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Australian Undergraduate IT Curricula: Employer Perspectives

Full research paper

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Abstract

This research paper outlines our research approach relating to analysing current trends within Australian undergraduate BIT curricula. With a variety of data collection techniques, we seek to address a knowledge gap in the literature through identifying the strengths and challenges facing university curricula. Closing the education-employment gap requires the involvement of all stakeholder groups (academics, employers, and students) (Trauth et al, 1993). We develop an educational matrix based on the information literacy framework and the Australian Qualifications Framework (AQF). Secondary data collection is conducted from a range of NSW BIT core units to map against this framework, as well as conducting pilot interviews with selected employers to gain a better understanding of the current curriculum and the needs of the employers. The outcome of this research will enable current educational sectors to improve the tertiary education curriculum, with a view towards increasing employability rates post-graduation, which may be generalizable to other nations.

Keywords: Education, Employability, University, Curriculum, ICT

1. Introduction

Higher educational institutions face increasing pressure to better prepare graduates for the workforce - within professional courses and practical placements - such as clinical residencies and internships (Ryan, Toohey, and Hughes, 1996). However, the schooling and grading system drastically varies from country to country prior to tertiary education. At the tertiary level, Australian students typically choose between universities or vocational studies, with universities the most common type of tertiary educational institution attended. Approximately 57% of students completing year 12 apply for a university place (Norton, Cherastidham, and Mackey, 2018). This paper seeks to address the education-employability mismatch through examining the needs of employers and identifying knowledge gaps current IT graduates experience, based on undergraduate degrees in Australia.

2. Australian Undergraduate IT Curricula

The Australian Qualifications Framework (AQF) was established in 1995 and categorises qualifications for tertiary education with 10 levels of certification linking schools, vocational and university educational qualifications into one standardised national system (AQF, 2020). The levels vary from 1 - first year apprentice, through to 7 - bachelor's, 9 - master's and 10 - doctoral degrees. The Australian curriculum is progressively being developed and introduced from foundation kindergarten to senior secondary level in all states and territories, across all school systems (Marginson et al., 2013), and differs from the AQF as the latter focuses specifically on a national framework for post-compulsory education, typically at post-secondary level. In 2010, the higher education sector catered for over 1,192,000 students with some 83% enrolled in public universities (Marginson et al., 2013). Admission to an undergraduate degree in Australia is typically based on a student's Australian Tertiary Admission Rank (ATAR). The ATAR is calculated by a state or territory tertiary admission centre based on the higher school certificate (HSC) which is the year 12 award, and used in all states and territories except Queensland, where an overall position (OP) is calculated instead (DFAT 2017). The alternative system is the International Baccalaureate (IB).

Academic quality or ranking also influences institutional choice, as this is perceived to not only result in a greater quality of education, but also a higher employability rate for graduates (Dill and Soo, 2005; Taylor and Braddock, 2007). Rankings are however often heavily criticised, as many believe ranking systems should not dictate university policy but be used as a source of information for guiding policies according to the needs of the university's own community, traditions, market niche, national role and so on (Taylor and Braddock, 2007). There exist three major global university rankings of note: (1) Quacquarelli Symonds (QS) World Ranking, (2) the Academic Ranking of World Universities (ARWU), and (3) the Times Higher Education World University Rankings (University of Sydney, 2016). Despite different metrics to derive results, all major rankings are generally consistent when it comes to outcomes for Australian universities.

3. Australian IT Graduate Employability

This paper examines the university educational IT curriculum to understand the limitations of the current curricula and the needs of the employers. Employability relates to having the skills, ability, and capability to gain initial employment, while retaining jobs benefiting themselves, their employer, and the wider economy (Hillage and Pollard, 1998). It is important to acknowledge employability varies according to the economic conditions of a society (Brown, Hesketh, and Williams, 2003). Based on a 2019 analysis, there were around 12.7 million people employed in Australia with around 15% accounting for young workers, representing 15% of total employment. Labour market conditions for youths have improved over the last year, with youth employment increasing solidly in Australia by around 39,600 to 1,934,300 in January 2019. Despite such improvements, many young people continue to encounter difficulty securing work and face longer spells of unemployment, especially as roles become increasingly competitive (DJSB, 2019). Full-time graduate employment rates varied significantly over the past 35 years due to the changing expectations of employers and an increase in competition globally amongst graduates (Yezdani, 2017).

