Embedding Sustainability into University Curricula

Prepared for Macquarie University

This report reviews literature pertinent to embedding sustainability education into university curricula. We examine the history of sustainability education and how it is defined in today’s academic spheres; the prevailing attitudes and initiatives regarding sustainability implementation in university curricula and the most common barriers that prevent implementation; the expectations, demands, and projections for sustainability education within the current market, addressing student and employer preferences, as well as statistical projections for sustainability industries over the next decade; case studies of implementation; and resources for institutions hoping to succeed at implementation, including professional development training and a comparison of strategic embedding approaches.
Introduction and Key Findings

This brief provides an overview of embedding sustainability into university curricula. It begins with a general discussion on the topic of sustainability and education for sustainable development, then transitions to examine at the major driving factors that have motivated the worldwide push to prioritize sustainability education. We then look at the barriers to implementation as well as case studies from institutions and corporations in order to elucidate the best approaches for embedding sustainability into extant curricula. Finally, the report provides a list of resources for Australian universities intended to aid efforts to update curricula.

Summary of Key Findings

Our research suggests that the inherent inextricability between sustainability as taught in a classroom and as practiced in the field makes curricula embedding both challenging for the institution and particularly relevant to the lives of students after graduation. Our review resulted in the following key findings:

- Interest in sustainability-related programs in universities has greatly increased in the last few years, which may indicate a shift in the demands of students and employers.

- A United Kingdom survey found that over half of employers will be looking in the future to employ recent graduates that are socially and environmentally responsible. For the promotion, recruitment, induction, and training of staff in terms of social and environmental responsibility, larger businesses were most demanding.

- According to the U.S. Bureau of Labor Statistics, Employer need for graduates educated in concentrations related to sustainability is expected to increase at least 20 percent between 2008 and 2018. While the Australian labor market will not mirror that of the United States exactly, it is not unreasonable to assume that broad trends will be similar in both.

- While many universities have signed declarations pledging support of sustainability initiatives, most have fallen short in regards to implementation.

- Most failed attempts to embed sustainability cite a lack of leadership, incentives, knowledge, and/or resources when trying to implement new programs or add them to existing curricula.

- Findings from case studies suggest that support from top management for sustainability embedding is necessary to maintain a cohesive plan and
implement it successfully; however, other universities have also yielded positive results from “bottom-up” approaches.

- Professional Development of academic staff is a major factor identified as contributing to a high rate of success among schools that attempt sustainability implementation.

- Resistance from academic staff was most common when it became necessary to remove existing materials from curricula in order to make room for sustainability education.
Education for Sustainable Development: History and Definition

In 2005, the United Nations’ Educational, Scientific and Cultural Organization (UNESCO) implemented a Decade of Education for Sustainable Development, continuing until 2014. The goal of the Decade is to promote and improve the integration of Education for Sustainable Development into curricula at all levels and sectors of education worldwide.¹ Part of this initiative includes “reorienting” education to incorporate the value of sustainability regardless of subject matter and relating education in all fields to corresponding questions in this area.

The Sustainable Development Education Network defines Education for Sustainable Development as, “the process of acquiring the knowledge, skills and attitudes needed to build local and global societies that are just, equitable, and living within the environmental limits of our planet, both now and in the future.”²

Sustainability education seeks to cultivate knowledge surrounding the following principles:

- Interdependence of our society and life on our planet;
- The limited ‘carrying capacity’ of the earth;
- The value of biological, social and cultural diversity in maintaining the wellbeing of our planet and our society;
- The essential role of rights and responsibilities in a sustainable society;
- The essential role of equity and justice in a sustainable society;
- The presence of uncertainty and the need for precaution in making decisions that will affect society (and subsequently, affect the planet).³

Education in this area seeks to cultivate the skills to understand the relationships between different issues, appreciate how they are connected, and approach problems and decision-making with these interdependencies in mind.

The key attitudes that sustainability requires and sustainability education seeks to cultivate are the following:

- The confidence to take action and the belief that such actions have the power to affect positive change;
- The appreciation that we are all part of society and that our individual behaviors must be balanced by our shouldering of responsibilities;

¹“UN Decade of Education for Sustainable Development: Overview.” http://www.unesco.org/education/tlsf/TLSF/decade/uncomESD_FS.htm
³Ibid.
- The understanding that humanity depends on the natural world and must respect its limits;
- Respect for biological, social, and cultural differences that are a fundamental part of our world;
- An attitude of caring for ourselves and others.\(^4\)

### The Last Decade: An Unprecedented Rise of “Green” Majors and Minors

“...how to use our resources without wasting them; how to teach and learn about sustainable development; how to generate the skills, knowledge and understanding to allow us to fulfill our duty as global citizens.”

- C. Clark, *Sustainable Development Action Plan for Education and Skills*

Sustainability is easy to address in curricula already dedicated to environmental studies and programs innately focused on sustainability and energy. It’s a good thing, too, because demand for these programs is higher than ever before: in 2009, more than 100 majors, minors or certificates were created at colleges across the U.S. to address these topics, up from just three new programs in 2005.\(^5\) In Australia, 46 universities offer coursework related to sustainability, spanning undergraduate engineering and community studies degrees to graduate degrees in business sustainability.\(^6\)

There are two reasons for this rise in sustainability-related educational programs across the world: students are increasingly interested in learning more about this field, and employers are more interested in hiring graduates with sustainability backgrounds. According to a report by USA Today, “the Obama administration has estimated that jobs in energy and environmental-related occupations will grow 52 percent from 2000 to 2016, as compared to just 14 percent for other occupations.”\(^7\)

In an economy where institutions are particularly strapped for cash, this is one area that administrators are willing to promote at the expense of other programs: many have added sustainability degrees while cutting other majors and minors.

