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**Book Chapter title:  Stakeholder Perceptions of the Importance and Effects of Sustainability Education**

**Authors:**  Lynne Eagle[1], Breda McCarthy[1], Rachel Hay[1], Amy Osmond[2] and David R. Low[1]
[1]College of Business, Law and Governance, James Cook University, Townsville, Australia
[2] Hertfordshire Business School, University of Hertfordshire, England

**Overview:**

This chapter discusses the role that universities are expected to play in addressing sustainability-related issues, noting a lack of agreement on definitions for key terms and on the most effective way to include relevant content within the curriculum.  These debates need to be seen within the context of calls to ensure that graduates are 'work ready'.

The way that sustainability issues are addressed in curriculum, and the impact on subsequent attitudes, beliefs and behaviours has been the subject of considerable debate in both academic and industry outlets.  We discuss a multi-phase study by an Australian regional university that has made significant investment in integrating sustainability into all subjects within undergraduate business degrees.  This investment was informed both by the academic debate on sustainability issues and by discussions with potential employers.  We review the curriculum changes and examine key stakeholders' views regarding the importance of both sustainability specifically and overall work readiness of graduates.

The chapter concludes with a discussion of strategies for ongoing fine-tuning of business curricula and for ongoing engagement with current and prospective employers regarding sustainability-related issues within the wider context of equipping graduates with the skills and abilities valued by prospective employers in a rapidly changing workplace.

**Introduction**

The need for increased focus on sustainability and sustainable development-related issues across society is increasingly recognised (Lans, Blok, & Wesselink, 2014), with assertions that the majority of the world's CEOs regard sustainability and sustainable development as essential for long-term business success (Lans et al., 2014).  We note, however that there has yet to be common agreed definitions of these and related terms (Stough, Ceulemans, Lambrechts, & Cappuyns, 2017), with criticism of them focusing on their lack of precision (see, for example, Seghezzo, 2009) while others suggest, in relation to sustainable development, that "its inherent vagueness and interpretive flexibility contribute to its broad appeal" (Boström, 2012, p. 3).  This debate also presents some significant challenges in terms of what to include in sustainability-related curriculum content.

The most common definitions of sustainability are:

"A way of doing business that creates profit while avoiding harm to people and the planet" (Centre for Sustainable Enterprise cited in Connelly, 2010, p. 86).

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development (1987) cited in Chabowski, 2011, p. 55).

"Consumption that can continue indefinitely without the degradation of natural, physical, human and intellectual capital" (Costanza, 1991, cited in Crittenden, Crittenden, Ferrell, Ferrell, & Pinney, 2011, p. 72).

"Sustainability ... translates into a 'triple bottom line' responsibility, with the implication that assessment of business results should be based not only on economic performance but should take into account the environment and social impact as well" (Sheth, Sethia, & Srinivas, 2011, p. 21).

The second and third definitions highlight the need to focus not just on the present and short term future, but also on the longer-term future. The fourth definition highlights the growing pressure for commercial organisations to report on wider issues than just financial performance (Gross, 2015). This is linked to a growing trend for commercial organisations to undertake corporate social responsibility (CSR) programmes linking themselves to either or both of social or environmental sustainability (Dahlsrud, 2009).

While CSR may be a genuine commitment, it may also be 'greenwashing', i.e. an attempt to make an organisation look good in the eyes of its stakeholders (Prasad & Holzinger, 2013) or to divert attention away from the negative impacts of a firm's activity (Eagle, Dahl, & Low, 2015; Kuznetsov, Kuznetsova, & Warren, 2009). Additionally, while CSR is a prominent manifestation of the recognition of wider responsibility, there are disagreements over its concepts and operationalisation, together with significant differences in the way CSR is interpreted across cultures (Kuznetsov et al., 2009; Panimbang, 2013).

There has also been debate regarding whether 'sustainability' and 'sustainable development' are separate concepts or sufficiently closely related in terms of the former being goal-focused and the latter being the processes used to achieve the overall goal to enable the two terms to be used synonymously (Sidiropoulos, 2014):

"Some scholars argue that there is a difference between ''sustainable development'' and ''sustainability'', for example: that sustainability refers to the environmental dimension of sustainable development, or that sustainability refers to a process whereas sustainable development refers to the product (end state). To us the two concepts entail the same dimensions and the same policy implications. Thus, we use them interchangeably" (Holden, Linnerud, & Banister, 2014, p. 131).

"Some authors consider sustainability to refer to objectives to be achieved, with sustainable development referring to the processes to achieve them. Others interpret sustainable development as focusing on ameliorating economic growth by taking into account the environment, while sustainability focuses on the ability of humanity to live within the environmental limits of the planet" (Mancebo, 2013, p. 30).