Noticeable is a concern in the literature over the job-education mismatch, or correlation between education and employment, meaning there is a lack of correspondence between the qualification level required, and the qualification level acquired through higher education. According to Yezdani, (2017), 29.1 percent of graduates feel they work jobs not fully utilising their skills and education, and that the university curriculum does not prepare them for the real world. The aim of this study is thus to reduce this mismatch ensuring graduates are work-ready within the review process (Støren and Aamodt, 2010).

During this process, employer involvement in course design will be vital to providing input to educators for improving the curriculum to better match the 21st century job market. The curriculum should aim at enhancing a graduate's skillset in ways that should increase their attractiveness to potential employers (Mason, Williams, and Cranmer, 2009).

Skills learned by students during their tertiary education can be classified as either technical or non-technical. The former skills refer to content-specific knowledge and relevance to or within a particular discipline, whereas the latter are those deemed relevant across different jobs or professions (Greenbank, 2014). This demand of skills can vary depending on the current need of society as mentioned by especially within IT as it is constantly changing, and thus ICT programs have a responsibility to alter current curricula to match the demands of changing fields (Aasheim et al, 2012, Lee et al, 2002). Employability skills are not necessarily job specific but useful across all industries and different job roles (Cassidy, 2006). Conceptions on how to make such employability skills more prominent within the tertiary educational curriculum represents a strong focus, especially within the Australian higher education sector (Greenbank, 2014). Today, graduate employability has become a key objective for government and a performance indicator for higher educational institutions. Whilst employers may be satisfied in general with the technical skill level of recent graduates, they are less convinced by graduate competency in non-technical abilities or employability skills. Studies demonstrate employers are more interested in personal attributes and soft skills, rather than degree classification, subject or university attended (Archer and Davison, 2008, Todd and McKeen). There has also been an increase in the number of graduates, increasing competition, which in turn has changed employers' expectations. A university degree which was once a bonus or differentiator, is now seen as a prerequisite for a job even in sectors which would not previously have required a degree at entry level. Graduates are increasingly aware they require additional skills and attributes for career success; hence curricula attempt to incorporate soft skills within degree programs (Støren and Aamodt, 2010) – i.e., extra skills now seen as a bonus on top of the degree. Employers generally seek a variety of skills, including technical and non-technical requirements. Skills may be broken into five categories: (1) Fundamental, (2) People-related, (3) Thinking, (4) Personal-work and (5) Occupational specific skills. Employers and organisations recruit students who have gone beyond the university curriculum and who demonstrate the ability to apply their knowledge successfully within practical life. To minimise this gap, this research aims to generate a matrix demonstrating the effectiveness of units within Bachelor of Information Technology (BIT) degrees, taking employer needs into account.

4. Education-Employability Framework

The employment sector continues to become competitive, and it is important institutions (i.e., universities) remain current. Reviewing their educational curriculum allows institutions to identify strengths, gaps, and weaknesses. Today, full-time employability rates for those with undergraduate degrees in the state of New South Wales (NSW) hovers around 73% according to the 2018 Graduate Outcomes Survey, a decrease from 85.2% in 2008 (Singhal, 2019), illustrating current employability competition and the importance of improvements in the educational curriculum (Lin-Stephens et al., 2016). The education-employer mismatch is a major concern for graduates as universities may prescribe units, they deem valuable, which employers do not. Career development learning was first introduced to the education sector in the 1970s and progressed into more specific terms, models, and theories.

This study specifically focuses on Lupton and Bruce's (2010) information literacy learning model (Table 1), which demonstrates a hierarchical relationship through literacy levels identified as Generic, Situated and Transformative (Lloyd and Talja, 2010; Lupton and Bruce, 2010). The concepts and categories of the information literacy framework (Table 1) are quite like the concepts of the AQF, with different category names and terminology. The AQF uses the framework of knowledge, skills, and the application of both, whereas the literacy learning framework represents generic, situated, and transformative concepts respectively. The AQF recognises the link between these three actions are essential to ensuring learning outcomes are achieved. All qualifications in the AQF assist students to prepare for further study and working life. Finally, the AQFs purpose is to establish a standard framework to ensure the design and quality assurance of education and training in Australia remain high (Education.gov.au, 2019).

5. Methodology

This study adopts a mixed methodology to investigate a range of problems from a variety of perspectives including data collection through primary and or secondary data collection.