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\(^4\) Ibid.
\(^5\) Schmidt, J. “As colleges add green majors and minors, classes fill up.” *USA Today.*

\(^6\) Australian Learning and Teaching Council. “Learning and Teaching Sustainability.”
http://sustainability.edu.au/

Sustainability Education: Attitudes and Initiatives

As universities have moved to include more programs that directly target sustainability and issues of green energy, attention has also been placed on embedding these same themes and foci into extant curricula and disciplines. When it comes to putting such goals into practice, however, most educational institutions have an easier time welcoming the theory than actually applying it.

Integrating ideas and practices related to sustainability into pre-existing theories, schools of the thought, and the curricula built upon them is a theoretical ideal, but can prove to be a practical unreality. Difficulties arise in shifting from area-focused teaching to inter-disciplinary approaches that synthesize fields like economics, architecture, trade, labor, literature and human rights. The current approach may foster students who, as graduates, are “poorly prepared to integrate the economic, environmental, cultural and social dimensions of their professions or to see opportunities in implementing sustainable practices.”

The current infrastructure available to institutions is largely theoretical, leaving them with little in the way of hard data or instructions. In 1990, a conference in France composed The Talloires Declaration, the first-ever official statement made by university leaders committing to environmental sustainability in all disciplines within higher education through teaching, research, operations, and outreach at colleges and universities. The ten-point action plan had a total of 433 signatories as of 2010, twenty of which are Australian, though Macquarie University is not currently a signatory. The Talloires Declaration’s steps for implementing change include:

- Increase awareness of environmentally sustainable development;
- Create an institutional culture of sustainability;
- Education for environmentally responsible citizenship;
- Foster environmental literacy for all;
- Practice institutional ecology;
- Involve all stakeholders by expanding work with local community and NGOs;
- Collaborate for interdisciplinary approaches;
- Enhance capacity of primary and secondary schools;
- Broaden service and outreach nationally and internationally;
- Maintain the movement by creating a steering committee and Secretariat.

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The Association of University Leaders for a Sustainable Future is the Secretariat for signatories of the Talloires Declaration, and focuses on making sustainability a “critical focus” of teaching, research, operations, and outreach in higher education.11

Other, smaller initiatives have been undertaken across the globe to promote the ‘greening’ of curricula in higher education, including:

- **Second Nature**, a non-profit based in the United States that aims to increase the visibility of sustainable practices and values among senior university leaders and administrators;12
- **The Haga Declaration** for the Baltic Region, which agreed in 2000 upon “Agenda 21” to implement and pursue education for sustainable development at all levels;13
- **The Swansea Declaration of the Association of Commonwealth Universities (1993)** emphasizes the responsibility universities have and the role higher education plays in shaping society’s present and future development policies as related to sustainable development.14

**Living Sustainably: The Australian Government’s National Action Plan for Sustainability**

In April 2009, Australia’s federal government released an initiative called “Living Sustainably: the Australian Government’s National Action Plan for Sustainability.” This initiative aims to equip all Australians with the knowledge and skills required to “live sustainably.”15 Its four primary strategies are to:16

- **Demonstrate Australian government leadership**: promote system-wide change through greater coordination with state, territory, and local governments;
- **Reorient education systems to [embed] sustainability**: achieve a culture of sustainability in which teaching and learning are reinforced by continuous improvement in the sustainability of campus management;
- **Foster sustainability in business and industry**: adopt frameworks, tools, and incentives to improve efficiency, save cost, and minimize use of natural resources;
- **Harness community spirit to act**: collaborate with educators to improve access to knowledge and tools.

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The initiatives already in place and the current discourse surrounding embedding sustainability into university curricula suggests that, in the words of a survey result that polled Australian institutions, “There [is] a general appreciation that sustainability education has a clear place in tertiary curricula, but only a handful of Australian institutions had worked on, or were working on, implementing it. This was in contrast to the number of schools that [included] sustainability education in the curricula of specific departments or disciplines.”

Barriers to Success: Resistance at Individual and Institutional Levels

Thus far, the debate has been less about the importance of integrating sustainability education into existing curricula than about methods best suited to do so successfully. A 2002 survey of Australian universities found that the lack of professional development programs was one of the biggest hindrances to embedding sustainability within curricula. A large portion of the staff responded sympathetically to the notion of sustainability education, but felt restrained by the following barriers:

- Lack of leadership;
- Problems with access to information;
- Lack of training to assist staff;
- No information available regarding methods of integration for sustainability education.

The Higher Education Academy’s “Subject Centre Questionnaire” assessed the main barriers for embedding sustainability into university curricula by academic subject. Table 1, on the next page, shows the relationship between the number of barriers and the subject’s relationship to sustainable development:

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18 Sarah Holdsworth, Carina Wyborn, Sarah Bekessy and Ian Thomas. “Professional Development for Education for Sustainability: How advanced are Australian Universities?”
http://search.proquest.com/socialsciences/docview/205040677/fulltextPDF/12EB5E65636253C2762/4?accountid=132487
### Table 1. Barriers to Embedding Sustainability in Curricula

