

**Tertiary Education for Sustainability:
Four Australian Universities' Commitment to Sustainability**

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Abstract

With increasing evidence of issues such as global climate change and environmental degradation, the need for sustainable development has become evident. While achieving sustainability will require many approaches, there is an immense body of literature, declarations and charters supporting education as key. Tertiary education is particularly important because universities are training our future leaders and professionals. For this reason, universities have a moral responsibility to prepare to work toward achieving a sustainable world. Unfortunately, integrating sustainability education is complex, requiring a paradigm shift toward collaboration, interdisciplinary education and an action-oriented approach.

This study analyzed the extent to and manner in which sustainability has been integrated into the tertiary curricula of four disciplines: Architecture, Business, Economics and Engineering. Additionally, the major drivers and impediments of EfS were reviewed in order to assist universities to take the necessary actions to overcome barriers and effectively implement EfS. The research was conducted over a one month period at Griffith University, Swinburne University of Technology, University of Sydney, and University of Melbourne. Data was collected in two main forms: 1) course handbooks analysis and 2) interviews with professors from each faculty studied.

Data revealed that sustainability as a concept has infiltrated into other disciplines, but at greatly varied levels. Engineering at Griffith and Swinburne and Architecture have accomplished EfS implementation in a well integrated and action-oriented manner, while Business and Economics display a much more limited level of integration. Griffith and Swinburne have made more progress across disciplines, in part due to the universities' committed executive staffs' top-down action complementing bottom-up support. Major drivers proved to be a mixture top-down and bottom-up action in addition to pressure from accreditation bodies. The most pervasive impediment was structural impediments of the curriculum itself. The lack of resources on EfS also is an important barrier and requires the further development of case studies and staff education. While no university has achieved complete integration of EfS, the data suggests that within the next 5-10 years Australian Universities will see substantial improvements in the integration of interdisciplinary sustainability education.

Topics Codes: 207, 232, 213

Key Words: Sustainability, University, Interdisciplinary, Education, Curriculum

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Abbreviations

ARIES: Australian Research Institute in Education for Sustainability

CSR: Corporate Social Responsibility

COPERNICUS: Cooperation Programme in Europe for Research on Nature and
Industry through Coordinated University Studies

EE: Environmental Education

EFS: Education for Sustainability

HE: Higher Education

IAE: Institute of Australian Engineers

RIBA: Royal Institute of British Architects

RMIT: Royal Melbourne Institute of Technology

SD: Sustainable Development

SE: Sustainability Education

TBL: Triple Bottom Line

UIA: Union of International Architects

8.0 Introduction

8.1 Definition and Principles of Sustainability

Research shows that decades of ecological ignorance, apathy, economic expansion, and the introduction of technologies, have created an incompatibility with ecological cycles (Baimbridge 2004, p.173). The concept of sustainable development (SD) and its end goal, sustainability, have developed in response to this growing body of literature and scientific evidence portending the potential for environment and human disaster. SD, as defined by the World Commission on Environment and Development in 1987, is a way to “manage technology and social organizations to make balanced and equitable progress on economic, environmental and social needs so that meeting these needs in the present does not compromise the ability of future generations to meet their own needs”. Essentially, SD proposes a new way of approaching the world and the way we live in it (Cullingford 2004, p.19).

Because of the potential for business and government to capitalize on the concept and implications of SD, SD has become a highly contested topic. Despite disagreements regarding the term’s definition, there are a few key elements that are common to all. One such element is *triple bottom line* (TBL), which developed in response to the overwhelming priority that economic considerations receive in relation to other factors in decision making. TBL states that in decision making processes, economics, social and environmental impacts should be considered equally. Another important element of SD is long-term thinking. The status quo favors short-term economically based thinking; however, in order to achieve sustainability, people must begin to consider how their actions will affect future generations (Goldsmith and Samson 2005, p.21).