"Sustainability is often thought of as a long-term goal (i.e., a more sustainable world), while sustainable development refers to the many processes and pathways toward that goal (e.g., education and training, sustainable agriculture, sustainable production and consumption, good government without corruption, research, and technology transfer)"(McKeown, 2013, p. 17).

Neither term can be discussed in isolation from the other.  Our stance is that the two terms are sufficiently related in terms of sustainable / sustainable development educational applications, and that the relationship between them is both dynamic and context-specific, which warrants them being discussed in tandem, if not treated as synonymous.  We note that sustainability as a concept continues to be seen as being both abstract and complex, leading to a lack of engagement with policy development and operationalizing sustainability practices (Aleixo, Leal, & Azeiteiro, 2016), thus presenting challenges in terms of how best to engage students with the issues.  There is a large and robust body of literature that confirms that mere information provision has no effect on attitudes let alone subsequent behaviours (see, for example, Anderson, 2015).

## Role of Universities

What is not disputed is that universities are expected to play a key role in addressing sustainability-related problems (Aleixo et al., 2016; Gale, Davison, Wood, Williams, & Towle, 2015), producing graduates who not only are 'work ready', being able to work with minimal supervision, but who can become change agents with regard to sustainability-related issues within their employing organisation (Heiskanen, Thidell, & Rodhe, 2016; Hesselbarth & Schaltegger, 2014).   Universities, through engagement with industry, also have the potential to influence both perceptions and processes within industry organisations (Cicmil, Gough, & Hills, 2017).  There is also recognition of the need to develop resilience and adaptability skills for a rapidly changing workplace (Seibert, Kraimer, & Heslin, 2016) and the ability to address complex, change resistant challenges for which no single solution exists:  these challenges are increasingly being termed 'wicked problems' (Head & Alford, 2015).  How universities can be most effective at addressing these issues is under explored.

International tertiary quality assurance organisations such as EQUIS and AACSB now include sustainability as an explicit criterion for accreditation, for example:

The school must demonstrate a commitment to address, engage, and respond to current and emerging corporate social responsibility issues (e.g., diversity, sustainable development, environmental sustainability, and globalization of economic activity across cultures) through its policies, procedures, curricula, research, and/or outreach activities (AACSB International, 2017, p. 7).

We note that there has been a long history of debate regarding the relevance of business curricula to the business world and concerns regarding a perceived academic-practitioner divide, particularly in disciplines such as marketing (Brennan, 2004) and management (Stewart, Gold, Gray, Iles, & Watson, 2011).  However universities may be unfairly blamed as there is evidence from a Spanish study that identifies both organisational and strategic capabilities as barriers to organisations themselves achieving sustainability (Murillo-Luna, Garcés-Ayerbe, & Rivera-Torres, 2011).  There is a lack of proactive discussion regarding the role of universities in improving these capabilities.

As part of the wider dissatisfaction, there is evidence of ongoing employer dissatisfaction in many countries with the performance of graduates entering the workforce (Jackson & Chapman, 2012; McMurray, Dutton, McQuaid, & Richard, 2016). There is also evidence of some frustration among recent graduates that some skills expected by employers, especially time management, communication and analytical skills, had not been taught (Orinos, 2012).

Much of the debate regarding the potential effectiveness of including sustainability content into curricula has focused on post graduate programmes (see, for example, Hesselbarth & Schaltegger, 2014) or, at undergraduate level, individual subjects or disciplines (see, for example, Lozano, Ceulemans, & Seatter, 2015; Perera & Hewege, 2016) and not on a holistic, integrated approach across an entire curriculum.

We now discuss a case study, based on a multi-phase research programme, from a Business College within an Australian regional university, James Cook University, headquartered in Townsville, Queensland with campuses in Cairns (Far North Queensland) and in Singapore, that made a very deliberate decision to ensure explicit sustainability content throughout the business curriculum within the context of increased engagement with potential employers to improve graduate work-readiness. We note that this university has a record of graduate employment slightly higher than the national average (75% versus 73.1% in full time employment and 89.6% versus 89.3% in full or part time employment) https://www.qilt.edu.au/institutions/list/institution/james-cook-university/business-management?ca=full-time-employment.

We examine the perceived importance of a range of sustainability issues from the perspectives of three key stakeholder groups: students at the beginning and end of their undergraduate studies, graduates and employers. We note that it is claimed that regional universities have a very specific role in helping regional organisations to address both global and regional sustainability-related issues and to help build regional capacity to respond to challenges facing regional economies (Karatzoglou, 2013; Sedlacek, 2013). It has been acknowledged that it is important for students to understand the relationship between the various components of sustainability and both individual and overall integrated business functions and operations (Stubbs & Cocklin, 2008).