Literacy Level	Description
Generic	Refers to cognitive skills and processes providing individuals with the ability to find, analyse and manage information (Lloyd and Talja, 2010). Generic refers to basic skills required in life.
Situated	Includes generic skills and processes but expands on these. The information at this level is evaluated and examined according to the context of individual and/or social group, as the information literacy provides contrasting meanings within different contexts (Lloyd and Talja, 2010; Lupton and Bruce, 2010).
Transformative	Includes generic level skills and the social practices and relevance of the situated level. Skills at this level are seen through a range of information practices used to transform oneself and society by challenging norms (Lloyd and Talja, 2010).

Table 1. Information Literacy Learning Model

A range of current BIT Learning Outcomes (LOs) from different universities were categorised into a matrix according to the information literacy learning framework and the AQF, to understand the current curriculum and to better adapt it in future (Table 2). The LOs were categorised as Theory (i.e., Generic, Situated, Transformative Learning); Skills (i.e., Fundamental, People, Thinking, Personal, Occupational Specific); and Application. The purpose of developing a taxonomy here was to study the relationships between current educational curricula coupled with the skills organisations seek. After completion of this mapping, pilot interviews were conducted with IT job recruiters. In future, we will also further examine the perspectives of current undergraduate students, academics, and alumni by collecting data through primary and secondary sources, with a view to examining university curricula via LOs to understand how they may or may not limit employability to ICT employers, as well as provide graduate mobility across disciplines as a means of increasing employability.

Theory			Skills				Application
Generic	Situated	Transformative	Fundamental	People	Thinking	Personal	

Table 2. Information Literacy Model

6. Results and Discussion

6.1 Matrix Mapping

Core units were taken from a range of computing units within the named degrees of “Bachelor of Information Technology” only across universities within New South Wales (Australia). Information Systems (IS) under the category of BIT degrees, with universities offering IS as a major within the degree. Only NSW universities and specific named degrees are showcased here for reasons of publication length. Those highlighted in yellow in Table 3 are the universities mapped within the matrix in this study.

University	Computing Degree Offered	Years
Australian Catholic University (ACU)	Bachelor of Information Technology	3 years
Charles Sturt University (CSU)	Bachelor of Information Technology (with specialisations)	3 years
Macquarie University (MQU)	Bachelor of Information Technology	3 years
Southern Cross University (SCU)	Bachelor of Information Technology	3 years
University of New England	Bachelor of Computer Science	3 years
University of New South Wales	Bachelor of Information Systems	3 years
University of Newcastle (UON)	Bachelor of Information Technology	3 years
University of Sydney	Bachelor Advanced Computing	4 years
University of Technology Sydney (UTS)	Bachelor of Information Technology	3 years
Western Sydney Uni (WSU)	Bachelor of Information and Communications Technology	3 years
University of Wollongong (UOW)	Bachelor of Information Technology	3 years

Table 3. NSW universities and their computing named degrees

The following steps were taken to determine the data demonstrated in the matrix, which due to its size cannot be displayed here. First, (1) each of the LOs from core units from universities highlighted (Table 3), were chosen from the unit guides provided to the public (secondary data). These LOs were mapped according to the categories in Table 2. During this mapping stage it was ensured the university and years were hidden and randomised to avoid bias toward any specific unit or university. The result was then cross-checked by another person within the field of academia. After initial completion of the mapping, (2) the learning outcomes were organised respective of their units and then universities, for further analysis. (3) Once all LOs were mapped and categorised per university, each of the instances of occurrence were calculated by category using the following formula: Number of Occurrence in a category/ (Count of Learning Outcomes per unit x 9). A multiplication by 9 served to demonstrate each individual category present (Generic, Situated, etc., to Application), to present the percentage of occurrence per unit. A percentage per unit was then undertaken by calculating for each unit the percentage count of each occurrence in a category. The following formula was applied:

$$= \frac{\text{Occurance Per Category}}{\text{Total Possible Occurance}} \times 100$$

A breakdown of the formula is described through an example below which specifically looks at the unit “Introduction to Computer Programming” offered at Macquarie University (Table 4):

Learning Outcomes	Generic	Situated	Transformative	Fundamental	People	Thinking	Personal	Occupational Specific	Application
Apply problem solving skills to develop algorithms that solve small-to-medium sized computational problems		Y				Y		Y	Y
Design and write code to implement a program description in an imperative programming language		Y						Y	Y
Identify and describe ethical issues in an academic environment and demonstrate active engagement in the learning process	Y			Y					
Understand and apply appropriately the concepts of variables, loops, functions, conditionals, and compound data in the implementation of programmed systems		Y				Y		Y	Y
Use standard software engineering practices to document, debug, and test programs	Y			Y		Y		Y	

