b correlation did not find a significant correlation between age group and PE. Students aged under 18 (PE 3.61, $n = 8$, $SD = 0.64$) had very similar levels of mean PE to those in the 18-20 age group (PE 3.59, $n = 53$, SD = 0.40), then decreased with increasing age (21-26: PE 3.53, 26-30: PE 3.22), before improving to 3.49 for students aged over 31 ($n = 8$, $SD = 3.49$).

Year Level

Kendall's tau-b correlation ($\tau = -.149$, $p = .038$) indicated there is a significant negative correlation between year level and PE, indicating perceived employability generally drops as year level increases. Although first-year (PE 3.63, $n = 31$, $SD = 0.51$) and second-year students (PE 3.64, $n = 39$, $SD = 0.31$) had similar mean PE, fourth-year students had the lowest PE at 3.30 ($n = 19$, $SD = 0.69$). However, there was also a small group of fifth-year students with the highest PE at 3.7 ($n = 5$, $SD = 0.22$).

Major

As the distribution of results within the Mechanical Engineering major was not normal, the Kruskal-Wallis test was used to compare PE results across the majors instead of a one-way ANOVA. While students in the Environmental Engineering major recorded the lowest PE at 3.13 ($n = 3$, $SD = 0.49$), and students who were undecided about their major had the highest PE at 3.72 ($n = 7$, $SD = 0.38$), there were no statistically significant differences across the majors.

Discussion

Statistical analysis of the survey responses found that perceived employability decreases as students' progress through the year levels of their degree. Mean PE for first-year and second-year students was almost identical at 3.63 and 3.64 respectively, before dropping to 3.42 for third years, and then to 3.30 for fourth years.

The findings of this study are also reflected in the literature with a range of studies indicating student confidence in their ability to secure employment drops as they get closer and closer to entering the job market (Qenani et al., 2014), even though student confidence in their own perceived employability increases at the same time (Beaumont et al., 2016; Donald et al., 2018). Beaumont et al. (2016) described marine science students perceiving their own employability to increase as they moved through their degree, although they became less and less confident in their ability to secure a job after graduation. Donald et al. (2018) reported similar findings across a range of disciplines noting that while students might become more confident in themselves as they progress through their degrees, the external market factors have a negative impact on their confidence at the same time. Beaumont et al. (2016, p. 8) added that the drop in confidence was particularly marked in third and final year students, suggesting that the students were probably having a 'crisis of confidence' as they approached the reality of needing to enter the job market.

Perceived Employability in Fifth-Year Students in Double Degrees

There were also five responses from fifth-year students, resulting in a mean PE of 3.70 for fifth-year students as compared to 3.30 for fourth years. The fifth years would generally be in their final year of a double degree, where they combine an engineering degree with second degree such as Business or Science. However, as there were only five respondents in the fifth-year category, their results need to be treated with caution.

There also appears to be little research into students in double degrees and their perceptions of their employability. Russell et al. (2008) surveyed double degree students and graduates, finding that the majority of students who chose double degrees did so hoping for an improved skill set and better job prospects. However, while most respondents felt that completing a double degree had broadened their knowledge, only half of the double degree graduates indicated that their degree had improved their competitiveness. Future research is clearly necessary and can investigate how students in double degrees perceive their employability development, and how it compares to students in the single degrees.

Other Demographic and Enrolment Findings

Statistical testing of mean PE scores did not find any significant differences in perceived employability across the remaining demographic and enrolment categories in this study: Campus, Engineering Major and Age. The following sections provide more detail on these categories.

Perceived Employability for Campus and Age Groups

Students reported similar levels of PE across the campuses, with GC respondents having a mean PE of 3.55 as compared to 3.52 for those at Nathan. There were no significant differences in perceived employability across the age groups in this study. Jackson and Wilton (2017) reported mixed results for links between age and perceived employability, and they did not find any significant correlations between age and perceived employability in Australian undergraduates. However, they did report a positive correlation between age and perceived employability for students in the UK. Similarly, Woodfield (2011) also described research in the UK suggesting that mature students may be more familiar with navigating the labour market, which in turn, has a positive impact on their perceived employability. Future research with a larger sample of students can explore the links between age and perceived employability.

Perceived Employability and Engineering Major

No significant differences were found in perceived employability across the engineering majors, although mean PE for each major varied. The major with the highest mean PE (3.68) was Civil Engineering. Respondents from Environmental engineering (PE 3.13) and Software engineering (PE 3.36) reported scores lower than most other majors, although both majors had only three respondents each, and these low numbers may be skewing the results. For Environmental engineering in particular, two of the three survey respondents were fourth year students. As fourth years generally have lower perceived employability, this would explain the lower perceived employability result for such a small group.

It was initially somewhat surprising to see the group of respondents who were undecided about their preferred engineering major to have the highest mean PE at 3.72. However, as six of the seven students who were undecided about their major were in their first year of study, this result aligns with the finding that first year students generally have higher perceived employability than students in later years. Future research could provide more insight into these results, by potentially asking respondents to describe their decision-making processes while they complete the perceived employability scale. This would also assist in better understanding how respondents understand their employability in relation to their chosen industry.

