The Journal of Teaching and Learning for Graduate Employability

ISSN: 1838-3815 (online) Journal Homepage: https://ojs.deakin.edu.au/index.php/jtlge/

Using internship placements to road test threshold learning outcomes for environment and sustainability

Michael Whelan[1] and Amanda Reichelt-Brushett[2]

Corresponding author: Michael Whelan (michael.whelan@scu.edu.au)
[1]School of Environment, Science and Engineering, Southern Cross University, Lismore, Australia. ORCID https://orcid.org/0000-0002-4310-3291
[2]School of Environment, Science and Engineering, Southern Cross University, Lismore, Australia. ORCID https://orcid.org/0000-0002-5212-7586

Abstract

In 2015 the threshold learning outcomes (TLOs) for Australian bachelor degree graduates in the discipline of Environment and Sustainability were released. This study road tested the Environment and Sustainability TLOs in the workplace via environmental science students' internship placement. The study, which incorporated surveys of host-supervisors, students and teaching staff, was conducted over four years. The surveys enabled comparisons between the performance expected of a new graduate by employers with the level of performance students achieved while on placement. Overall, hosts expect new graduates to be 'Capable' performers (2.8 on a 5 point scale). Host-supervisors also rated the overall performance of interns as 'Capable' (3.4/5). Expected performance of a new graduate for individual TLOs was compared with the performance of interns. Students exceeded the expectations of host-supervisors for all TLOs. In contrast, teaching staff rated the performance of students lower than students themselves and host-supervisors. Fundamental differences in the way students are assessed in the workplace and the classroom may account for the difference in perceived student performance. The results of the surveys can be used as evidence that the degree is meeting the needs of industry and for graduates to undertake professional work in the Environment and Sustainability discipline. The methodology has the potential to be used in any discipline that has published TLOs. The authors recommend that the Australian Qualifications Framework is reviewed and a rubric that describes student behaviour is used rather than vague terms such as 'well developed'.

Keywords: WIL, employability, environment and sustainability, threshold learning outcomes, graduate employer expectations

Introduction

In 2010, the Australian Teaching and Learning Council, Learning and Teaching Academic Standards project supported discipline communities to develop and articulate threshold standards. The standards were to define the minimum learning outcomes a graduate must achieve. The standards included discipline-specific knowledge, discipline-specific skills and discipline-specific capabilities. In addition, the standards included generic skills (e.g. teamwork) as they would be applied in the discipline (Australian Learning and Teaching Council, 2010). Threshold learning outcome statements

have been published for 28 disciplines (Table 1). At this stage, the future of the Australian threshold learning outcome statements is unclear in relation to the Tertiary Education Quality and Standards Agency. Similar initiatives have been undertaken abroad. Harris (2009) summarized initiatives refining expectations of knowledge outcomes within subjects and disciplines, including the Tuning Process (Europe) which identified threshold-level learning outcomes for a wide range of subjects, and the Subject Benchmark Statements (UK), wherein subject-specific statements of learning outcomes are part of the national quality assurance framework (Harris, 2009).

Table 1: Threshold Learning Outcomes Published for Disciplines in Australia.

Discipline (Year of release)	Discipline (Year of release)	Discipline (Year of release)
Law (2010)	Health, medicine and veterinary science (2011)	Biology (2013)
Geography (2010)	Architecture, Building & Construction, Education (2011)	Economics (2013)
History (2010)	Building (2011)	Journalism, Media & Communications (2013)
Creative & Performing Arts (2010)	Pharmacy (2011)	Mathematics (2013)
Accounting (2010)	Education (2011)	Biomedical Science (2013)
Engineering and Information and Computer Technology (2010)	Marketing (2012)	Chemistry (2013)
Creative & Performing Arts (2010)	Sociology (2012)	Agriculture (2014)
Public health nutrition (2010)	Psychological Literacy and Global Citizenship (2012)	Finance (2014)
Science (2011)	Physics (2012)	Environment and Sustainability (2015)
		Tourism, Hospitality and Events (2015)

From: Freeman and Ewan (2014); Office of Learning and Teaching (2015).