8.2 History of Environmental Education, Sustainability Education and Education for Sustainability

Once one accepts the principles of sustainability, the question becomes how it is going to become a reality. While achieving sustainability will require many approaches, there is an immense body of literature supporting education as key. David Orr (1992, p.137) writes that without environmental knowledge there is little potential for a sustainable society. In his 1994 publications he writes, “The crisis we face is first and foremost one of the mind, perception and values; hence it is a challenge to those institutions presuming to shape minds, perceptions and values” (Orr, in Tilbury et. al. 2005, p.1). The 1972 United Nations conference in Stockholm was the first international conference to address environmental education (EE) as key in addressing environmental issues.

Both EE and sustainability education (SE) are fairly new concepts in the context of formal education. While term EE has been widespread since 1960’s, sustainability education (SE), later called education for sustainability (EFS), did not gain momentum until the 90’s (Sterling 2004, p.44). EFS developed because of EE’s perceived inadequacies. While EE provides students with a firm understanding of environmental systems and sometimes how humans affect them, it does not supply students with the capability to work toward achieving sustainability (Sherren 2005). Unlike EE, EFS is interdisciplinary and solution based. Kate Sherren (2005) explains that it is not enough for students to engage in EE across all subjects; they must learn it in an integrated fashion so that it becomes embedded in their understanding of the discipline itself. As time goes on, the concept of EFS continues to evolve and new terms are developed. For example, in the discipline of business, sustainability and ethics have been combined into the term *corporate social responsibility* (CSR).

Since the inception of EfS in the 90's, declarations and charters promoting SE have continued to emerge. The Talloires Declaration of 1990, created by university leaders from across the world, is possibly one of the most significant declarations pertaining to SE (Tilbury et. al. 2005, 14). The declaration outlined a 10 point action plan to “engage higher education (HE) in the quest for a sustainable future” through integration of sustainability across all areas of study within the university system (Blewitt 2004, p.4). Only 3 years later, COPERNICUS developed the University Charter for SD, which called for interdisciplinary education, lifelong learning, sustainability production and consumption (Blewitt 2004, p.5). The Earth Charter of 2003 outlined 16 principles and an ethical framework for SE (Blewitt 2004, p.5). Most recently, the United Nations has marked 2005-2014 as the Decade of Education for Sustainable Development, encouraging all countries to incorporate sustainability into education plan at all levels across all sectors (Tilbury et. al. 2005, p.1).

8.3 Tertiary Education for Sustainability

According to Hopkinson et. al. (2004, 79) universities have three main environmental areas in which they must address sustainability:

- 1) Direct impacts of activities such as energy use and waste production
- 2) Indirect impact of research about environmental issues and sustainability
- 3) Indirect impacts of SE on students knowledge and future actions.

While all 3 areas are important to address, this study focuses on the third area.

In Australia, sustainability is not uniformly integrated across universities' curricula (Sherren 2005). While some universities have been slow to take the initiative, some universities are actively pursuing the integration of sustainability into their curriculum. For example Griffith University and Swinburne University of Technology have created CD Roms to assist professors

in implementing EfS (Tilbury et. al. 2005, p.2). Despite these efforts, Stephen Sterling (2004, p.47) states that there has been little to no impact on society views or the environment has occurred despite attempts to promote EfS. He believes not enough has been done because of universities' tendency to orient their priorities toward economic goals. Economic rationalism is not the only change that needs to occur in order to implement EfS. EfS requires a more 'deep' learning process and therefore, a fundamental shift in the philosophy and process that underpins curriculum development. Current trends toward objectivism, reductionism and mechanism are inhibiting a deep learning process (Sterling 2004, p.59). Cortese points out the need for an emphasis in collaboration and cooperation, as opposed to individual learning and competition in order to achieve EfS (2003, p.16). Additionally, unlike the current paradigm that instills the notion of human domination over nature, students must learn they are a part of nature (Cortese 2003, p.19). Two other major changes needed to achieve EfS are a more interdisciplinary and action-oriented approach to education.