<table>
<thead>
<tr>
<th>Academic Subject</th>
<th>Number of Barriers</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics</td>
<td>11</td>
<td>Perceived irrelevance by staff; lack of awareness/expertise; need to acquire new knowledge; lack of time to update courses; lack of relevant course examples; lack of academic rigor; internal accreditation, validation, benchmarks; lack of institutional drive and commitment; perceived irrelevance by students; lack of student demand; financial restrictions (inhibits interdisciplinary work); confusion over what needs to be taught.</td>
</tr>
<tr>
<td>Performing Arts</td>
<td>10</td>
<td>Awkward fit with subject area; lack of staff expertise; perceived irrelevance by staff/students; need to acquire new knowledge; curriculum too crowded; internal validation and accreditation procedures; financial restrictions and confusion over what needs to be taught; lack of institutional drive and commitment.</td>
</tr>
<tr>
<td>English</td>
<td>9</td>
<td>Difficulty of translating ecological concepts into literary theoretical concepts; perceived irrelevance by staff; curriculum too crowded; lack of staff awareness/expertise; need to acquire new knowledge; perceived irrelevance by students; lack of student scientific literacy; confusion over what to teach; lack of institutional drive and commitment.</td>
</tr>
<tr>
<td>Languages, Linguistics, and Area Studies</td>
<td>9</td>
<td>Similar issues to English, plus awkward fit with subject area; lack of relevant course examples.</td>
</tr>
<tr>
<td>Engineering</td>
<td>7</td>
<td>Curriculum too crowded already; lack of time to update courses; lack of staff expertise; need to acquire new knowledge; lack of staff awareness; confusion over what to teach; lack of relevant course examples; lack of academic rigor; lack of institutional drive and commitment.</td>
</tr>
<tr>
<td>Philosophy and Religion</td>
<td>7</td>
<td>Curriculum too crowded already; lack of time to update courses; perceived irrelevance by staff; lack of staff/student awareness; awkward fit with subject area; lack of staff expertise; need to acquire new knowledge; financial restrictions.</td>
</tr>
<tr>
<td>Academic Subject</td>
<td>Number of Barriers</td>
<td>Comments</td>
</tr>
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<td>------------------------------------------------------</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hospitality, Leisure, Tourism, Sports</td>
<td>5</td>
<td>Perceived irrelevance; awkward fit with subject area; curriculum too crowded; lack of time to update courses; lack of staff awareness and expertise; need to acquire new knowledge.</td>
</tr>
<tr>
<td>Sociology, Anthropology, Politics</td>
<td>5</td>
<td>Perceived irrelevance by staff; problems with internal validation and accreditation systems; uneven distribution of institutional commitments; financial restrictions; confusion over what needs to be taught</td>
</tr>
<tr>
<td>Geography, Earth and Environmental Sciences</td>
<td>3</td>
<td>Curriculum too crowded; lack of time to update courses; lack of institutional drive and commitment; financial restrictions.</td>
</tr>
</tbody>
</table>

Source: Subject Centre Questionnaire

Table 1 demonstrates that while many of the issues with practical implementation of sustainability education are subject-specific, there are still general trends cited by professors in all disciplines that could be addressed by university initiatives and specialized attention, from Professional Development training to instruction manuals or examples of sustainability-embedded lesson plans.

Exploring the Barriers to Embedding ESD in Higher Education: Different Views

Resistance to change can come from structural constraints. In contrast to businesses, universities have less control over their operations: there are more revenue and opportunity constraints, not to mention many different stakeholders. There is also a greater need for participation by staff when making decisions, and universities often have complex governance structures, high workloads, and an ambiguous centre of responsibility for implementing “organization-wide change initiatives.” Bringing about any kind of change in this environment would be challenging, making the “transformational” shift necessary to embed sustainability one that is particularly difficult to achieve.

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21 Ibid.
Other barriers exist, as well. Many academic staff remain “ideologically” resistant to curriculum changes that transcend the bounds of their particular discipline. This is a deeply entrenched problem that points to an issue within the educational world of the effective ‘stove piping’ of information and foci for the various disciplines. As a result, for those without sustainability backgrounds, who are unfamiliar or inexperienced with its relevance to their field, there is little incentive to put in the time and effort to embed it into their curricula without precedent from the past or mandate from above. This is particularly problematic as most of the staff in higher education institutions were themselves educated at a time before widespread acceptance of these ideals across all disciplines: therefore, most lack the experience to make the shift on their own.

As a result, progress often fails to move beyond discussions of best practices. In order to make progress in embedding sustainability into university discourse and curricula, it is critical for institutions to ask themselves what they expect to accomplish and develop a clear message regarding a chosen definition of sustainability. Doing so will allow staff to rally around a unified, articulated concept and move forward with a clear idea of what must take place in order to achieve desired results.

The Current Market: Expectations, Demands, and Projections

Student Expectations for Acquiring Sustainability Literacy at University

While a discrepancy exists between interest in sustainability and its implementation, there appears to be a real and present demand for it among students and future employers. In the last ten years alone, the number of students enrolling in classes on sustainability has jumped six-fold in some cases.23

In June 2010, the United Kingdom’s Higher Education Academy surveyed 5,763 first-year higher education students in order to investigate the role of “developing skills for sustainability literacy.”24 (No equivalent study appears to have been conducted in the Australian context to date). The findings demonstrated the significance of sustainability in the eyes of students, as 80 percent believe that sustainability skills are going to be important to their future employers. Key findings from the survey include:

- 65 percent of respondents believe that sustainability skills should be delivered throughout the curriculum rather than through a separate module;
- 63 percent of respondents would sacrifice £1,000 from their salary to work in a [sustainably] responsible company;
- Skills in sustainable development are slightly more relevant to students from Scotland [than from Britain], where there is a history of national policy in education for sustainable development;
- Respondents placed high value on many of the aspects of sustainable development for use in higher education in relation to increasing their ability to perform well in their course;
- Understanding of sustainability as a concept was good among respondents, although in practice most focused on the environmental dimension of sustainability;
- Overwhelmingly, skills in sustainable development are viewed as significant for employability.