The threshold learning outcomes (TLOs) for Environment and Sustainability, published in 2015 (Phelan et al., 2015), were developed in consultation with more than 250 individuals: industry representatives; academics in the discipline; students and Indigenous representatives. The TLOs for Environment and Sustainability, which were commissioned and endorsed by the Australian Council of Environmental Deans and Directors, are presented in Table 2. Graduates are meant to meet, or exceed, all TLOs on graduation *to undertake professional work and as a pathway for further learning* (Phelan et al., 2015, p. 13). However, there is no definition of the descriptors 'meet' or 'exceed'.

Table 2: Threshold Learning Outcomes for Environment Sustainability (Phelan et al., 2015, p. 13)

Domain	Threshold Learning Outcome	Abbreviated threshold learning outcome
Transdisciplinary knowledge	1. Demonstrate a broad and coherent knowledge of: 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity.	1.1 Know: Human & environment 1.2 Know: key drivers 1.3 Know: holistic
Systemic	2. Demonstrate an understanding of diverse	

understanding	approaches to environment and sustainability, including: 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of indigenous peoples globally.	2.1 System: conceptualise 2.2 System: frameworks 2.3 System: values 2.4 System: indigenous
Skills for environment and sustainability	3. Demonstrate well-developed cognitive, technical and communication skills through: 3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with Indigenous approaches to environmental and sustainability challenges.	3.1 Skills: research 3.2 Skills: think critically 3.3 Skills: apply tools 3.4 Skills: teamwork 3.5 Skills: communication 3.6 Skills: indigenous
Ethical practice	4. Demonstrate an ethical professional, public and personal conduct by having capacity to: 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.	4.1 Ethical: reflection 4.2 Ethical: participate

Institutions may use TLOs to map existing course learning outcomes against the discipline TLOs to ensure that graduates meet the minimum standard required. The present study is part of that process. Southern Cross University has developed seven generic graduate attributes. For each graduate attribute, course learning outcomes were developed. There are 13 course learning outcomes in total. In a study that was conducted in 2014 the importance and perceptions of student performance of graduate attributes and learning outcomes were evaluated (Whelan, 2017a). The 2014 study enabled the comparison of graduate attributes and course learning outcomes that were developed 'in house'. At the time the survey was conducted the TLOs for

Environment and Sustainability were in development. The present study provided the ability to evaluate the performance of students against nationally recognised TLOs and graduates preparedness for professional employment.

Context

Since the 1990s there has been a focus for universities to produce 'work ready' graduates (Moore & Morton, 2017). The focus led to the development of graduate attributes and employability indicators (e.g. Oliver & Whelan, 2011). As a consequence, pressure is placed on universities to provide evidence that they are producing 'work ready' graduates (Tee, Ferns, & Hughes, 2018). Past studies, which focused on writing skills of various disciplines (Moore & Morton, 2017), overall graduate performance in various disciplines (Oliver et al., 2014) and pharmacy (Tee et al., (2018) did not find significant gaps in the skills of graduates. In fact, Evans-Greenwood, O'Leary and Williams (2015) suggested that *the biggest challenge facing educators, however, is in forging a new relationship with students and industry* (p. 33). Clearly, work integrated learning (WIL) is a pathway to forging these relationships and has been identified as playing an important role in preparing graduates for employment (Business Industry and Higher Education Collaboration Council, 2007; Jackson, 2013, 2015; Rowe & Zegwaard, 2017). Consequently undergraduates approaching graduation who have participated in WIL (i.e. internships) could be used to provide empirical evidence of employability (Jackson, 2010).