**Student Perceptions Prior to Inclusion of Specific Sustainability Content**

We initially surveyed both entry-level and senior students prior to, and after the introduction of substantial sustainability-related content across business degree syllabi (JCU ethics approval number H4491). Attitudes, beliefs and self-reported behaviours were explored, using a list of sustainability issues originally drawn from the literature and validated in earlier studies of students enrolled on an undergraduate business degree (see, for example, Michalos, Creech, McDonald, & Kahlke, 2011).

Students who had not been exposed to specific sustainability content showed low levels of awareness of, or interest in these issues, coupled with scepticism regarding what the practical implications of any behaviour change aimed at addressing sustainability issues would be and whether individual actions would have any effect on what they perceived as global issues. These students also identified both unrealistic optimism regarding society's (and governments' abilities to resolve environmental problems and a denial of personal risk, findings consistent with research from other countries (for a review, see Eagle, Low, Case, & Vandommele, 2015).

*Self-reported Knowledge*
In terms of self-reported knowledge of the key terms (refer to Table 1), final semester students appear to have higher levels of knowledge of all bar one of the terms tested although only four of these were statistically significant. An interesting exception is the significantly lower level of knowledge about climate change adaptation than first year students (Table 1). We ran both parametric and non-parametric analyses, drawing on the proposition by Norman (2010) that the robustness of parametric statistics for this type of data is frequently unrecognised – and found no differences in the outcomes of the two types of tests.

*Implications*
A disconnect between awareness and behaviour is well-documented in the academic literature across a diverse range of both generic environmental behaviours (Morren & Grinstein, 2016) and specific behaviours such as renewable energy (Claudy, Peterson, & O'Driscoll, 2013) and tourism mobility (Juvan & Dolnicar, 2014). This is particularly concerning when awareness and interest levels are low, indicating that information provision alone is unlikely to be effective in increasing engagement with sustainability issues. Past over-reliance on the information deficit model, i.e. the assumption that people do not act as desired due to a lack of knowledge and that provision of this knowledge will rectify the situation has been criticized for ignoring underlying attitudes and values that influence behaviours (Kraft, Lodge, & Taber, 2015; Simis, Madden, Cacciatore, & Yeo, 2016).


**Insert Table 1 about here**



## Curriculum changes
The business curriculum was then modified, drawing on advice from industry groups regarding the knowledge and skills sought from graduates, together with best practice strategies identified in the academic literature to strengthen the sustainability content. The aim was to ensure a consistent approach across subjects and disciplines and also to address identified shortcomings regarding the relevance of the curriculum, including sustainability.

The curriculum revision used a best practice 'active learning' approach to maximize potential engagement of students with real-world issues, using a range of situations that students were likely to face in their working lives to illustrate the types of sustainability challenges and potential actions that could be taken, together with their consequences (MacVaugh & Norton, 2012). This curriculum change also included four components, authentic assessment, work integrated learning, the optional opportunity to study abroad for a semester and optional mentoring by members of the local Chamber of Commerce during student's final semester of study and early months of employment as part of their transition from education to the workplace.

A combination of blended learning (using digital technology to combine lectures and tutorials through online platforms) and fully online study options to complement traditional face-to-face delivery was introduced to meet the needs of students in the communities that the university serves, particularly those who are in employment or who live some distance from campuses. This move was driven by feedback from stakeholders and reported best practice

in the academic literature.  It reflects a global move to meet the changing needs of new cohorts of students (López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Marín et al., 2016; Murphy, 2011).

**Authentic Assessment**

Authentic assessment draws on real-world problems, often with active input from organisations, with the aim of specifically developing and assessing skills that will be required in actual employment.  This approach has been shown to both increase student satisfaction and employability (James & Casidy, 2016).  It is closely linked to work integrated learning, but the latter extends to actual placements of students within an organisation, either on a part time basis while continuing studies, or as a defined break from conventional studies.

**Work Integrated Learning / Placements**

Placement of students within organisations in order to gain experience within work environments and exposure to real-world challenges, including sustainability-related issues, are recognized as effective in increasing work-relevant skills and thus enhancing employment prospects upon graduation  (Jones, Green, & Higson, 2017).  It also helps students to envisage their future professional identities and, on completion of their studies, aid in the transition to the workforce (Kinash, Crane, Judd, & Knight, 2016) , although these benefits are often not recognised by students (Brooks & Youngson, 2016) in spite of evidence that all forms of experiential learning are valued by potential employers (Crossman & Clarke, 2010).