Table 4. Mapping applied to the unit ‘Introduction to Computer Programming’

In the Generic column, the following steps were involved: (1) The count of all “Ys” were calculated. (2) Then the Total Possible Occurrence for the unit was calculated by Counting the Number of Learning Outcomes for the Unit (5) and multiplying that with the Number of Categories (9). (3) The outcome from step 2 was then converted to a percentage. This result cell is highlighted in yellow in Table 5 and then rounded to a whole number. The equation for this is as follows:

$$= \frac{(0 + 0 + 1 + 0 + 1)}{(5 \times 9)} \times 100 = \frac{2}{45} \times 100 = 0.044444444 \dots \times 100 = 4\%$$

The same steps were followed for each category for all units allowing us to further analyse and visualise several breakdowns, such as occurrence per category, per university and per year of study.

6.1.1 Occurrence Per Category

Figure 1 was created from the dataset in the matrix by summing the occurrence per category to create the pie chart - clearly demonstrating universities across Australia focus mainly on Occupational (28%) and Situated Theory Skills (23%). Occupational Specific skills led in all skills by a large percentage, with 191 of the 299 learning outcomes mapping to this category, followed by Fundamental at only 72 in comparison (only 10%) - highlighting a massive gap in skills taught at university level. Application (3%),

People (4%) and Personal (4%) skills are least applied in the BIT core units across Australia, demonstrating universities are largely focused on technical and theoretical knowledge in comparison to skills. For theoretical skills, situated (23%) is more often taught at a university level in comparison to the other two (Generic and Transformative), but unlike the skills categories, Transformative skills are least applied in the BIT curriculum.

Unit Code	Unit Name	Year	Generic	Situated	Transformative	Fundamental	People	Thinking	Personal	Occupational Specific	Application
COMP1000	Introduction to Computer Programming	1	4%	7%	0%	4%	0%	7%	0%	9%	7%
COMP1300	Introduction to Cyber Security	1	2%	4%	4%	4%	0%	7%	0%	9%	0%
COMP1350	Introduction to Database Design and Management	1	8%	3%	0%	3%	0%	0%	0%	8%	0%
COMP2250	Data Communications	2	4%	7%	0%	2%	0%	0%	0%	11%	2%
COMP3850	Computing Industry Project	3	2%	9%	0%	4%	4%	7%	0%	0%	2%

Table 5. Percentages Per Unit based on the Matrix

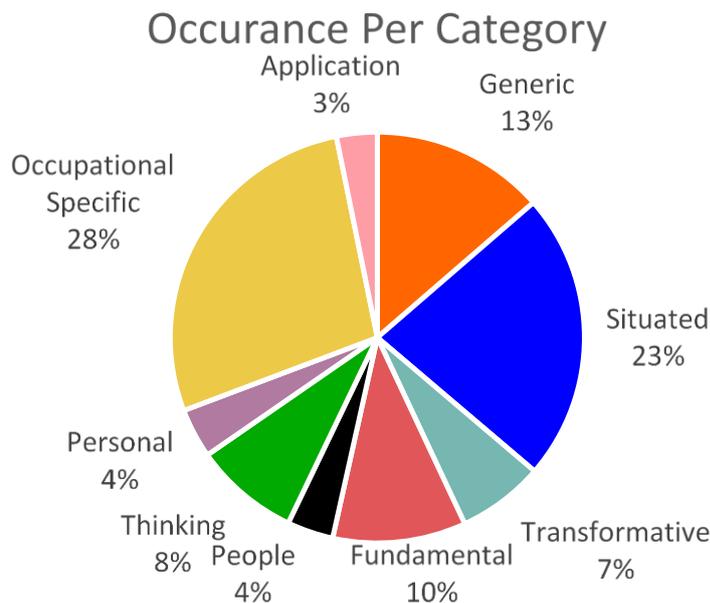


Figure 1: Percentages Per Category based on NSW Universities

6.1.2 Occurrence Per University

The percentage per university was the next breakdown analysed. The same formula as above was applied to this category. The following explanation specifically examines units at Macquarie University, but this time not broken down by per university for the generic category: [1] The count of all the “Ys” were calculated. [2] Then the Total Possible Occurrence for the unit was calculated by Counting the Number of Learning Outcomes for the Unit (25) and multiplying that with the Number of Categories (9). [3] The output from this process was then converted to a percentage with the equation as follows:

$$= \frac{9}{(25 \times 9)} \times 100 = \frac{9}{225} \times 100 = 0.04 \times 100 = 4\%$$

The value is highlighted in yellow in Table 6, rounded to a whole number. The formula was applied to each category per level, per university. This was then converted to a radar map as shown in Figure 2.