The use of surveys of industry and students can be used to not only to assess capabilities and perceptions of capabilities, but also to review and develop curriculum. Azevedo, Apfelthaler and Hurst (2012) conducted a survey of employers in Europe and, using a Likert-type scale of 1 (strongly disagree) to 7 (strongly agree), asked them to judge the value, relevance and capability of a new graduate on eight competencies. The overall mean for all capability questions was 5.4/7. Similarly Tee, Ferns and Hughes (2018) recently published the results of an employability survey of pharmacy graduates. In their study, industry representatives, recent graduates and teaching staff were surveyed to compare the extent that graduates demonstrated capabilities and the importance of those skills to graduate success. The results of the survey and qualitative data collecting in the process were used to review the curriculum. While these studies focussed on the importance of skills rather than expected performance of a new graduate, a comparison of the importance of TLOs and performance of environmental science students on placement has previously demonstrated that the results can be used in course design (Whelan, 2016).

Research aims

The objectives of the present study were to 1: assess the suitability of the TLOs as an instrument to quantify the employability of graduates, and 2: quantify the performance required by potential employers for each of the Environment and Sustainability TLOs and determine if students completing WIL placements were meeting the expected performance level of employers.

Methods

The degree

The Bachelor of Environmental Science is a three-year degree (Australian Qualifications Framework Level 7). It offers four major areas of study: Coastal Management; Fisheries and Aquaculture Management; Environmental Resource Management; and Waste Management and Resource Recovery. The internship program has been running as an elective in the degree since 2002. The internship unit requires the students to complete a placement of 280 hours. Very few students are paid for their internship. Students are encouraged to enrol in the internship towards the end of

their degree. Any student who has completed two years of the degree can enrol regardless of their grade point average. Around 50 students enrol in the internship unit each year.

The survey

The present study used results of a survey that students and host-supervisors complete at the end of the students' placement. The survey has been conducted since 2014 and a previous study (Whelan, 2017a) road-tested graduate attributes and course learning outcomes. The present study is focused on Environment and Sustainability TLOs. In 2015 the survey asked participants (host-supervisors, teaching staff and students) to indicate the level of importance they placed on TLOs. The scale included: Meaning unclear, Not Applicable, 0 (Unimportant), 1, 2, 3, 4 and 5 (great importance). They were then asked to rate student performance in a 'Skill Area' (i.e. TLO). All surveys used the definitions of performance (Table 3) defined in the Core Skills For Work Developmental Framework (Department of Industry Innovation Climate Change Science Research and Tertiary Education & Department of Education Employment and Workplace Relations, 2013). In 2016 the survey was changed and asked participants to indicate the level of performance they expect of a new graduate (rather than the level of importance) and compared expected performance to the actual performance (Table 3) of students they supervised (Whelan, 2016). Additional questions that asked for an overall expectation of graduate performance and actual performance were also included.

Approval was granted by the Human Research Ethics Committee, Southern Cross University for both studies (2015 - ECN-15-183 and 2016-18 - ECN-16-199).

Table 3: Descriptors of Performance used in all Surveys.

Descriptor	Value used
A novice performer: Has little or no practical experience of the Skill Area on which to base actions. Is highly reliant on explicit 'rules' (e.g. instructions, processes, procedures, and models), guidance and support and priorities determined by others, to guide activities.	**1**
An advanced beginner: Has some practical experience of the Skill Area and is beginning to recognise patterns (e.g. routines, regular responses, links and connections) that help understanding and influence action. Is still reliant on explicit 'rules' and on assistance to identify priorities, but can apply these more autonomously in familiar, routine situations.	**2**
A capable performer: Has sufficient practical experience of the Skill Area to identify patterns and organising principles and establish priorities for action. Can comfortably apply the explicit and implicit 'rules' associated with familiar situations. Adopts a systematic, analytical approach to tasks, especially in unfamiliar situations.	**3**
A proficient performer: Has considerable practical experience of the Skill Area in a range of contexts and is moving from reliance on externally prescribed rules to recognition of principles that guide actions. Organises knowledge and practical experience as patterns, concepts and principles, which makes it possible to assess, and respond to situations in an increasingly intuitive and flexible way. Reverts to analysis and seeks guidance when making important decisions.	**4**
An expert performer: Has extensive practical experience of the Skill Area, with both a big picture understanding and an eye for relevant fine detail. Operates fluidly, intuitively and flexibly in highly complex situations, drawing on knowledge and practical experience organised into highly refined patterns, concepts and principles. Uses a combination of informed intuition and analysis in different situations, recognising that 'it all depends'. Will often reconceptualise approaches and practices to produce more effective outcomes, while also recognising which rules and principles are always applicable.	**5**

From: Department of Industry Innovation Climate Change Science Research and Tertiary Education and Department of Education Employment and Workplace Relations (2013).