**Study Abroad**

Students also were offered the opportunity to spend a semester or more at the Singapore campus if they were Australian based, or at one of the two Australian campuses if they were Singapore based.  This form of international study experience is recognized as being beneficial to both employers and potential employees.  It recognises the increasing globalization of business activity and the need for graduates to be able to function in culturally diverse environments if employed outside of their home country and in increasingly culturally diverse workplaces and range of business contacts regardless of their country of employment (Begalla, 2013; Crossman & Clarke, 2010; Kivunja, 2015).

**Chamber of Commerce Mentoring**

To aid students' transition from the university 'learning space' to the commercial 'working space', a programme has been  established with the local Chamber of Commerce as an addition to other support programmes available to students. This provides students with the opportunity to:

a) Network with business professionals [the impact of which is also under recognized by students (Kinash et al., 2016)].
b) Obtain advice regarding resume presentation and interview skills
c) Direct mentoring of students by professionals external to the university.

Such programmes have been shown to benefit mentees from this type of mentoring, increasing their confidence, knowledge about their chosen career options and career path options  (Jackson, 2016; Smith-Ruig, 2014).

**Student Perceptions After Studying Revised Curriculum Incorporating Specific Sustainability Content**

The entry-level study participants from the first round of data collection were then resurveyed in their final semester of undergraduate study to determine whether changes in self-reported attitudes and behaviours had occurred.

Table 2 indicates that the incoming first year students had higher knowledge scores than those for the incoming cohort three years previously. This is not unexpected as considerable communication was undertaken with these students from their initial enrolment, orientation programmes and their first lectures regarding the rationale for the curriculum change. When this cohort was resurveyed in their final semester, positive changes in familiarity were evident for all terms, with all bar two of these being statistically significant.

When the final semester groups pre- and post-introduction of the sustainability content were compared, a complex pattern emerges. While familiarity with the first three terms has increased significantly, familiarity with *social sustainability* is lower, possibly because it is a more complex topic than *economic* and *environmental sustainability*. It is subject to conflicting definitions, leading to the observation that it has been under-theorised or oversimplified (Missimer, Robèrt, & Broman, 2017). Harsher critics suggest that "*it is a concept in crisis*" (Vallance, Perkins, & Dixon, 2011, p. 342), comprising "*a theoretically unfounded selection of assumptions, goals and indicators*" (Spangenberg & Omann, 2006, p. 320) and being influenced by political agendas and the outcomes of policies (Colantonio, 2009; Littig & Griessler, 2005). This may account for social sustainability being reported vaguely if at all (McKenzie, 2004; O'Dwyer & Unerman, 2016). In this, and related research, we have adopted the following widely cited definition: no more recent definitions have been proposed to supersede this definition (McKenzie, 2004, pp. 18 - 19):

*Social sustainability occurs when the formal and informal processes, systems, structures and relationships actively support the capacity of current and future generations to create healthy and liveable communities. Socially sustainable communities are equitable, diverse, connected and democratic and provide a good quality of life.*

An investigation of how this can be explained more effectively within the curriculum will now be undertaken, given the importance of social sustainability for small businesses within the university's traditional catchment area.

Any impacts from the curriculum revision will not have occurred in isolation, with potential reinforcement (social encouragement) or discouragement originate from family or peer groups as well as from information obtained through traditional or digital media (Peattie & Peattie, 2003). This influence is likely to have varied according to the specific term and associated behaviours. Peers and associated perceived norms may be stronger influencers in some areas (Hoorn, Dijk, Meuwese, Rieffe, & Crone, 2016) and families in others (Gronhoj and Thogersen 2012).

The lack of change in relation to terms such as *sustainable development*, *conservation* and *environmental protection* may reflect a complex pattern of noise via media coverage of regional issues such as the resource extraction (mining) industry and impacts on the natural environment such as the Great Barrier Reef. For example, a large foreign-owned mining complex was given approval in 2016, with support due to the potential employment opportunities expected. The approval was gained in the face of significant protests as illustrated by the 2016 media headlines shown below, most of which appeared in non-mainstream outlets.

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Newlands, M. (2016). "Coral not coal – Australian activists fight to save the Great Barrier Reef". *The Ecologist*, 15 December.

Dempster, Q. (2016). "Adani / Carmichael mega coal mine: the mother of all our fears". *The New Daily*, 9 December.

Reside, A., Mappin, B. & Watson, J. (2016). "Four environmental reasons why fast-tracking the Carmichael coal mine is a bad idea". *The Conversation*, 2 November.

Visser, N. (2016). "Australia wants to save the Great Barrier Reef while building a massive coal mine". *The Huffington Post*, 7 December.

Day, J., Grech, A., & Brodie, J. (2016). "Australia must choose between coal and coral – the Great Barrier Reef depends on it". *The Guardian*, 6 December.