University	Generic	Situated	Transformative	Fundamental	People	Thinking	Personal	Occupational Specific	Application
Macquarie University (MU)	4%	6%	1%	4%	1%	4%	0%	8%	2%
Southern Cross Uni (SCU)	6%	4%	0%	3%	0%	2%	0%	9%	0%
University of Technology (UTS)	3%	6%	2%	4%	1%	1%	3%	5%	1%
University of Wollongong (UoW)	3%	6%	1%	2%	1%	2%	1%	8%	1%

Table 6. Percentages per University

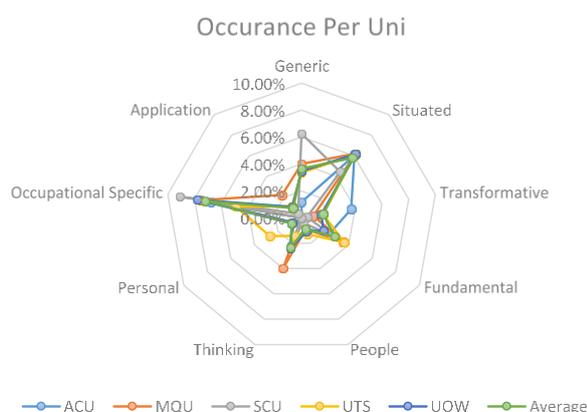


Figure 2: Radar graph illustrating Percentages per University

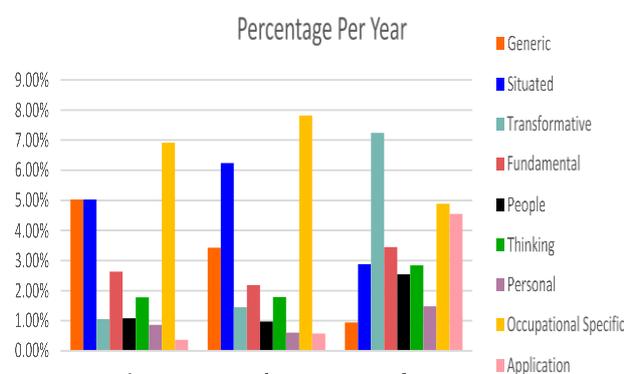


Figure 3: Occurrence Per Year

The radar graph (Figure 2) demonstrates a similar analysis to Figure 1, but with a breakdown per university as well as the overall average (green). The map clearly shows that Occupational Specific is the most common in occurrence (7.21% average) across all universities, except for UTS which is the outlier with situated skills taking the lead. Overall, this is closely followed by Situated skills across all universities with an average of 5.82%, with outliers being SCU where Generic is the second highest in occurrence and UTS with Occupational Specific. Similar to the pie chart in Figure 1, Personal and Application are the lowest in occurrence with some having a 0% occurrence, such as Application skills for ACU and Personal skills at Macquarie and Southern Cross Universities. The other skills of Transformative, Fundamental, People and Thinking, follow a similar trend across universities and do not greatly fluctuate between universities. In summary, the radar graph illustrates the highest and lowest priority of skills universities apply within their BIT degree. It is evident Occupational and Situated are the focus overall, and Personal and Application represent the lowest priority across universities.

6.1.3 Occurrence Per Year

The bar chart in Figure 3 follows a similar trend to the above two analyses, showing that regardless of university, Occupational Specific skills are one of the highest in occurrence with an average of 6.54%, being the highest in occurrence across all years - except the final year units (3rd) with Transformative Theory skills in the lead at 7.24%, constituting a massive leap in comparison to 1st year (1.05%) and 2nd year units (1.45%). Personal, People and Application are once again least in occurrence across the years of study. In the first year, Occupational Specific is in the lead with 6.92%, followed by both Generic and Situated at 5.03%. The trend is similar in second-year units, except for Situated skills taking a large lead in comparison to Generic skills, with a difference of 2.82%. In the final year, there is a switch in skills being taught, with Transformative Theory skills in the lead at 7.24%, followed by Occupational (4.89%), then Application skills (4.55%). While Generic and Personal skills are lowest in occurrence throughout the final year. These results demonstrate that NSW universities generally focus on theory and technical aspects in the first and second year of the BIT degrees, and only start focussing on the application of

these skills in the final year of study. Today some universities provide students with opportunities to acquire practical skills to complement their university degree, which can prove useful in the real world. Examples of such practical skill learning opportunities are evident through the Professional and Community Engagement (PACE) program at Macquarie University (2019) and the sandbox program at the University of New South Wales (UNSW 2020).