All statistical analysis was carried out using SPSS Version 25. One-way analysis of variance was used to compare means and Tukey Honest Significant Difference was used as a *post hoc* test. A paired t test was used to compare expected performance of a graduate with the actual performance of an intern for individual TLOs. The Euclidean distance was used to calculate a distance between groups of respondents in 15 dimensions (i.e. a score for each TLO).

Results

Importance of TLOs

The study in 2015 enabled detailed comparisons of the importance of individual Environment and Sustainability TLOs between students (n=33), host-supervisors (n=14) and teaching staff (n=10) (Table 4).

Table 4: Comparison of the Importance of TLOs.

Threshold learning outcome	Host	Student	Teaching staff	F ratio	P
1.1 Know: human & environment	4.1	4.6	4.0	2.46	0.095
1.2 Know: key drivers	4.0*	4.7*	4.4	7.53	0.001
1.3 Know: holistic	3.9	4.1	3.7	0.87	0.425
2.1 System: conceptualise	3.7	4.2	3.7	2.65	0.080
2.2 System: frameworks*	3.2[a]	4.1[b]	3.2[a]	5.75	0.006
2.3 System: values	3.6	4.1	3.8	0.99	0.379
2.4 System: Indigenous	3.4	4.3	3.8	3.12	0.052
3.1 Skills: research	3.9*	4.4	4.8*	4.28	0.019
3.2 Skills: think critically	4.1	4.5	4.5	1.39	0.258
3.3 Skills: apply tools	4.2	4.3	4.4	0.23	0.793
3.4 Skills: teamwork	4.4	4.4	4.3	0.11	0.895
3.5 Skills: communication	4.4	4.5	3.9	2.23	0.117
3.6 Skills: Indigenous	3.5	4.3	3.5	4.26	0.019
4.1 Ethical: reflection	3.6*	4.3*	4.0	5.07	0.010
4.2 Ethical: participate	3.9	4.3	3.8	1.81	0.174
Overall	**3.9**	**4.4**	**4.0**		

Means that are significantly different (P<0.05) are marked with * or have a different superscript (a/b).

There were four significant differences (P<0.05) in importance of TLOs (Table 4).

- Students placed greater importance on TLO 1.2 Know: key drivers and 4.1 Ethical: reflection than hosts.
- Students placed greater importance on TLO 2.2 System: frameworks than teaching staff and hosts.
- Teaching staff placed greater importance on 3.1 Skills: research (4.8) than hosts.
- Overall, students (4.4) place greater importance on the TLOs than hosts (3.9) and teaching staff (4.0).

The Euclidian distance between students and hosts and teaching staff were 4.6 and 3.4, respectively. While the Euclidian distance between hosts and teaching staff was small (1.9).

Perceptions of student performance

Perceptions of student performance (Hosts n=14, Students n=33 and Teaching staff n=10) in Environment and Sustainability TLOs are presented in Table 5. The values represent the levels of performance described in Table 3. Overall:

- Teaching staff had a lower perception of student performance than students and hosts.
- There were seven significant differences between perceived performance of students.
- There were no significant differences between students and hosts.
- All the significant differences were due to teaching staffs' lower perception of students' performance.
- Perceived performance of TLOs 1.3: Know: holistic, 3.4: Skills: teamwork and 4.1: Ethical: reflection were lower than students' perceptions.
- Teaching staff's perception of performance of TLOs 2.2 System: frameworks, 2.3 System: values, 2.4 System: Indigenous and 3.6 Skills: Indigenous were lower than students and hosts (Table 5).

The differences between teaching staff and host-supervisors and students were highlighted by the Euclidian distance between teaching staff and students (9.7) and hosts (6.1) compared with the close alignment between students and hosts (1.2).

Table 5: Comparison of the Perceived Student Performance.