8.3.1 *The Disciplinary Nature of Universities vs. the Interdisciplinary Nature of Sustainability*

Most universities are organized into highly specialized departments pertaining to a single discipline; however sustainability relates to all disciplines and therefore, demands a more interdisciplinary approach to education. Because most academics today have been trained in a specific discipline, they are often resistant to an interdisciplinary introduction such as sustainability (Tilbury et. al. 2005, p.17). However, Orr (1992, p.144/134) claims that achieving EfS requires the acceptance of its interdisciplinary nature and criticizes how ecology is narrowed into biology departments, despite its connection to many other social sciences and humanities. This is why staff development is fundamental in promoting EfS in higher education (HE). All professors, not just those in environmental departments, must be educated in sustainability to

effectively educate their students (Tilbury et. al. 2005, p.17). Still, Toyne (in Blewitt 2004, p.5) points out that “faculties and disciplines are incapable of interdisciplinary cooperation, while the university, as a whole, has no ethos or collective conscience for sustainability”. The university must take the initiative and embrace sustainability in order for faculties to effectively implement EfS. The ultimate goal is that ideals of sustainability would be integrated in all professions and disciplines making environmental degrees superfluous; however, this requires breaking down the barriers of a discipline based system.

8.3.2 *Teaching for or about sustainability*

A “National Review of Environmental Education and Its Contribution to Sustainability in Australia: Further and Higher Education” draws a distinction between teaching *about* and teaching *for* sustainability. Teaching *about* sustainability simply educates students on the concepts and principles it entails; however, this is not enough. Universities need to teach *for* sustainability, creating a conceptual framework within the students to “effectively enact change toward sustainability” (Tilbury et. al. 2005, p.14). While theory is an important aspect of sustainability, without the skills to apply it, SE is useless. It is this rationality that has distinguished SE from EfS, EfS emphasizing the skill-based education style. A recent study showed that Australian Business schools tend to just teach about sustainability. Similarly, Hadgraft et. al. (2004, p. 47) report that in physical sciences, the university system seems too often to be trapped in the ‘teach the fundamentals’ model. As opposed to focusing on teaching inputs, these disciplines must develop an approach that stresses capabilities, (p.34). It is education *for* sustainability that will equip the students with the skills to become well-informed decision makers in their future.

8.4 Disciplines Studied

Because EfS stresses an interdisciplinary approach, the research conducted focuses on disciplines that traditionally fail to address environmental issues and sustainability, but contribute to current environmental degradation and apathy. The four curricular disciplines analyzed are Architecture, Business, Economics and Engineering. Three of the four disciplines chosen are profession-oriented, making education *for* sustainability particularly applicable. Economics, which is a more theoretical discipline, still has significant implications for sustainability. It is the current understanding of Economics that drives business and government policy; therefore, the discipline, despite its theoretical nature, indirectly impacts the ability of society to achieve sustainability. Although EfS in all areas of the curriculum relies on the same basic principles, such as the importance of environmentally conscious decision making, each discipline emphasizes different skills needed to work toward achieving sustainability.

8.4.1 *Architecture*

The concept of environmental design became widespread in the 1960's and primarily focused on energy use as opposed to a complete sustainable approach which developed later (Edwards 2004, p.129). The Oxford Conference of Architecture Education of 1958, sponsored by Royal Institute of British Architects (RIBA), designated environmental design as a crucial criterion in building design (p.130). Since then, RIBA has worked to promote architectural responsibility to community and environmental ethically design (Edwards 2004, p.132). The Energy Crisis of 1970's garnered more attention for the cause (p.130). Then, in 1992, the convergence of The UN Earth Summit (and the development of Agenda 21), the Maastricht Treaty and the Toyne Report solidified a commitment from higher education of environmental design (p.133-135). Today, the Union of International Architects (UIA), an umbrella group that coordinates architectural institutions across the world, has incorporated environmental design

and the concept of sustainability into its basic principles. These principles call for thoughtful consideration of social and environmental impact of professional activity and promote sustainable design. The UIA has acted as a major factor in improving environmental awareness for undergraduate architecture programs across the world (p.135-136).