6.2 Interviews

After completing the matrix by collecting unit guides for NSW BIT degrees, a set of trial interviews were conducted with IT professionals in a range of different companies responsible for recruitment. The purpose of this process was to analyse the needs of employers and match these with skills taught at universities (as indicated through the matrix). In the trial run of interviews, three candidates were interviewed from the IT department of their organisation and responsible for recruitment for several years. The questions were adjusted several times to maximise the efficiency of the interviews. The average time of the final set of beta questionnaires was 20 minutes and included a range of open-ended and closed Likert scale questions. This beta interview will then be sampled with a larger pool of employees (around 15) from a range of IT backgrounds. A sample of the final interview questions and their analysis from the small beta interviews are as follows:

6.2.1 Background

- Q1. Can you please tell me the structure of your organisation?
- Q2. How long have you worked with the organisation and what is your current role with the organisation?

Interviewee 1 (EL) recently left CBA to join Amstelveen and spent 8 years in the IT field and was responsible for the recruitment process for multiple businesses he worked for. Interviewee 2 (JS) was involved in the IT sector for 17 years and works for a Multinational Organisation as their Learning Technology Manager and has been involved in the recruitment of graduates and employees over the past 10 years. Interviewee 3 (MN) has over 24 years IT experience and is currently focusing on the health sector where the most recent projects involved the impact of cyber risk on hospitals. MN has been involved in recruitment/hiring for the last 20 years.

6.2.2 Recruitment

- Q3. On a scale of 1 – 10 how much emphasis do you place on education such as a university degree? (1 representing not at all and 10 being all the time). Average rating = 8.75
- Q4. On a scale of 1 – 10 how often do you look at a graduate's GPA when hiring employees? Average rating = 4.25
- Q5. When you hire a new IT graduate, looking through an application, what are the key criteria are you looking for?

The interview stage of this study provided the primary data to validate the research. Stewart (2021) highlighted the impact of graduate capabilities versus employability and this outcome was supported by our interviewees. Also, a study by Succi and Canovi (2019) in which 131 employers were surveyed in Europe, raised the importance of “soft skills” for graduate capability in the workforce. This response was also noted in our employer interviews. Finally, potential employers further highlighted that certain “basic skills” were also required for entry level roles, rather than a focus on high level skill sets for more competent experienced roles (Jackson 2013). In summary, the importance of soft skills and the development of these in conjunction with hard skills is a contribution of this research.

6.2.3 Skills

The next three questions related to the matrix (Table 2). A summary of terminology was shown to the interviewees who were asked to rank them accordingly. The ranking of skills included: *Theory* (Generic, Situated, Transformative Learning), *Skills* (Fundamental People, Thinking, Personal, Occupational Specific) and *Application*. For these questions the answers were ranked and the average graphed.

- Q6. In your opinion, rank these skills in the order you think university students are learning.
- Q7. In your opinion, rank these skills in order of importance for employment.
- Q8. How do you measure the skills of a candidate?

A range of skills were noted, but the most important skill was communication; one interviewee emphasised this saying “if you can communicate well to people what's going on, then it doesn't really

matter if you don't have those skills to start with, it's something I can provide on the job with training” while another stated “depending on the role... if it is a very technical role, then we use technical tests... Apart from that, it is just generic question and answer.”

6.2.4 Hiring Graduates

Regarding the graduate hiring process, the following questions were posited:

- Q9. Does your organisation provide internships to students who are currently studying a degree? If yes, how many approximate interns have you offered employment to in the company? If no, why not?

All employers interviewed had some form of internship within their organisation, something they all saw value in, bringing fresh perspectives.

- Q10. On a scale of 1 – 10, how essential is it to know the candidate previously? For example, the candidate might have worked as a summer intern for the organisation, or the candidate might have known to the organisation through Macquarie University's PACE program. Average rating = 8.75.

- Q11. What are your expectations when hiring graduates?

“Person of sound character who is interested and curious, who wants to learn, who's sort of got enough self-autonomy that they are not going to need to be kind of babysat” - EL

“Someone who is self-motivated and willing to challenge the norm” - JS

“Interested in the field... they understand there are challenges with working...” - MN

- Q12. What are some benefits of hiring graduates in your company and department?

MN said that hiring graduates is beneficial as it allows them to “... influence the education of those people, while they're at university”

- Q13. What are some issues you have had with hiring interns and graduates?