Employer Expectations for the Sustainability-Related Knowledge of Recent Graduates

A comprehensive survey of employers’ attitudes toward sustainability was conducted by the United Kingdom’s Higher Education Academy (no equivalent study appears to have been conducted in the Australian context to date). Although the sample size was small (87 respondents, approximately a 9 percent response rate), it found both direct and indirect evidence that some employers, especially larger businesses, considered the social/environmental ethics and values, as well as the experience of university students, as part of their graduate recruitment. The research showed evidence that a growing proportion of employers want to attract recent graduates with responsible values that fit their own. About a quarter of human resources staff said that their policies on sustainable development or corporate social responsibility affect the way they recruit recent graduates.

Most employers focused on career progression and professional development (59 percent) to attract potential graduate employees, closely followed by the types of services or goods provided to customers (58 percent) and the atmosphere and culture of the workplace (47 percent). These were seen as more important than the social and environmental ethics of the employer (23 percent), the pay and perks (31 percent) or the location and local environment (26 percent).25

Over half of employers responded that they will be looking in the future to employ recent graduates that are socially and environmentally responsible…For the promotion, recruitment, induction, and training of staff in terms of social and environmental responsibility, larger businesses were most demanding. Over 40 percent of HR managers said that they always mentioned social and environmental responsibility, and about 75 percent of employers said they had included it in staff training at some time and about two thirds said they had included it in staff induction at some time. Approximately 25 percent always included it in staff training and induction. Over half of employers had at some time used social and environmental responsibility in their selection of recent graduates and in their questions as staff interviewers. Equally, over half of employers had been asked about it by recent graduates at interview, and over half said that they will be looking in the future to employ recent graduates that are socially and environmentally responsible.26

The four main employment sectors – larger businesses, smaller businesses, public sector and voluntary sector – differed in their responses. For the promotion,

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26 Ibid.
recruitment, staff induction and training in terms of social and environmental responsibility, larger businesses were most demanding. Over half the larger businesses often or always included social and environmental responsibilities in the staff induction and training. The responses from businesses differed significantly based on size. Of the four employment sectors, businesses with over 500 employees were most supportive of an employer’s social and environmental responsibility and businesses with less than 500 employees were least supportive. The larger businesses claimed to be most aware of the value and promotion of their own social and environmental responsibility, as well as that of recent graduates whom they would wish to recruit.

Over a third of the larger businesses (36 percent) always included social and environmental responsibility in the induction of recent graduates, as opposed to 13-15 percent of smaller businesses, public bodies and voluntary organizations. 38 percent of the larger businesses were often asked about environmental and social responsibility by graduates at interview, and 42 percent often used social and environmental responsibility in the selection of recent graduates.27

Businesses with few than 500 employees appeared to value social and environmental responsibilities less than larger businesses and organizations in the public and voluntary sectors. Only 33 percent of smaller businesses thought it important for employers to take social and environmental responsibility seriously, compared to 80 percent of larger businesses, 65 percent of public bodies and 57 percent of voluntary organizations. Overall, 55 percent of employers said that universities should do more to prepare students to work with socially and environmentally responsible employers.28

Kingston University conducted a study on how far sustainability criteria have been adopted as part of the graduate recruitment process of “multidisciplinary built environment organizations” in the private sector, particularly those in surveying. While it would be cavalier to extend their findings to all disciplines and employer demands, the impact of the built environment is highly relevant to environmental issues, as buildings account for some 50 percent of carbon emissions in the UK.29 Sustainability has no doubt shifted the demands for surveying professionals, but it was not until recently that sustainability education became a focus for leaders in the field.

The findings of this survey are summarized below:

27 Ibid.
28 Ibid.
Sustainability is considered “high” on the agenda of built environment organizations; A majority of employers indicate that sustainability literacy is a requirement for graduates hoping to become employees; However, sustainability literacy is given low priority when it comes to recruitment decision-making: these ‘soft’ skills are less of a priority than technical knowledge.

This last point represents the crux of the sustainability debate: everyone cares about the idea in an abstract sense, but there is little quantification of its importance. The nature of the topic makes it very difficult to set clear targets and create quantifiable benchmarks.

Qualitative evidence suggests a greater demand for sustainability literacy. Kevin Doyle, President of US-based consulting firm Green Energy, states that any institution with a large number of people and infrastructure including buildings, grounds, food services, vehicle fleets, wastewater facilities, intensive use of energy, etcetera will all eventually require a sustainability manager. “This,” he writes, “means cities and towns, school districts, utility districts, universities, federal government agencies, military bases, and private corporations.” In the United States, that means 3,304 county governments, 19,431 municipal governments, 13,522 school districts, 50 state governments, the Fortune 1000 companies, and thousands of smaller businesses. While there is still no consensus on how best to train today’s future leaders, there is no doubt that a need for sustainability literacy is real and present now, and will be increasingly necessary in future markets.

Sustainability in the Current Job Market

Hundreds of major corporations are responding to consumer demands and reducing expenses by embarking on plans to change operations in ways that will cut energy consumption. The New York Times outlines Frito-Lay’s effort to take its New Mexico potato chip plant off the power grid, running the factory “almost entirely on renewable fuels and recycled water.” The plan included reducing electricity and water consumption by 90 percent each, natural gas use by 80 percent and greenhouse gas emissions by 50-75 percent. Not only does this “net zero” concept establish Frito-Lay (and parent company PepsiCo)’s “green credentials” among consumers, but PepsiCo benefits financially, as well.