Recommendations

This section makes two broad recommendations to improve graduate outcomes for engineering students by embedding employability development into the curriculum, and ensuring students know how to make the most of their work experiences or work-integrated learning (WIL) placements.

Embed employability development into the curriculum

Although students can also strengthen their own employability through participating in relevant extra-curricular activities, industry mentoring programs, and via relevant professional associations such as Engineers Australia (Kinash et al., 2016; Jackson & Rowe, 2023), students from equity backgrounds may not be able to access such opportunities as they need to work to support themselves (Dickinson et al., 2020). Therefore, all students need the opportunity to develop their employability through integration into the curriculum (Bennett, 2018; Jorre de St Jorre & Oliver, 2018).

Firstly, the engineering curriculum should include as much industry engagement as possible so students can see links between their courses and industry practices. The Male and King (2014) industry engagement guidelines, and the Engineering Futures reports (Crosthwaite, 2019, 2021) are excellent resources for engineering educators to consult. Secondly, students need to be taught the career management skills they will need to navigate the labour market and influence future employers (Bridgstock, 2009; Okay-Somerville & Scholarios, 2017; Jackson & Wilton, 2017; Jackson & Tomlinson, 2020). This could also include explicit training in interview skills as students have described them as ‘daunting and tricky before you learn how to handle them’ (Howell et al., 2023, p. 172).

Assist students to make the most of Work Experience/WIL

Engineering students are required to complete 12-weeks of professional practice during their studies (Engineers Australia, 2019). Students recognise work experience as a crucial part of preparing to join the engineering industry (Qenani et al., 2014; Male & King, 2019), and have suggested that multiple work-experience opportunities would further build their employability (Jackson & Collings, 2018; Howell et al., 2023). Many Australian universities assist students to meet their work experience requirements through WIL placements in industry, often as part of a capstone course. Palmer and Young (2021, p. 18) explain WIL placements as ‘where a student undertakes an experience in a workplace setting, for an extended period, with structured assessment linked to their study curriculum’. WIL placements have many benefits, including allowing students to apply their skills in an industry environment, improving their confidence, and helping them to build professional connections

(Jackson & Collings, 2018), and have been shown to result in stronger graduate outcomes (Jackson & Rowe, 2023). Given that all engineering students should have completed work experience before graduation, we recommend that students be explicitly taught how to articulate the value of their experiences to future employers.

Conclusion

This study set out to explore how student perceptions of their own employability change over the span of their engineering studies. Our finding that perceived employability drops as students progress through their engineering degrees is in line with previous findings where later year students become less confident in their ability to compete and successfully navigate the labour market (Qenani et al., 2014; Donald et al., 2018). Accordingly, the perceived employability scale (Rothwell et al., 2008) may be a useful tool allowing universities to understand how their own students view their employability, which could lead to the development of suitable interventions. Although competing to secure a graduate role will always be a stressful experience, universities can better prepare their students for later success by explicitly embedding employability development into the curriculum, and ensuring students know how to highlight the value of their work experiences to future employers.

The study has limitations as it is solely based on the perceptions of a small number of engineering students at one university in Queensland, Australia. When considering year levels, the first year generally has the largest number of students, but this was not reflected in the year levels of the survey respondents, where second year students formed the largest group. In addition, findings based on the small number of fifth-year students in double degrees should be treated cautiously.

Although the survey form collected information on the students' English language background, it did not collect information on student status, either domestic or international. We recognise that language background is not an identical proxy for student status, but note that the distribution of survey respondents with an English language background and from a non-English speaking background is similar to the distribution of domestic and international students in the undergraduate engineering student cohort at Griffith.

Despite these limitations, the findings of the study build on previous research into employability, and show that universities need to ensure their engineering students develop their employability as part of an integrated curriculum to develop the graduates of the future.

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Appendix

Perceived Employability Scale (Rothwell et al., 2008)

1. I achieve high grades in relation to my studies.

2. I regard my academic work as top priority

3. Employers are eager to employ graduates from my university

4. The status of this university is a significant asset to me in job seeking
5. Employers specifically target this university in order to recruit individuals from my subject area(s)
6. My university has an outstanding reputation in my field(s) of study
7. A lot more people apply for my degree than there are places available
8. My chosen subject(s) rank(s) highly in terms of social status
9. People in the career I am aiming for are in high demand in the external labour market
10. My degree is seen as leading to a specific career that is generally perceived as highly desirable
11. There is generally a strong demand for graduates at the present time
12. There are plenty of job vacancies in the geographical area where I am looking
13. I can easily find out about opportunities in my chosen field
14. The skills and abilities that I possess are what employers are looking for
15. I am generally confident of success in job interviews and selection events
16. I feel I could get any job so long as my skills and experience are reasonably relevant