8.4.2 *Business*

Accounting is one area of Business that has had difficulty incorporating sustainability because it traditionally does not consider externalities (Cowton 2004, p.157). Social and Green Accounting are new forms of accounting that address features of corporate activity of ethical, social and environmental significance “that are generally omitted from conventional transaction-based, profit-focused accounting” (p.158). Initially, Green Accounting tended to examine natural resource use (p.158). These concepts, however, made much headway in the 90’s, especially with the introduction of TBL, extending the breadth of Green Accounting from just resource consideration to a complete sustainability assessment (p.159).

Marketing and Management also traditionally lack environmental consciousness, but recent research has shown the importance of considering sustainability in their practices. In fact, it is not uncommon today for business to have managers devoted to engaging the business in SD (Goldsmith and Samson 2005, p.5). Goldsmith and Samson (p.6) argue that because a primary concern of a business is its stakeholders, it is in the interest of a business to act sustainably, thereby satisfying them at an even higher level than the status quo. Additionally, Goldsmith and Samson discuss the issue of short-term thinking within business, choosing immediate economic gains over sustainable business practice. They claim that considering “both financial and non-

financial performance measures and recognizing that in the long-run, non-financial performance is reflected in financial performance” is crucial to long-term business success (p.21).

8.4.3 *Economics*

Greening of Economics reflects reorienting Economics so that the environment is no longer an externality, but a central theme. It discards the assumption that humans act rationally and calls for policy development to reduce economic distortions so that allocative efficiency is increased (Baimbridge 2004, p.167/174). Mark Baimbridge (p.167-8) maintains that if new economics is going to be realistic, it must become less simplistic and more interdisciplinary (p.167). For example, GNP, the common measure of economic development, fails to indicate well-being of the people. In fact, “destruction of utility and income distribution are ignored along with social indicators such as access to nutrition, housing, education etc. that truly reflect the standard of living (p.167-8). This type of index is simplistic and lacks any social and environmental status indicators. A more robust option is the Human Development Index (HDI) which encompasses income per capita, life expectancy and education (p.169). In explaining the importance of interdisciplinary economic thinking, Baimbridge discusses the significance of social capital, “the multitude of distinct, yet closely related, ideas that are generally unsuitable for economic modeling”, such as trust and participation in groups (p.172).

One perceived problem in incorporating sustainability into economics is the issue of the environmental destruction and economic growth. Many question whether SD can occur with economic growth; however, Baimbridge (p.173-4) points out that some commodities do not result in environmental damage. Therefore, if consumer preference shifted toward more sustainable products and more sustainable products and technologies are developed, economic growth and environmental damage could be decoupled.

8.4.4 *Engineering*

Traditionally engineering curricula are devoted to foundation courses in mathematics, physics and chemistry, with a later emphasis on applied engineering subjects. Wider social, environmental and economic implications of the discipline are usually ignored (El-Zein et. al., p.2). However, in 1999 the Institute of Australian Engineers (IAE) recognized sustainability as key in engineering education (Hadgraft et. al. 2004, p.34). It then designated 10 attributes that all engineers should have including an action-oriented understanding of SD, sustainable design and ethical responsibility to these concepts (p.34). This, among other factors, has led to engineering curriculum changes at various Australian universities, such as Royal Melbourne Institute of Technology (RMIT). RMIT utilized an integrated and innovative approach to program redesign in which they moved the emphasis of their curriculum from “content” to “capabilities”. Based on work with industry partners and the community, the faculty identified important capabilities for graduates, such as life cycle analysis, systems approach, TBL and retrofitting, and incorporated these concepts into the curriculum (Hadgraft et. al. 2004, pp.34-36,43).