Ibid.

Hundreds of major corporations are responding to consumer demands and reducing expenses by embarking on plans to change operations in ways that will cut energy consumption. PepsiCo is not alone: Toyota Motor Engineering and Manufacturing North America reduced energy consumption for each vehicle manufactured by 24 percent from 2002 to 2007. Texas Instruments built a green semiconductor plant in Texas in 2006 that was expected to save the company $4 million in energy and water costs per year.33

A 2011 study by Pike Research asserts that sustainability initiatives will have an impact on more than 100 billion electronic product units worldwide by 2015 as the largest companies in the industry focus on improving sustainability practices in their new products.34 Initiatives include sustainable design, raw materials extraction, manufacturing, distribution, use, and end-of-life management. The study states that “corporate policies, legal requirements, and certification processes are being used to drive economic, environmental, and social responsibility throughout electronics supply chains.”35

Sustainability initiatives do not end with the private sector, either. The United States Department of Defense has pledged a commitment to sustainability initiatives that save natural resources and taxpayer dollars. In April 2011, a solar micro grid was completed at the nation’s largest Army Reserve training post and is expected to save $1 million in energy costs each year,36 demonstrating the government’s support of clean energy initiatives, the financial incentives for backing them, and their implications for security and other sectors. Additionally, The recently passed Higher Education Opportunity Act of 2008 authorized a “University Sustainability Program” at the U.S Department of Education to offer competitive grants to institutions and associations of higher education to develop, implement and evaluate sustainability curricula, practices, and academic programs.37

This shift toward sustainability literacy in both the public and private spheres underlines the extent to which knowledge in this area is increasingly required by companies looking to keep up with the ‘greening’ of industry and governments. The

35 Ibid.
inevitable result, then, is likely to be an increased emphasis on this knowledge by employers hiring recent graduates.
Jobs Requiring Sustainability Literacy: The Current Market

A brief scan of current job advertisements across technology, policy and defense sectors in Australia that relate to sustainability include, among others, the following positions:38

- Sustainability Manager
- Energy Analyst
- Senior Sustainability Engagement Officer
- Sydney Harbour Ranger
- Environmental and Sustainability Officer

The descriptions of these job qualifications include the following:

- Guide the organization in performing on environmental, economic/socio-economic and social dimensions of sustainability, including water and land management, indigenous issues, community wellbeing, emissions and wastes, and socio-economic development;
- A demonstrated understanding of state and federal regulatory frameworks as they apply to sustainability;
- Extensive experience in research and practical applications of sustainability;
- A track record of looking at sustainability issues and projects within energy-intensive industries.

The qualifications employers emphasize demonstrate a need for knowledge of sustainability implementation in a wide range of sectors. However, the nature of the need is such that the qualifications themselves are vague: “A track record of looking at sustainability issues and projects” is a quote from an employer’s job listing, but provides little quantifiable information about what the company actually requires. 39


According to the U.S. Bureau of Labor Statistics, the outlook for sustainability-related employment is bright. While the Australian labor market will not exactly mirror that of the United States, it is not unreasonable to assume that broad trends will be similar in both. The U.S. Bureau of Labor Statistics has yet to create a category for jobs related to sustainability (the closest extant categories are geoscientists and hydrologists as well as environmental scientists and specialists): these professions are

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38“Indeed Australia: Job Search (keyword: sustainability).”
39 “Sustainability Manager Job Description.” Aussie Employment.
expected to undergo significant growth. This growth may be indicative of greater employer demand for sustainability literacy more generally.

Geoscientists and hydrologists are in charge of researching “energy needs, environmental protection, and responsible land and water management.”40 The BLS predicts employment growth of 18 percent for this group between 2008 and 2018, a rate significantly higher than the average rates for most occupations (7-13 percent).

The Bureau predicts that graduates with a master’s degree in geosciences will have excellent opportunities within consulting and the oil and gas industry, as the former tailors its services to accommodate “greening” among others sectors, and the later institutes more sustainable business practices.

The Bureau of Labor Statistics’ outlook for environmental scientists and specialists is even more optimistic. Employment is expected to increase by 28 percent between 2008 and 2018, a rate much higher than the occupational average. Many of these jobs will be in the consulting field, where businesses and governments seek help addressing issues related to remediation, engineering solutions, and “new Federal and State initiatives that integrate environmental activities into the business process itself, resulting in a greater focus on waste minimization, resource recovery, pollution prevention, and the consideration of environmental effects during product development.”41 This transformational shift makes the field a ripe career path for graduates with a knowledge of sustainability.

Implementing Sustainability Education: Case Studies

Australia: RMIT University

Two attempts to introduce sustainability education have been made at RMIT since 1996. After the first attempt “languished,” it was found that “the ‘diffusion model,’ in which already committed individuals are expected to change the entire culture of departments from the bottom up, was not going to work.”42 Instead, there must be:

- Active leadership from the top;
- A new approach to staff development;
- Adequate resources to allow staff to integrate environmental/sustainability content into teaching material.

The second attempt emphasized the extent to which enthusiasm from the staff directly involved in embedding sustainability will go to waste if no opportunities are provided to spread that effort to other programs through institutionalized training and development. In the case of RMIT, the staff who had initially expressed interest and a willingness to head the move toward embedding sustainability became caught up again in the “day-to-day” demands of their programs. Some of these individuals did succeed in incorporating sustainability concepts into their own courses, but the movement made less headway that it would have with more official support and encouragement.