Knaus, C. (2016). "Minister defends coal industry after call to ban new mines to save reef". *The Guardian*, 25 November.

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The media has not been neutral on the issue, with recent headlines in mainstream media appearing to marginalise the views of environmental organisations, as illustrated by the following headlines:

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Mundine, W. (2017. "Greens are out to damage Australia", *Daily Telegraph*, 9 June.

Kelly, J. (2017). "Green activists intent on killing coal accept funding from US foundation". *The Australian*, 30 May.

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This latter influence may explain the lower mean for *energy conservation*, given this has neither been a specific focus in the curriculum change nor a focus in the state of Queensland where the debate has been centred on the need to transition from coal-powered electricity generation to renewable sources (Eagle, Osmond, McCarthy, Low, & Lesbirel, 2017) and on government attempts to reduce costs per unit rather than rather than energy conservation per se. This is also reflected in media coverage, for example:

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News Corp (2017. "Malcolm Turnbull tells electricity industry chiefs to cut prices", *Daily Telegraph*, 28 August.

AAP (2017). "Greens call for energy price regulation". *Sky News*, 8 August.

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We would also observe that many of the cohorts studied would not as yet be responsible for the payment of power bills and, although they are less likely than older age groups to use traditional media channels, they still rely on some channels such as TV news for information, although increasingly via mobile media platforms (Westlund & Färdigh, 2015) and thus can be expected to have been exposed to the media coverage noted above.

Similarly, in relation to the lower mean for *climate change* for the final cohort who undertook the sustainability curriculum, the causes and impact of climate change in the

region have been vigorously debated for a number of years, with a small but vocal denialist group actively challenging both the evidence base for, and potential impact of, climate change (Carter, 2010; Carter & Ward, 2010) and gaining media coverage for their counter views whenever the topic was covered by the media such as:

> Bolt, A. (2016). Ridd on Reef: Don't Trust alarmists. *Herald Sun*, 8 December. Bateman, D. (2016). Great Barrier Reef Death in five years is "laughable" *Cairns Post*, 21 May.

As noted earlier, the media are not themselves necessarily neutral, being influenced by "*powerful societal interests that control and finance them*" (Herman & Chomsky, 2010 (updated from1988 edition), p. xi). The tendency to gives equal coverage to both sides of a debate, regardless of the nature or volume of evidence to support or refute claims is well documented in the academic literature, together with the bias this may create (Boykoff & Boykoff, 2004; Dixon, McKeever, Holton, Clarke, & Eosco, 2015; Gross, 2009; Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). The consequence of 'balanced reporting' has been shown to "*make the science seem more controversial and uncertain than it actually is*" (Kortenkamp & Basten, 2015, p. 288) and "disproportionate visibility" being given to denialists / contrarians.

While the mean for climate change adaptation increased with the new curriculum, it remains the lowest of the terms tested. This may be a reflection of the climate change debate noted above, and also the lack of clear climate change adaptation policy, in spite of repeated calls for this to be developed (Howes et al., 2015), including disaster risk reduction (Serrao-Neumann, Crick, Harman, Schuch, & Choy, 2015).

The findings in Table 2 indicate weaknesses in the current curriculum that need to be addressed for future cohorts. Additionally, an investigation of the relative impact of external media on attitudes and beliefs will be undertaken along with the most effective strategies to correct misinformation.

**Insert Table 2 about here**

## Alumni and Employer Perceptions

We then reviewed the perceptions of graduates and employers regarding the performance of graduates in relation to both generic and sustainability-related skills and competencies (JCU ethics approval H6863). We note two issues: firstly, that skills and competencies are sometimes used interchangeably in the literature, with debate extending over decades as to whether this is correct or whether they are different concepts. We have adopted the stance that they are related concepts, with competencies being broader in scope, incorporating specific, usually taught, skills but also extending to include broader knowledge and attitudes that enable skills to be used in practice. Thus the ability to extract and interpret business research data would be a skill, and problem solving a competency (Orinos, 2012; Parry,

1996). Secondly, there is no agreement on exactly what these key competencies are (Barth, Godemann, Rieckmann, & Stoltenberg, 2007; Rieckmann, 2012) although there is substantial commonality across studies and also recognition of the need to "*mirror professional practice and test more than just rote memorization*" (James & Casidy, 2016). This includes both technical skills needed in business profession roles and 'soft' skills such as empathy and compassion in communication (Brundiers & Wiek, 2017).

## Alumni

We compared the student attitudes, beliefs and self-reported behaviours with those of the same university's alumni, who had graduated prior to the introduction of the sustainability content with the latter group also having reflected back on their studies to identify positives, negatives and perceived gaps in curriculum coverage.