8.5 Levels of Integration of Sustainability into the Curriculum

The ultimate objective of implementing EfS is to produce graduates that enter the professional world prepared to contribute to society in a sustainable manner; however, the issue remains as to the most effective way to achieve this goal. According to Thomas (2004), sustainability can be incorporated into a curriculum in three ways:

- 1) Cover some environmental issues in some existing course.
- 2) Have a separate course that specifically addresses environmental matter.
- 3) Integrate environmental issues and discussion into all courses so that environmental understanding is developed in the context of the discipline, program and course material.

According to Thomas, the third method is preferred because the first two can make the environment seem peripheral to the discipline. Unfortunately, the first two methods are more common due to the relative ease of implementation. Tilbury et. al. (2005, p.15) expand the notion, stating that integration is not enough, because the current system inherently promotes unsustainability. Instead, they promote innovation to include more collaboration, action-oriented skills for change and critical reflection. Cortese moves beyond innovation, proposing a complete integration between universities and their surrounding communities. In this scenario, students and faculty address community relevant research, negative social and environmental factors of the institution and increasing a sense of identity and responsibility to local communities (Cortese 2003, p.18). He claims that it is the will, not the ability, which has thus far been lack in achieving sustainability (p. 19).

8.6 Impediments to Integration

The list of factors inhibiting integration of EfS is extensive within the literature. According to Thomas (2004) the major factors inhibiting integration of sustainability are:

- The committed individuals are expected to change an entire culture of a department.
- Professors are often resistant to “extradisciplinary” information.
- There is lack of knowledge about the environment and how to access information.
- Some academics question the appropriateness and importance of EfS in their discipline.
- Sustainability as a concept can be abstract and ambiguous.
- There is a general lack of interest and support within specific departments and campus culture in general.
- There is a lack of incentives to integrate EfS.

This list, however, is by no means comprehensive. In the University of Sydney Engineering case study Abbas El-Zein et. al. (p. 5-7) found other barriers to integration. First, because sustainability is a more qualitative subject, they found that it can be unattractive and difficult to grasp for physical science students who are more accustomed to technical material. This among other issues often leads to the students perceiving EfS as peripheral to the focus of their studies. Another issue was the lack of available case study materials, which are crucial to EfS in engineering. Developing case studies is quite costly in terms of money and time to create. Another study conducted in UK by Owen (1994) reviewed undergraduate Accounting programs and found professors complaining of lack of resources and space within the curriculum (Cowton 2004, pp.160-161). Additionally, Owen found “shorternism” in contemporary education to be a hindrance to the improvement of EFS (p.161).

1.7 Drivers of Integration

While there is emphasis in the literature placed on obstacles of integration, there are relatively few discussions of effective drivers of education. One important driver is the commitment of the academic staff and university executives. Thomas (2004) states that top-down leadership is necessary to properly integrate sustainability into the curriculum. Leaders must provide organizational support and necessary resources to achieve EfS. Equally important is the bottom-up support by staff and students. Thomas maintains that this combination is crucial in order to enact Efs measures. Another possible driver of integration of EfS into the curriculum is the new materials available on the subject due to recently conducted research (Cowton 2004, 163). Finally, Cowton suggests that professional bodies requiring SE are the key to initiating improvement in EFS for Accounting (163). He explains that perceived importance of topics often determines whether or not specific courses are requirements for accreditation. Concepts that

accreditation bodies demand are perceived to be more central to the discipline and drive faculty to incorporate them into the curriculum (Cowton 2004, pp.160-161).

1.8 Confronting Barriers

According to Thomas (2004), confronting these challenges requires a cultural change, starting with the staff. All staff must be trained in terms of campus operations and curriculum. He calls for staff and university leaders become committed to EfS as the transdisciplinary core of all education, thereby redefining notions of excellence (Thomas 2004). For this to occur, more case studies and interactive materials that “propel students along an investigative and reflective path” must be developed (El-Zein et. al., p.7). In the University of Sydney Engineering case study, El-Zein et. al. (p.6) confronted issues of the engineering students’ qualms about the qualitative nature of EfS through discussion so that the students were aware of the relevance of the EfS despite its qualitative nature.