Monash University’s MBA Program

Over 70 percent of the world’s top 50 MBA programs offer one or more units on sustainability-related topics. While providing these courses as “standalone” electives is easiest for implementation, the worry becomes that “the gap [between free-market business and sustainability] is so wide and the ideas that are promoted are so disconnected that students are trapped into choosing one position (or neither), and

are unable to link the two discussions.” Monash University incorporates sustainability by presenting ideas about it in three different frameworks along a continuum, and allows students to interact with the ideas to arrive at those they relate to most closely. The three perspectives most relevant to graduate business coursework include:

- **Neoclassical economic paradigm:** unlimited economic growth through the operation of free markets and increasing consumption of products and services, where technology solves any issues of environmental degradation.
- **Ecocentrism:** the belief that an environment with finite resources makes infinite growth impossible; nature has an inherent worth beyond its instrumental value for market development.
- **Ecological modernization:** a middle ground between the two perspectives described above; promotes a path of economic development in which technological advances and social changes combine to reduce the environmental impact of economic activity.

The MBA courses at Monash encourage students to develop their own perspectives on this framework by reflecting, critiquing, and engaging with the issues at a practical/community level. Case studies are incorporated and guest speakers from a variety of industries (automotive, manufacturing, banking, steel, energy, etc.) share with students the role sustainability plays in their careers. The course then incorporates assignments in which students must analyze the major sustainability issues and risks for various industries, the implications of those risks, and possible solutions for their minimization.

The authors of the study found that “this framework generates a good deal of class discussion because it juxtaposes different sustainability perspectives with the neoclassical ‘business-as-usual’ thinking that otherwise underpins the MBA program.” That said, more work could be done to integrate these concepts into core MBA subjects to address the concerns about conceptualizing sustainability as separate from business strategy, the legal environment, economic, accounting, corporate finance, marketing and other core MBA units.

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44 Ibid.

45 Ibid.
UK: The University of Plymouth’s Environmental Building Degrees

The University of Plymouth began offering Environmental Building Degrees in the mid-1990’s to prepare students for a professional career in construction that took sustainability into account. Given the emphasis placed on this issue during that time, enhancing awareness of the environmental context of their discipline became a priority. In 2005, an audit of the Environmental Building Degree curriculum reviewed course content against a ‘master-profile’ of sustainability-relevant knowledge and skill sets for construction professionals. The results were mixed: while Plymouth was able to provide strong coverage of environmental knowledge and skills, the audit exposed two areas that had been overlooked:

- No consideration for developing students’ values and attitudes;
- Little focus on the social and economic aspects of sustainability.

The auditing body found these findings were “unsurprising.” Curriculums tend to focus on developing occupationally relevant knowledge and skills, such as modes of energy efficiency and waste management. Institutions have a harder time incorporating what they see as value-based material that appears less objective. Plymouth responded to these educational gaps exposed by the audit by working to “integrate sustainability more widely within the Environmental Building Degrees and [devising] methods of promoting sustainability values and deepening learner awareness of the social and economic perspectives” of the area. This “sustainability training” employed by Plymouth University aims to make learners more aware of the complexities of the big issues tied to sustainability and includes workshops, whose characteristics include:

- Potential for use with a variety of audiences;
- Enquiry rather than outcome-based;
- Engaging and motivational;
- Requiring no prior preparation by learners.

After conducting these workshops for the first time, Plymouth came to many unexpected conclusions, including:

- Values and the social/economic aspects of sustainability are difficult to integrate into career-based programs like construction, “due to a shortage of curriculum space and a lack of relevant expertise among teachings staff;”

47 Ibid.
48 Ibid.
The discipline of ICS includes several innate links with sustainable development, including decision support systems; environmental issues; financial issues; and issues of globalization: networking, the internet, communications, and trade.

External funding proved critical for supporting the underpinning research and in paying for the piloting process and field trials;

Further consideration is required on how to engage learners uninterested in sustainability.

University of Hull’s Information and Computer Sciences (ICS) Program

Dr. Neil Gordon, a professor of Computer Science at the University of Hull, points out that embedding sustainability into ICS curricula not only creates the potential for tools and technologies within ICS to help accomplish sustainable development in a vast array of applications, but also offers support for sustainable development itself in the importance placed on ethics as part of the ICS curriculum.

According to Gordon, the discipline of ICS includes several innate links with sustainable development, including decision support systems; environmental issues; financial issues; and issues of globalization: networking, the internet, communications, and trade. Gordon suggests approaching implementation of sustainability into ICS curricula by breaking down the topics covered into five main areas and then brainstorming the ways in which sustainability could be included.49 His own version of this is listed below:

- **Hardware**: longevity of systems; cost benefits analysis of upgrading over replacements; energy requirements for different approaches; efficient system design; power-saving features.
- **Software**: development of particular programs to solve sustainable development-related problems; explicit inclusion of sustainable development-related requirements in software specifications for programming exercises.
- **Communication and interaction**: role of networks in the ‘one world’ view supporting sustainable development; IT support for concepts like the ‘paperless office.’
- **Practice**: professionalism and ethics, for instance, use a related issue in a professional capacity, where a choice is made to follow the most sustainable practices; support of systems in data mining; the role of strategic systems in ensuring sustainability is considered by organizations.

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Gordon warns that universities hoping to succeed in embedding sustainability should avoid removing materials from existing curricula: in his experience, this is most likely to generate resistance within the academic community.