Threshold learning outcome	Host	Student	Teaching staff	F ratio	P
1.1 Know: human & environment	3.6	3.8	3.4	0.98	0.381
1.2 Know: key drivers	3.6	3.8	3.5	0.76	0.473
1.3 Know: holistic	3.5	3.5*	2.7*	3.39	0.041
2.1 System: conceptualise	3.6	3.6	3.0	2.25	0.116
2.2 System: frameworks*	3.1^{b}	3.5^{b}	2.0^{a}	10.55	0.000
2.3 System: values*	3.7^{b}	3.8^{b}	2.8^{a}	7.07	0.002
2.4 System: Indigenous*	3.1^{b}	3.2^{b}	2.1^{a}	7.79	0.001
3.1 Skills: research	3.5	3.9	3.4	2.09	0.134
3.2 Skills: think critically	3.5	3.6	3.1	1.11	0.336
3.3 Skills: apply tools	3.5	3.8	3.4	0.97	0.387
3.4 Skills: teamwork	3.9	4.4*	3.7*	4.02	0.024
3.5 Skills: communication	3.7	3.9	3.2	2.73	0.075
3.6 Skills: Indigenous*	3.2^{b}	3.1^{b}	2.1^{a}	4.50	0.016
4.1 Ethical: reflection	3.2	3.8*	2.7*	8.42	0.001
4.2 Ethical: participate	3.5	3.7	3.1	1.58	0.215
Overall	**3.5**	**3.7**	**3.0**		

Means that are significantly different (P<0.05) are marked with * or have a different superscript (a/b).

Expected overall graduate performance vs actual performance of interns

In answer to the question regarding the expected overall performance of a new graduate the hosts indicated that a 'Capable' performer (Table 3) was required (2.8/5) (Table 6). Students' expected performance of a new graduate was slightly higher (3.2/5) but the difference was not significant (P=0.09).

The actual performance of students on placement (3.4/5) reported by host-supervisors (Table 6) was greater than the expected overall performance of a graduate (2.8/5), but the difference was not significant (P=0.06). Students reported the same level of actual performance (3.4/5) as hosts.

Table 6: Comparison of Expected and Actual Overall Performance

	Hosts		Students	
Performance	**Mean**	**s**	**Mean**	**s**
Expected	2.8 (n=18)	0.86	3.2 (n=62)	0.76
Actual	3.4 (n=19)	0.96	3.4 (n=53)	0.84

s: standard deviation

Expected and actual performance of individual threshold learning outcomes

There were no significant differences between hosts and students in actual performance for any TLO (Table 7). There were 7 significant differences (P<0.05) where students had higher expectations than hosts. Results from paired t tests of host-supervisors' expected performance and evaluation of actual student performance revealed that student performance was significantly greater (P<0.05) than the hosts' expectations for 14 of 15 TLOs.

Table 7: Comparison of Expected and Actual TLO Performance.

	Host perceptions of performance (n=30)				Student perceptions of performance (n=65)	
Threshold learning outcome	Expected	Actual	Mean Difference	P paired t test	Expected	Actual
1.1 Know: human & environment	2.93	3.17	0.23	0.02*	3.09	3.23
1.2 Know: key drivers	2.94	3.19	0.26	0.09	3.23	3.32
1.3 Know: holistic	2.57	2.97	0.40	0.01*	2.92	3.06
2.1 System: conceptualise	2.57	3.07	0.50	0.01*	2.92	3.12
2.2 System: frameworks	2.74	3.21	0.47	0.01*	2.90	3.02
2.3 System: values*	2.55*	3.48	0.94	0.00*	3.42*	3.65
2.4 System: Indigenous*	2.39*	2.93	0.55	0.00*	3.03*	3.12
3.1 Skills: research	3.03	3.42	0.39	0.03*	3.29	3.55
3.2 Skills: think critically*	2.73*	3.29	0.56	0.00*	3.17*	3.39
3.3 Skills: apply tools	3.00	3.38	0.38	0.05*	3.15	3.42
3.4 Skills: teamwork	3.39	3.87	0.48	0.01*	3.80	3.88
3.5 Skills: communication*	2.90*	3.42	0.52	0.01*	3.52*	3.50
3.6 Skills: Indigenous*	2.48*	3.07	0.59	0.00*	3.05*	2.94
4.1 Ethical: reflection*	2.94*	3.55	0.61	0.00*	3.41*	3.47
4.2 Ethical: participate*	2.68*	3.26	0.58	0.00*	3.17*	3.27
Overall	**2.79**	**3.29**	**0.50**		**3.20**	**3.33**

*Significant difference (P<0.05).