**Insert Table 3 about here**

## Employers

Given the often-reported disconnect between academia and employers regarding the skills and competencies of graduates noted earlier, employer perspectives are then discussed, drawing on data from a survey of regional employers. This phase of the study used the same initial questions as used in the student surveys, then explored the perceived importance of sustainability-related practices within their organisations, their perceptions of the importance of both generic and sustainability-specific skills and competencies identified in the academic literature and the performance of recent graduate employees on these. The list in the right hand column of Table 4 provides the additional skills and competencies identified as particularly important in sustainability and sustainable development contexts, compared to the generic competencies in the left-hand column. We have marked with an asterisk (*) those skills and competencies that are common to both lists, and with a hash (#) to indicate those for which there is a partial overlap. We acknowledge the observation of other researchers that possession of competencies is not, in itself, a guarantee of future business leadership success (see, for example, Grint, 2007).

We note that, while many of the perceived deficiencies in graduate knowledge and skills were addressed in the curriculum review, many of the employees on which comments were made would have undertaken the curriculum prior to its revision and the inclusion of specific sustainability-elated content. Seven respondents noted that, where employees fell short on any of these attributes, internal coaching and mentoring systems were activated.

In terms of what should be taught re sustainability, the following quotes from employers indicate a commitment to sustainability as an important issue:

"the school should put students in different workplaces. One organization practically respect the eco-friendly environment and train the employees how to address issues related to working sustainability. And the other organization will not care about what the employees emphasize the issues in their workplace".

"To reinforce the importance that society, the economy, and the environment are interconnected, thus students need to be aware of all three in their future work endeavours. They are after all the planets future, without emphasising sustainable behaviours and activities, it will be detrimental to the planets survival as we know it".

"All businesses should have a Sustainability plan. You must understand what sustainability is. When you understand it you may be daunted by the cost of implementing it. Most businesses will have a different plan so you can map out one that suits you. There is plenty of information on the net that you can use parts of to suit your business. Once you have your plan mapped out you can use it as a marketing tool. The benefits gained will far outweigh the costs involved. Always remember Sustainability is an ongoing commitment and you should have log books to keep track of processes and implementing new plans".

We note that the first quote may be value loaded but also that there is implicit recognition of the complexity of 'wicked problems' and challenges faced by organisations.

**Insert Table 4 about here**

**Insert Table 5 and 6about here**

## Discussion: Future Engagement and Curriculum Fine Tuning Strategies

The data from students shows that existing active learning and teaching strategies have been largely effective and highlights the areas where additional content and focus could be beneficial in understanding all elements of sustainability. The feedback from both alumni and employers provides guidance on additional areas of the curriculum that could benefit from additional focus. Holistic, transdisciplinary curriculum approaches that stimulate critical thinking and problem solving (Doh & Tashman, 2014; Howlett et al., 2016) will be strengthened, together with strategies for maximizing the opportunity for real-world learning as advocated by Grint (2007) to complement individual subject-specific content and the skills and competencies discussed earlier. This approach is noted as aiding "translation from theory to practice" (Grint, 2007, p. 233) and, as has been noted in areas such as ethics, practical wisdom, originally termed 'pronesis' by Aristotle (Carter, Mayes, Eagle, & Dahl, 2017), particularly important in the context of uncertainty and ambiguity seen in many 'wicked problems'.

The quotes cited earlier from employers also indicate that strategies for dealing with the complexities of 'wicked problems' and their implications for management should be given more explicit focus, a factor also noted in recent academic literature (McMillan & Overall, 2016). The need for universities to strengthen their coverage of strategies to address wicked problems has been identified as an issue in other countries (Cantor, DeLauer, Martin, & Rogan, 2015; Dentoni & Bitzer, 2015).

The existing links with business regarding work integrated learning, mentoring and other forms of engagement will continue and will be strengthened, recognizing that there are mutual benefits in such arrangements (Bruneel, d'Este, & Salter, 2010).  Industry benefits from collaborations not just in areas of research (Dowling, 2015) but also through insights into implications of government policy actions, assistance with problem solving, enhanced human capital and, importantly, business efficiencies and economic competitiveness (Ankrah & AL-Tabbaa, 2015). These latter authors also suggest a role for universities in aiding economic regeneration – a factor important to a regional university in a state in which coal mining has, to date, been a significant contributor to the economy but which is facing increasing calls to focus more on renewable energy for domestic consumption  (McCarthy, Eagle, & Lesbirel, 2017) and increasing resistance to the establishment of new export-oriented coal mines (Meadows, 2017).