Gordon also asserts that projects, dissertations, and industrial placements offer a “particularly effective way of teaching and developing sustainability-related material” within the ICS curricula. These assignments tend to incorporate real-world issues, where sustainable development plays an important role. Gordon emphasizes that teaching staff must demonstrate the importance of sustainable development if “students are [going to] take sustainability on board as part of their own learning.”

There is a demonstrable connection between the manner in which sustainability is presented by university staff and the extent to which it is received in a larger sense by the students and community at large. However, Gordon also warns that universities hoping to succeed in this endeavor should avoid removing materials from existing curricula: in his experience, this is most likely to generate resistance within the academic community.

Canada: The University of British Columbia

In 1997, The University of British Columbia (UBC) became the first Canadian university to adopt a sustainability policy, implementing initiatives and processes to guide its approach to learning, operations and knowledge development. After passing “Policy 5” in 1997, a “Sustainability Advisory Committee” was appointed, where faculty, students, and staff could advise on strategy and actions to realize the Policy. Integrating sustainability into operations became a priority: two thirds of UBC’s supplier requests include sustainability criteria, and energy conservation initiatives on campus have saved the university $75,000 per year.

An effort was made by UBC to brand and communicate its sustainability programs, thereby advancing internal and external awareness of its commitment to sustainability programs, which included ELECTREK, an energy-conservation project, and a corporate-sponsored subsidized bus program for students.

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50 Ibid.
51 UBC Sustainability Office. “UBC Case Study: Institutionalizing Sustainability.”
52 Ibid.
In 2008, UBC’s President established an Advisory Council on Sustainability, whose objectives include:

- Oversee development of a sustainability strategic plan, identifying campuses as a model for sustainability;
- Communicate and educate internal and external communities about the university’s initiatives and success;
- Serve as a forum of ideas for implementation of sustainability initiatives in everyday practice, monitoring indicators and identifying trends;
- Explore sustainability proposals and opportunities from various faculties, departments, and individuals, and recommend appropriate action;
- Liaise with potential donors and external funders, developing case statements.

Today, UBC is considered a trendsetting campus sustainability leader by other organizations. Research performed on campus reveals that the university agenda has influenced student, faculty and staff behavior on campus.

Ultimately, UBC identified the source of its success in this regard as the result of “implementing a management system for sustainability. The more of these elements [that are] in place in an organization, the likelier the organization is to benefit from a culture and ethic of sustainability.”

Spain: Technical University of Catalonia (UPC)

Since 1996, the conviction of UPC’s decision-making bodies has been that the transformation process towards sustainable development had to be based on a comprehensive approach that addressed various university activities, education, research, and facilities. As the main environmental ‘outputs’ of higher education institutions are their graduates, UPC considers education to be the critical and most important matter. After the initial planning stage to implement new curricula, an assessment of the plans arrived at, among others, the following recommendations:

- The number of projects should be reduced to avoid dispersion of resources and commitment;

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53 Ibid.
By calibrating courses offered in response to student feedback and rising demand, Lehigh was able to offer courses that addressed industries through the lens of sustainability, which were well-received by staff and students alike.

An Environmental Plan Coordination Office was created in 1996 to coordinate, promote, and follow up with the transformations and implementation of planned projects. As of 2004, the office was run by four full-time staff, and three students. The main responsibilities of the Office include:

- Supporting a platform that creates opportunities for new sustainability projects;
- Find opportunities to save resources;
- Become a permanent stimulator of the ‘greening’ process at UPC;
- Become a meeting point of sustainability-concerned students and staff at the university.

UPC’s Environmental Plan Cooperation Office has also explored the most effective ways to measure the process of “curriculum greening,” a challenge that evolves as the university’s offerings and student demands shift. Reliable metrics were identified, and these indicators include:

- Looking for sustainability-related words in the descriptions of UPC courses;
- Inclusion of environmental aspects in final projects;
- The student demand of sustainability-related courses.

USA: Lehigh University

In 2002, Keith M. Gardiner, a professor at Lehigh University, published Management Strategies for Sustainable Manufacturing. Interest in the paper generated the idea for an experimental course in 2003 that explored the “concept of manufacturing as a wholly integrated system taking produces from ‘cradle to grave’...to generate wealth and prosperity without occasioning trauma for employees, the host community or our planet.”55 Offered again in 2006, the course, titled “Aspects of Sustainable Systems Design,” was submitted for approval and added to the course catalog with the intent to include it every other spring semester. Students were encouraged to develop their own research projects, and topics

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included: *Sustainability in Solar Energy; Brownfield Revitalization—Pennsylvania; Commercial Greenroofs; IBM: Building a Smarter Planet Through Smarter Cities; Department of Defense Renewable Energy Initiatives*, etc.

By calibrating courses offered in response to student feedback and rising demand, Lehigh was able to offer two more courses that addressed industries through the lens of sustainability, which were well-received by staff and students alike.
Resources for Embedding Sustainability

Research by educational institutions and NGOs has been mixed regarding a decision to embed sustainability education from the “top-down” or from the “bottom-up.”

Embedding Sustainability: The “Top-Down” Approach

According to some research, the direction necessary to embed sustainability into curricula across all areas (and thus values across all areas) usually requires an initial push from top management, who are in charge of “defining” the policy that will drive the shift. The financial and administrative difficulties of developing cross-departmental (and usually cross-disciplinary) initiatives make their implementation more challenging than single-dimensional curriculum initiatives. According to researchers, the direction necessary to effect the “full and complete change of peoples’ behavior, values, culture, informal operating style…” required to embed sustainability into curricula across all areas (and thus values across all areas) usually requires an initial push from top management, who are in charge of “defining” the policy that will drive the shift. Ian Thomas points out that in these instances, “rarely do we see the whole process [of effecting change] being owned by those who will have to ensure that it is operable.”