Road test: Threshold Learning Outcomes for Environment and Sustainability

The Environment and Sustainability TLOs were developed using a rigorous and extensive process and were endorsed by the Australian Council of Deans and Directors (Phelan et al., 2015). The present study enabled the performance of graduates to be assessed using this nationally recognised standard. An earlier study (Whelan, 2017a) evaluated the course learning outcomes and graduate attributes that were developed 'in house'. Overall, the results from the previous study were similar but in the previous study the hosts perceived performance of students was

approaching 'Proficient' (3.8/5), while in the present study their performance was rated 'Capable' (3.3/5).

The complexity of the TLOs may be a factor that contributed to a lower perception of student performance. Combining skills within a TLO may have made it more difficult for students to demonstrate their skills. Many of the TLOs combine 3 or more skills (see Table 2), but course learning outcomes and graduate attributes tend to be simpler as shown in the course learning outcome: *Demonstrate imagination, initiative and enterprise in problem-solving.* TLO 3.2 is the closest to this course learning outcome: *Demonstrate well-developed cognitive, technical and communication skills through thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures*. As a respondent completing the survey it is easier to reflect on a student's placement and remember how they solved a problem rather than associate TLO 3.2 to a task in the workplace. However, the simpler course learning outcome does not provide context for problem solving. Problem solving while on placement may have had little bearing on how the student performs as a professional working in the discipline of Environment and Sustainability. Tee, Ferns and Hughes (2018) also considered that the general employability indicators developed by Oliver and Whelan (2011) needed to be more discipline specific.

It would be unrealistic for a host-supervisor to expect that a student who has completed 2.5 to 3 years of study to be working at an Expert level for any of the threshold learning outcomes. For some TLOs it is realistic that the student is Proficient. For example, one would expect that after 2.5 years a student would be able to find information to conduct a literature review to a Proficient skill level. However, this skill is incorporated into a more complex threshold learning outcome: '3.1 addressing research questions by identifying, synthesizing and applying appropriate knowledge and evidence from diverse sources'.

Road test: What skill level is required?

The 2015 survey asked the respondents for the importance of a threshold learning outcome, but it did not ask the skill level required of a new graduate working in the discipline. In subsequent surveys these questions were replaced with questions that asked 'what skill level is required of a new graduate?' The importance values were quite high (4.0) in comparison to the expectations of a new graduate (2.8). While questioning importance may provide a course designer with areas of focus, it doesn't provide a standard (i.e. descriptor of student behaviour). The graduate employability indicators asks respondents the importance of skills to graduate success (Oliver & Whelan, 2011). There may be TLOs that are important, but the skill level expected of a new graduate is low. The study conducted by (Azevedo et al., 2012) reported a value (relevance/capability) of competencies using a Likert scale. The result 5.4/7.0 is very similar to the average importance found in the present study (3.9/5 or 5.5/7).

Changing the survey to focus on expected performance made it possible to compare expected performance of a new graduate with the perceived performance of the student on placement. Results of the paired t test revealed that internship students were performing beyond the expectations of a new graduate (Table 7). From the hosts' perspective TLO 3.4 Skills: teamwork was the most important. It was ranked of greatest importance (Table 4) and highest in expected performance (Table 7). This result is consistent with other studies (Deloitte Access Economics Pty Ltd & Office of the Chief Scientist, 2014; Ferns, 2012; Oliver, 2010; Oliver, Freeman, Young, Yu, & Verma, 2014). The TLOs related to Indigenous studies were consistently ranked lowest by hosts (importance/expected performance). Given the diversity of placements, this result was not unexpected. For example, a student on placement in a laboratory testing water samples may not be using skills associated with engaging or understanding the perspectives of Indigenous people. In

addition, hosts who are involved with issues involving Indigenous people may not have high expectations of a new graduate.