**Limitations and Generalisability**
This study specifically focused on business students – a comparison of these from other discipline areas would be useful.   We also note that sustainability issues are increasingly being discussed in the community, possibly influencing responses from all respondent groups.

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**Table 1:  Comparison of Entry and Senior students Familiarity with Key Terms (prior to introduction of sustainability content)**

Note: * indicates significant difference between years of study p<.05

(Mean where 5 = very familiar 1 = not familiar at all) and standard deviation (SD)

| Term | Entry level students n= 247 | | Final semester students n = 133 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| Economic Sustainability * | 3.47 | 1.19 | 3.98 | 0.93 |
| Environmental sustainability* | 3.79 | 1.08 | 4.11 | 0.86 |
| Social sustainability | 3.25 | 1.12 | 3.41 | 1.25 |
| Sustainable development * | 3.45 | 1.16 | 4.01 | 0.85 |
| Conservation   * | 3.64 | 1.21 | 4.04 | 1.02 |
| Climate change * | 3.98 | 1.11 | 4.36 | 0.77 |
| Climate change adaptation * | 4.13 | 0.97 | 3.48 | 1.10 |
| Environmental protection * | 3.80 | 1.19 | 4.14 | 0.79 |
| Energy conservation | 4.25 | 1.07 | 4.11 | 0.94 |

**Table 2: Comparison of Student Responses in first and Last Semester of Study: Familiarity with Key Terms (after introduction of sustainability content)**

Note: * indicates significant difference between years of study p<.05

(Mean where 5 = very familiar 1 = not familiar at all) and standard deviation (SD)

| Term (Mean where 5 = very familiar 1 = not familiar at all) and standard deviation (SD) | Entry level students n = 167 | | Final semester students n = 80 | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| Economic sustainability * | 3.63 | 1.14 | 4.17 | 0.77 |
| Environmental sustainability * | 3.89 | 1.02 | 4.32 | 0.72 |
| Social sustainability * | 3.30 | 1.17 | 3.87 | 0.90 |
| Sustainable development * | 3.63 | 1.10 | 4.02 | 0.80 |
| Conservation * | 3.77 | 1.17 | 4.05 | 0.86 |
| Climate change | 4.10 | 1.03 | 4.27 | 0.84 |
| Climate change adaptation * | 3.92 | 1.06 | 3.64 | 0.99 |
| Environmental protection | 3.91 | 1.09 | 4.11 | 0.83 |
| Energy conservation * | 4.21 | 1.03 | 3.95 | 0.94 |

**Table 3: Alumni: Familiarity with Key Terms (after introduction of sustainability content), Valuable Learning and Perceived Curriculum Gaps**

| **Term** (Mean where 5 = very familiar 1 = not familiar at all) and standard deviation (SD) n = 46 | | | **Open ended responses (summarized and categorized)** | |
|---|---|---|---|---|
| | | | **Valuable learning from university study** | **Perceived gaps in university curriculum** |
| | Mean | SD | 4 x aspects of the triple bottom line approach | 2 x how to achieve organizational change / change management |
| Economic Sustainability | 4.46 | .50 | 2 x benefits of minimizing negative effects on the environment – short and long term | 2 x social sustainability including accounting / reporting |
| Environmental sustainability | 4.57 | .50 | 2 x small incremental steps can result in cumulative benefits | 2 x corporate social responsibility applications |
| Social sustainability | 3.70 | 1.23 | | 2 x potential impact of failure to implement sustainability |
| Sustainable development | 4.30 | .66 | Specific subjects noted as valuable: | 2 x organizational recycling |
| Conservation | 4.46 | .55 | Ecological / environmental Economics | 2 x eco-initiatives available e.g. IT driven |
| Climate change | 4.59 | .54 | Tourism and the Environment | 2 x benefits of sustainability |
| Climate change adaptation | 3.83 | 1.04 | Sustainable Marketing | 1 x national resource management |
| Environmental protection | 4.52 | .51 | | 1 x practical application of concepts (and their interrelationship) across industries |
| Energy conservation | 4.59 | .62 | However most respondents commented that there was very little sustainability content in the subjects they had taken | 1 x sustainable work and life practices |