This is a crucial finding that helps to explain the widespread support for embedding sustainability, juxtaposed with its relative lack of implementation. A failed attempt to embed sustainability education at RMIT University concluded: “The ‘diffusion model’, in which already committed individuals are expected to change the entire culture of departments from the bottom up, is not going to work… [what is required is] active leadership from the top, a new approach to staff development, and adequate resources to allow staff to integrate environmental content into their teaching material.”

According to Thomas, such an approach would include:

- Amending the institution’s mission statement to include the importance of sustainability
- Defining policy as it pertains to the organization
- Changing completely the organizational culture and strategy of the organization

57 Ibid.
Allowing all of these initiatives to “cascade down” to the academics who are in positions to implement them.\textsuperscript{58}

It is no wonder that areas requiring such widespread change are often left untouched by reform: without a clear and targeted implementation approach, there is little to do for sustainability other than discuss it.

**The “Bottom-Up” Approach**

However, other research suggests that a “bottom-up” approach could be more realistic in embedding sustainability into university curricula. The track record for actually effecting change from the top down is not particularly impressive: thus far, leaders have not given priority to developing a sustainability culture within their educational institutions, as evidenced by the relatively minor progress made in establishing sustainability across disciplines.\textsuperscript{59} This suggests it may be useful to try a grassroots approach, where students—already more likely to feel freer to criticize their school—take the lead, along with an institution’s lower and mid-level staff. Thomas identifies three aspects of the movement that would assist transformation at an institutional level:

- **Promote the new**: highlight the benefits of the innovation, noting its superior features;
- **Critique the old**: attack the status quo, directly or subtly, and point out the current problems/weaknesses;
- **Facilitate the change**: reduce the perceived cost of the change, and put effort into making the change as easy as possible, ideally making it seem like a net gain.

As with all other models for embedding sustainability, “facilitating” the change remains hardest to actually implement. Barbara de la Harpe conducted a survey to gather the perceptions of higher education academics about “changing university curricula” and the conditions they perceived as most important in facilitating this change.\textsuperscript{60} A significant finding was that staff did not feel it was important for the change to be mandated by management; furthermore, many indicated that mandating change from the top would be a barrier to success.

According to her findings, a successful curriculum change initiative driven by staff rather than their leaders would follow the steps outlined below:

\textsuperscript{58} Ibid.
\textsuperscript{59} Ibid.
A core group of staff would be identified to work together to lead and oversee the curriculum development and change initiative; this same group would be responsible for convincing others that change is necessary; key and influential staff would be specifically chosen to include a range of staff that would ensure direction and momentum are sustained; they would work to ensure a vision was agreed upon collaboratively and would develop a project brief to guide the change; resources for project development would be identified and set aside; a clear implementation strategy would be developed, and resources would be specifically allocated to support implementation activities; staff professional development needs tailored to the change initiative would be identified and planned for; administrative systems and work roles would be discussed and modified to support the shift; a monitoring program to assess the degree to which the desired change has occurred would be put in place, and small successes would be communicated often and rewarded along the way.

Addressing Barriers: The Utility of Professional Development

Regardless of the mode chosen, it is clear that staff need adequate resources in order to successfully implement a changed and enhanced curriculum. One of the biggest difficulties encountered by those interested in embedding sustainability into higher education curricula is the challenge of developing a sufficiently targeted approach. It has been established that there is an interest among students, university administrations, and employers: the key is integrating this new, constantly changing, body of knowledge into ideas and concepts that have been taught a certain way for much longer.

Ultimately, the success or failure of embedding sustainability lies in the willingness and ability of the professors to make the effort to transform the material they bring to the classroom. This is easier said than done: a report on professional development in Australia notes that academia is a culture that “perpetuates the image of academics as people who ‘know’ and therefore do not need to ‘learn.’” Many of the barriers in Table 1 cite staff hesitations or complaints about insufficient funding for new programs, no time to add them to the current curricula, or the need for new knowledge acquisition.

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The Swansea Declaration, developed in 1993 by the Association of Commonwealth Universities states that institutions should “enhance the capacity of the university to teach and undertake research in sustainable development principles, to increase environmental literacy, and to enhance the understanding of environmental ethics within the university.”

To date, however, no Australian university has formally recognized the Swansea Declaration. In response to a survey conducted in late 2000, the majority of Australian universities (there were a total of 21 responses) stated that sustainability issues were covered in their curricula. However, the extent of coverage was “notably variable,” with one third including sustainability education in the curricula of specific departments or disciplines, but less than half indicating that sustainability education was included in all disciplines.

A 2005 survey found that regardless of their status as signatories of the Talloires Declaration, most Australian or New Zealand universities do not have education for sustainability on their “radar.” Only one university offered a professional development course geared toward arming academic staff with the tools and resources to embed sustainability into their curricula. The survey concluded that the lack of Professional Development courses or training was the primary cause of the discrepancy between the interest in embedding sustainability and its actual implementation. According to the authors, “Professional development is needed [within Australian universities] to develop greater understanding regarding pedagogy, program content and structure, and to support a much deeper development of curriculum and learning outcomes within the student body.”

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63 Ibid.

64 Ibid.

65 Ibid.
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