Are teaching staff on track to deliver the graduates future employers want?

The teaching staff surveyed taught core units in the degree and were responsible for the curriculum content and assessment. The 2015 study revealed that hosts and teaching staff placed similar levels of importance on individual TLOs and were close when the Euclidian distance was calculated. There was only one significant difference between teaching staff and hosts (TLO 3.1 Skills: research). Teaching staff consider research was significantly ($P<0.05$) more important (4.8) than hosts (3.9).

The results of the present study are not consistent with Oliver, Whelan, Hunt and Hammer (2011) or Tee et al. (2018). In these studies industry and teaching staff were well aligned and students perceived that they performed better than teaching staff and industry. In both Oliver et al. (2011) and Tee et al. (2018) industry representatives were evaluating graduates in general rather than individual graduates which is different from the present study where the host-supervisor were evaluating individual students.

Road test: Tthreshold learning outcomes as a pathway to curriculum improvement

Results from the industry group surveys highlighted that the expected student performance is similar to how students perceive themselves and how host-supervisors perceive the students with average ranked expectations between 'an advanced beginner' and 'a capable performer' for each TLO. The results of the study provide evidence that the degree students are enrolled in is fundamentally sound and there are no specific gaps in the curriculum. The graduates of the degree have the skills that are relevant to their prospective employers because the TLOs were developed in consultation with stakeholders who employ environmental science and management graduates (Phelan et al., 2015). The graduates exceed the performance expectations of prospective employers. The internship is not selective, so a student who has passed two years of the degree with a grade point average below 4 (pass) is still able to enrol and complete their placement. Generic skills such as teamwork, communication skills and problem solving that are valued by employers are embedded in the TLOs.

Discussion

Any instrument used to determine the preparedness of a graduate for employment as a professional needs to be quantified by behaviour rather than vague statements of achievement. For example, The Australian Qualifications Framework (AQF) describes the learning outcomes for all levels of post-secondary school learning from Level 1 (Certificate I) to Level 10 (PhD) (Australian Qualifications Framework Council, 2013). The graduates of bachelor degrees (Level 7) *will have broad and coherent knowledge and skills of professional work and/or further learning* (Australian Qualifications Framework Council, 2013, p. 47). In the graduate attributes/course learning outcomes study (Whelan, 2017a) and the present study, the skill level of the student was scaled using behaviour described by the core skills development framework (Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education and the Department of Education, Employment and Workplace Relations, 2013). This scale provided the host-supervisor the ability to differentiate performance based on behaviour.

The document that describes the Environment and Sustainability TLOs is somewhat vague when defining graduate behaviour. The Environment and Sustainability TLOs state: *The bachelor degree qualifies individuals who apply a broad and coherent body of knowledge in a range of contexts to undertake professional work and as a pathway for further learning* (Phelan et al., 2015, p. 13).

However, there is no definition of 'to undertake professional work.' Graduates are expected to demonstrate that they have met or exceeded minimum standard for TLOs and to manage this, Phelan et al. (2015) has recommended using frameworks such as AQF in conjunction with the TLOs.

The graduate employability indicators developed by Oliver and Whelan (2011) do not associate skills and knowledge of a graduate with behaviour and are vague when defining performance. Respondents choose one of the following descriptors; Very little, Some, Quite a bit, and Very much, when they define the extent that graduates demonstrate knowledge and skills.

Comparing importance with performance is flawed because the definitions of the words imply they are measuring different factors. Identifying gaps between importance and performance does not necessarily mean that graduates are not meeting expectations (Whelan, 2016). For example, hosts considered that TLO 3.4: Teamwork was the most important (4.4/5 – Table 4) and perceptions of students' performance was lower (3.9/5 – Table 5). As a consequence, designers may consider reviewing teamwork in the curriculum. However, comparing expected performance (3.4/5 – Table 7) with actual performance (3.9/5 – Table 7) reveals that new graduates have the teamwork skills they need. Interestingly, Tee, Ferns and Hughes (2018) used the difference in importance between teaching staff, students and industry to review the curriculum.