“Trying to find the right person... too much investment of time and effort...” - EL

“They get lazy... lot of reinforcement is needed...” - JS

“... wide range of different aptitudes and people that are coming in...” - MN

- Q14. Is there anything we have not covered that you would like to add?

6.3 Matrix and Interview Summary

Regarding hiring, it was evident employers valued skills over theory overall. If the candidate is a student, they may ascertain the student's degree, but the basic skills, communication, attitude, and ability to learn on the job are a priority for recruiters. When the categories from the matrix were ranked by interviewees - People, Thinking and Application Skills were ranked highest on average. In comparison, the matrix (Table 2) demonstrates that university curricula within BIT degrees focus on Occupational Skills, Situated Theory and Generic Theory skills, which are not the categories employers prioritise as mentioned in the interviews. This clearly demonstrates an education-employment mismatch. In the interviews several interviewees mentioned that Occupational Specific skills are only tested by employers for very technical competences, otherwise they are willing to teach the candidate with the right attitude and communicative ability. This also matches with several studies which suggest that IT management prefer to hire graduates with a foundation of technical skills, but also other skills to ensure that graduates can work closely with non-technical departments and users as well (Abraham et al., 2006) especially as those who possesses sufficient human relations skills can communicate effectively, which is a scarce and vital resource (Trauth et al, 1993). In order to foster such skills, employers encourage students to undertake internships and view such training as a bonus to the degree, demonstrating a substantial education-employability mismatch, further highlighting the need for change to the BIT curriculum to meet employer needs, ensuring graduates are job-ready upon degree completion. However, we note what is presented are merely preliminary results from a very small sample of three interviews and a further large sample of interview data is to be collected for the final product analysis. Our research is ongoing, and we intend to gain a broader understanding of the potential IT employer vs. university computing curricula mismatch.

7. Conclusion

Employability is emerging as a top priority for graduates and employers in Australia for the betterment of society. There exists a suite of knowledge, skills, and attitudes sought by employers. Graduate employability has become a key objective for governments and a performance indicator for higher education institutions. Whilst employers may be satisfied in general with the technical skills of new graduates, they are not currently convinced by graduate competency in non-technical abilities or employability skills. This study examines ways to improve current university curricula to match the skills employers seek and ensure institutions remain current. The mapping of the matrix and the trial interviews conducted, helps identify the demands of employers, highlights the education-employment mismatch, identifies current strengths, and flaws of the curricula, and moves toward ultimately improving Australia's BIT degrees. Future work will examine a further sample of interviews from employers regarding their expectations, academics at universities and current students and graduates, to gather the perspectives of a range of different stakeholders relevant to education and employment, as closing the expectation gap requires the involvement of all stakeholder group (academics, employers, and students) (Trauth et al, 1993).

8. References

- Aasheim, C., Shropshire, J., Li, L., & Kadlec, C. (2012). Knowledge and skill requirements for entry-level IT workers: A longitudinal study. *Journal of Information Systems Education*, 23(2), 193.
- Archer, W., and Davison, J. 2008. *Graduate Employability*, The Council for Industry and Higher Education.
- Australian Qualifications Framework, AQF. 2020. Australian Qualification Framework, [Online]. Available: <https://www.aqf.edu.au/> [Accessed 7 July 2020].
- Brown, P., Hesketh, A., and Williams, S. 2003. "Employability in a knowledge-driven economy," *Journal of Education and Work*, (16), pp. 107-126.
- Cassidy, S. 2006. "Developing employability skills: Peer assessment in higher education," *Education+ Training*, (48), pp. 508-517.
- Department of Foreign Affairs and Trade, DFAT. 2017. *The Australian Education System*, Australian Government. [Online]. Available: <https://www.dfat.gov.au/sites/default/files/australian-education-system-foundation.pdf> [Accessed 1 September 2020].
- Department of Jobs and Small Business, DJSB. 2019. *Australian jobs 2019* Australian Government. [Online]. Available: <https://docs.employment.gov.au/system/files/doc/other/australianjobs2019.pdf> [Accessed 9 September 2020].
- Dill, D. D., and Soo, M. 2005. "Academic quality, league tables, and public policy: A cross-national analysis of university ranking systems," *Higher Education*, (49), pp. 495-533.
- Education.gov.au. 2019. *Review of the Australian Qualifications Framework Final Report 2019*, [Online]. Available: <https://docs.education.gov.au/node/53081> [Accessed 7 July 2020].
- Greenbank, P. 2014. "Competing in the graduate labour market: Student perspectives on (not) participating in extra-curricular activities," *Journal of Teaching and Learning for Graduate Employability*, (5), pp. 63-79.
- Hillage, J., and Pollard, E. 1998. "Employability: developing a framework for policy analysis," [Online]. [Accessed 13 August 2019].
- Jackson, D. (2013). Student perceptions of the importance of employability skill provision in business undergraduate programs. *Journal of Education for Business*, 88, 271-279. doi:10.1080/08832323.2012.697928
- Lee, S., Koh, S., Yen, D., & Tang, H. L. (2002). Perception gaps between IS academics and IS practitioners: an exploratory study. *Information & Management*, 40(1), 51-61.
- Lin-Stephens, S., Smith, S., Peso, M., and Pang, V. 2016. "The career information literacy learning framework: A case study of information systems, information technology and engineering capstone units of an Australian university," in *Pacific Asia Conference on Information Systems (PACIS) 2016*. Langkawi.