1.9 Justification of Study

Education as the means for achieving a sustainable society is key (see section 1.2). More specifically, scholars often emphasize the importance of EfS on the tertiary level. Anthony Cortese (2003, p.16) explains that it is crucial that education addresses SD because, “It is the people coming out of the worlds best colleges and universities who are leading us down the current unhealthy, inequitable and unsustainable path.” Because universities are training future leaders and professionals, they have a moral responsibility to prepare to work toward achieving a sustainable world (p.17). Unfortunately, EE plans and policies tend to focus on primary and secondary schools, ignoring the tertiary level. For example, the Department of Education, Science and Training who administers Australia’s HE policy has identified sustainability as a priority for research but ultimately governance of the universities rest at the state level. This has,

for the most part, resulted in a lack of governance pertaining to university EfS (Tilbury et. al. 2005, pp.3-4). Ironically, universities are historically slow to respond to societal changes, tending to follow society's lead, but it is their responsibility to lead us toward sustainability (Sterling 2006, p.209). Therefore, it is of the utmost importance for universities to take an active role in implementing EfS.

1.10 Aims of the Study

This study aims to answer 2 main questions:

1. In what ways and to what extent are Australian Universities incorporating principles of sustainability into the curricula for Economics, Engineering, Architecture and Business students? The study will analyze the progress that has thus far been made in creating a more interdisciplinary and action-oriented approach to EfS. Hopefully, it will also encourage universities to further integrate EfS into their curricula.
2. What are the major drivers and obstacles of EfS integration into the curricula? In order for Universities to improve their integration of EfS, it is crucial that they are aware of the external and internal pressures supporting their effort. Similarly, outlining the present obstacles of sustainability allows universities to take the necessary actions to overcome these barriers, thereby implementing EfS more effectively.

2.0 Methodology

2.1 Study Sites

Four Universities were chosen for analysis. The Universities were chosen to represent a range of locations across Eastern Australia, undergraduate population sizes, university ranking, age and esteem of university and university level commitment to sustainability.

2.1.1 Griffith University

Griffith University has five campuses. This study was only conducted at Nathan Campus, which is located just outside of Brisbane, Queensland. The university was established in 1971 and soon after founding became notable for its modern environmental education (Williams 2007, pers. comm., 1 May). In fact, recently Griffith along with UNESCO developed ‘Teaching and Learning for a Sustainable Future’, a CD Rom that assists in bringing sustainability into specific contexts (Tilbury et. al. 2005, p.2). Today it has about 25,000 undergraduate students; however, because of the separate campus system, it yields a much smaller community atmosphere. This university offers degrees in Business and Engineering. Architecture is not offered. Within the Business faculty, Marketing, Management and Economics were analyzed.

2.1.2 Swinburne University of Technology

Swinburne University of Technology has six campuses. This study was only conducted at Hawthorne campus, located in the suburbs of Melbourne, Victoria. The university was established in 1908 and today maintains a student population of 10,000 undergraduates among the six campuses. The university prides itself on a strong practice professional emphasis in its education (Wilson 2007, pers.comm.18 April). To assist educators in incorporating sustainability into teaching Swinburne’s National Centre for Sustainability developed a CD Rom called “Sustainability and Education (Tilbury et. al. 2005, 2). Additionally, Swinburne is the only

university to have signed the Sustainability Covenant, developed by the EPA Victoria. The Australian government recently ranked Swinburne as one of only 5 universities in its top tier for teaching quality. The faculties studied at Swinburne are Business and Enterprise and Engineering and Industrial Sciences. Within the Business and Enterprise faculties Marketing, Management and Economics were analyzed (Architecture is not offered).