When expected performance was compared with actual performance it revealed that students are exceeding prospective employers' expectation. These results are consistent with Moore and Morton (2017) where they found that overall writing skills of graduates were meeting the expectations of industry and with Oliver et al. (2014) who found that on the whole industry were satisfied with graduates.

The focus of teaching staff on research skills may be attributed to the cultural bias towards research within academia (Bexley, James, & Arkoudis, 2011; Norton, 2013; Probert, 2013; Whelan, 2017b). Evans-Greenwood, O'Leary and Williams (2015) explained that the difference in attitude to research could be attributed to industry's focus on problem solving rather than enquiry.

The lower perception that teaching staff have of student performance contrasts with perceptions of the host and with the students' perceptions of their own performance. The difference in perceived performance may be attributed to fundamental differences in the assessment of students in the classroom and in the workplace. First, teaching staff assess students as a cohort with the aim to assess students' knowledge, skills and application of skills and knowledge. However, the host evaluates an individual student for a total of 280 hours of work and assesses how well they contributed to a common goal. Secondly, teaching staff provide feedback to students on the completion of an assessment item and this feedback is then used by students to improve their subsequent assessments. In contrast to the teacher and student dynamic, the host and student relationship is more collaborative, both work together to achieve specific goals. As a consequence, students receive formative feedback as they progress. Traditional assessment at universities is not usually a collaboration between students and teaching staff. Finally, students on placement are learning without being assessed while at university they are learning to be assessed. Given these fundamental differences the difference in perceived performance should be expected.

Limitations

The present study has evaluated the performance of students at a particular university in a single degree. The scope of the study can be extended to include more universities and a more diverse range of degrees.

As a purely quantitative study it is not possible from the data collected to explore how hosts, for example, determine the performance of a student on placement. A qualitative study involving focus groups would need to be conducted to explore how such a decision was made and if the complexity of the TLOs was a factor in assessing the performance of students. Tee, Ferns and Hughes (2018) and

Moore and Morton (2017) were both able to explore the rationale of comments made by industry with qualitative studies.

Conclusion

The results of the present study clearly define the behaviour that is required of a graduate to undertake professional work. It is recommended that there is a stronger focus on behaviour when assessing the skills of graduates and definitions used in threshold learning outcomes and the Australian Qualifications Framework be reviewed to reflect graduate behaviour.

The importance of a learning outcome is not equivalent to performance of a learning outcome. It is recommended that studies that aim to improve the curriculum using surveys of industry should focus on the level of performance rather than importance.

Teaching staff value research skills more than potential employers. The focus of universities on research performance (publications and grant income) may be at the detriment of the employability of their graduates. University rankings of graduate employability exist (QS World University Rankings, 2018; The World University Rankings, 2018) but they are generic and based on indicators associated with employability (e.g. employer-student connections, alumni outcomes and graduate employment success - QS World University Rankings, 2018) or feedback from employers (The World University Rankings, 2018). However, it is recommended that an index that measures the employability of graduates in different disciplines be developed and used as a measure of teaching quality. This index could sit alongside the Excellence in Research Australia (ERA) rankings which are focussed on research success that does not always relate to teaching quality.

The interns meet or exceed expectations of their hosts and the internship is not selective, so a student who has passed two years of the degree with a grade point average below 4 (pass) is still able to enrol and complete their placement. It is recommended that grade point average is not used to restrict a student's access to a placement experience.

It has been reported that graduates fall short of the expectations of industry. Surveys of students who completed WIL programs and their host-supervisors provided evidence that graduates exceed industry needs and expectations. Both potential employers and students consider that graduates are 'work ready'. For any discipline where TLOs have been developed and students have placement WIL available, a survey of expected performance and actual performance could be used to provide evidence to determine if a degree is producing 'work ready' graduates.

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