- Lloyd, A., and Talja, S. 2010. *Practising information literacy: Bringing theories of learning, practice and information literacy together*, Elsevier, USA.
- Lupton, M., and Christine, B. 2010. "Window on information literacy worlds: Generic, situated and transformative perspectives," in Lloyd, A., and Talja, S. (Eds.) *Practising Information Literacy*. Centre for Information Studies, Charles Sturt University, Australia, pp. 3-27.
- Macquarie University. 2019. PACE experience, [Online]. Available: <https://students.mq.edu.au/experience/practical-experience/pace-experience> [Accessed 19 August 2020].
- Marginson, S., Tytler, R., Freeman, B., and Roberts, K. 2013. "STEM: country comparisons: International comparisons of science, technology, engineering and mathematics (STEM) education," Final report [Online]. Deakin Research Online. [Accessed 1 September 2020].
- Mason, G., Williams, G., and Cranmer, S. 2009. "Employability skills initiatives in higher education: What effects do they have on graduate labour market outcomes?," *Education Economics*, (17), pp. 1-30.
- Norton, A., Cherastidham, I., and Mackey, W. 2018. *Mapping Australian higher education 2018*, Grattan Institute.
- Ryan, G., Toohey, S., and Hughes, C. 1996. "The Purpose, Value and Structure of the Practicum in Higher Education: A Literature Review," *Higher Education*, (31), pp. 355-377.
- Singhal, P. 2019. "Full-time employment rate for university graduates plummets," *The Sydney Morning Herald*, Available: <https://www.smh.com.au/education/full-time-employment-rate-for-university-graduates-plummets-20190110-p50qlf.html> [Accessed 9 April 2019].
- Stewart, B. A. (2021) 'An empirical approach to identifying employability skills required of graduates in the environmental sciences', *Industry and Higher Education*, 35(2), pp. 89–101. doi: 10.1177/0950422220936869.
- Støren, L. A., and Aamodt, P. O. 2010. "The quality of higher education and employability of graduates," *Quality in Higher Education*, (16), pp. 297-313.
- Succi C and Canovi M (2019) Soft skills to enhance graduate employability: comparing students and employers' perceptions. *Studies in Higher Education*. DOI: 10.1080/03075079.2019.1585420.
- Taylor, P., and Braddock, R. 2007. "International university ranking systems and the idea of university excellence," *Journal of Higher Education Policy and Management*, (29), pp. 245-260.
- Todd, P. A., McKeen, J. D., & Gallupe, R. B. (1995). The evolution of IS job skills: a content analysis of IS job advertisements from 1970 to 1990. *MIS Quarterly*, 1-27.
- Trauth, E. M., Farwell, D. W., & Lee, D. (1993). The IS expectation gap: Industry expectations versus academic preparation. *MIS Quarterly*, 293-307.
- University of New South Wales. 2020. *Sandbox Education Program UNSW Business School* [Online]. Available: <https://www.business.unsw.edu.au/about/schools/information-systems-technology-management/sandbox-education-program> [Accessed 27 February 2020].
- University of Sydney. 2020. *Overseas jobs*, [Online]. Available: <https://www.sydney.edu.au/careers/students/finding-jobs/overseas-jobs.html> [Accessed 8 September 2020].
- Yezdani, O. 2017. "Five myths about Australian university graduate outcomes," *The Conversation*, Available: <https://theconversation.com/five-myths-about-australian-university-graduate-outcomes-87074> [Accessed 3 September 2019].

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