**Table 4: Comparison of Most Commonly Listed Generic versus Sustainability-specific Skills and Competencies**

| Generic skills and competencies (Finch, Nadeau, & O'Reilly, 2013; Jackson, 2014; MacDonald & Shriberg, 2016) | Additional sustainability-specific skills and competencies (Heiskanen et al., 2016; Rieckmann, 2012) |
|---|---|
| Effective oral and written communication | Competency for systemic thinking and handling of complexity |
| Critical thinking * | Competency for anticipatory thinking |
| Interpersonal communication | Competency for acting fairly and ecologically |
| Leadership | Competency for participation |
| Ability to work in a team / collaborate * | Competency for empathy and change of perspective # |
| Ability to take initiative | Competency for interdisciplinary work |
| Ability to think strategically | Competency for communication and use of media |
| Ability to set priorities | Competency for planning and realizing innovative projects |
| Ability to follow through on tasks | Competency for evaluation |
| Ability to adapt to change | Competency for ambiguity and uncertainty and frustration tolerance |
| Ability to problem solve | Able to analyse interdependencies |
| Time management | Able to motivate and inspire others |
| Conflict resolution | Able to anticipate and estimate consequences |
| Able to be empathetic# | Able to be self-critical |
| Aware of cultural diversity | |

\* Also on list of key sustainable development competencies
\# partial overlap between the two lists

**Table 5: Employer Familiarity with Sustainability Terms and Importance of sustainability-related Practices** (n = 30)

| **Term** (Mean where 5 = very familiar and 1 = not familiar at all) | | **Importance of sustainability-related practices to organization** (Mean where 5 = extremely important and 1 = not important at all) | |
|---|---|---|---|
| Economic Sustainability | 4.47 | Recycling (i.e., paper, cardboard, glass, plastic or aluminium cans) | 4.12 |
| Environmental sustainability | 4.40 | Setting targets for waste reduction | 3.23 |
| Social sustainability | 3.87 | Setting targets for reducing electricity consumption | 3.31 |
| Sustainable development | 4.40 | Installing solar or other renewable energy source | 3.50 |
| Conservation | 4.60 | Promoting daily energy saving activities in offices (turning off computers, lights, air-conditioning, etc.) | 3.69 |
| Climate change | 4.60 | Using low-flow water devices | 3.23 |
| Climate change adaptation | 4.00 | Having family-friendly policies (i.e., flexitime) | 3.81 |
| Environmental protection | 4.40 | Considering diversity in hiring decisions | 3.81 |
| Energy conservation | 4.40 | Using sustainability-related criteria in recruitment and selection | 3.08 |
| | | Contributing to community projects | 3.96 |
| | | Training of employees to raise their awareness of sustainability | 3.27 |
| | | Supporting local suppliers | 3.85 |
| | | Having eco-friendly merchandise or products | 3.31 |
| | | Appointing a Manager for Energy or Sustainability | 2.50 |
| | | Obtaining environmental certification (i.e., ISO 14001) | 2.85 |
| | | Reporting social and environmental impacts in annual reports | 3.27 |

**Table 6: Importance of and Satisfaction With Generic and Sustainability-related Skills and Competencies Expected of Employees**

| Generic skills and competency set | Mean importance | Mean Satisfaction | Sustainability-specific skills and competencies | Mean importance | Mean Satisfaction |
|---|---|---|---|---|---|
| Importance:  5 = extremely important, 1 = not important at all Satisfaction: 5 = extremely satisfied, 1  = extremely dissatisfied | | | | | |
| Effective oral and written communication | 4.44 | 3.94 | Competency for systemic thinking and handling of complexity | 3.92 | 3.29 |
| Critical thinking | 4.32 | 3.94 | Competency for anticipatory thinking | 3.96 | 3.19 |
| Interpersonal communication | 4.56 | 3.94 | Competency for acting fairly and ecologically | 3.63 | 3.18 |
| Leadership | 4.56 | 3.88 | Competency for participation | 4.25 | 3.59 |
| Ability to work in a team / collaborate | 4.40 | 4.00 | Competency for empathy and change of perspective | 4.08 | 3.47 |
| Ability to take initiative | 4.40 | 3.88 | Competency for interdisciplinary work | 4.04 | 3.59 |
| Ability to think strategically | 4.52 | 3.65 | Competency for communication and use of media | 4.04 | 3.53 |
| Ability to set priorities | 3.92 | 4.06 | Competency for planning and realizing innovative projects | 4.08 | 3.24 |
| Ability to follow through on tasks | 4.20 | 3.94 | Competency for evaluation | 4.17 | 3.35 |
| Ability to adapt to change | 4.40 | 3.71 | Competency for ambiguity and uncertainty and frustration tolerance | 4.04 | 3.00 |
| Ability to problem solve | 4.40 | 3.71 | Ability to analyse interdependencies | 3.92 | 2.59 |
| Time management | 4.60 | 3.88 | Ability to motivate and inspire others | 4.21 | 3.29 |
| Conflict resolution | 3.92 | 3.71 | Ability to anticipate and estimate consequences | 4.38 | 3.53 |
| Ability to be empathetic | 4.20 | 3.94 | Ability to be self-critical | 4.37 | 3.35 |
| Awareness of cultural diversity | 4.04 | 3.88 | | | |