2.1.3 University of Melbourne

University of Melbourne, founded over 150 years ago, is located in Melbourne, Victoria. Today it boasts one campus with a population of 25,000 undergraduates alone. It is ranked as one of the top universities in the world. The university signed the Talloires Declaration of 1990. The faculties studied at University of Melbourne are Architecture Building and Planning, Economics and Commerce, and Engineering. Within the Economics and Commerce Faculty, Marketing and Management and Economics were analyzed.

2.1.4 University of Sydney

Like University of Melbourne, University of Sydney was founded over 150 years ago and is internationally top ranked. The University is located in Sydney with an undergraduate population of over 31,000 students. The University founded the Environmental Education Project in 1990 with a grant from the Federal Department of Employment, Education and Training. The project focused on an interdisciplinary approach to SE. The Project was canceled one year later due to funding, but much information on the extent to which sustainability had been integrated was found with that year. The project concluded that environmental content was mostly contingent on the specific professor (University of Sydney 1990, p.1). In the faculty of Architecture, the project found that the faculty of Architecture “actively seeks to educate students to understand and be aware of the impact of their designs on the environment and to

incorporate environmental factors in their design. At least 3 core classes and 3 electives addressed environmental concerns and design (University of Sydney 1990, p.7). The Economics faculty did not have an environmental economics course at the time, but did cover some environmental issues such as global environmental issues and the effects of economics on biophysical systems in 2 core units (University of Sydney 1990, pp.18-19). Civil Engineering similarly had no environmental course but did mention the topic in 3 courses. For example, a unit on transportation required students to do an environmental impact report. In this study, the faculties of Architecture, Design and Planning, Economics and Business, and Engineering and Information Technologies. Within the Economics and Business faculties Accounting and Economics were analyzed.

2.2 Schedule of study

The study was conducted over a month-long period, between the dates of April 7th and May 7th, 2007. Time was allotted so that there was 1 week for preliminary research, 3 business days at each university of study and 3 days for data analysis.

April 7-14: Conducted preliminary research in Sydney

April 16-23: Interviewed professors and obtained course handbook data at University of Melbourne and Swinburne University of Technology

April 24, 26, 27: Interviewed professors and obtained course handbook data at University of Sydney

April 30-May 2: Interviewed professors and obtained course handbook data at Griffith University

May 3-6: Synthesized and analyzed data

2.3 Data collection methods

Two main types of data were collected in this study. First, the curricula themselves were reviewed through examination of the course handbooks. Then, a professor within each faculty analyzed was interviewed. This was repeated for each institution. In order to collect the data in a way that would yield clear and comparable results, only one degree path per faculty was studied.

In the area of Architecture, the Bachelor of Architecture was reviewed. In Business, Accounting or Marketing and Management were reviewed (note: sometimes Marketing and Management are organized as one course and are sometimes separate). In Engineering, Civil Engineering specifically was reviewed. Finally, Economics was sometimes integrated into the Business of Commerce faculty, but was always reviewed separately.

2.3.1 Part one: Analyzing Course Handbooks and evaluation process

In reviewing the curricula, the course goals and structure and unit descriptions were reviewed for each of the four disciplines (Architecture, Business, Economics and Engineering). First, the core units within a major were examined in search of those that addressed or were devoted to sustainability. Secondly, the electives were reviewed in the same way. Because one can easily get caught up in terminology of sustainability, for the sake of simplicity, the research project emphasized principles as opposed to the terms themselves. The name of each unit that had some sustainability content was recorded along with the parts of the course description and/or aims that addressed sustainability. Additionally, the course structure was recorded so that the structural integration of sustainability classes could be analyzed.

2.3.2 Part two: Interviewing Professors and Analyzing their views of the Curriculum

The aim for this part of data collection was to conduct at least one interview with at least one professor for each faculty studied. Unfortunately, no interview could be obtained in economics at Griffith University, Swinburne University of Technology and University of Sydney. Additionally, because of time constraints, some interviews were conducted via e-mail (see Figure 1). To obtain interviews an e-mail was sent to the dean of each faculty describing the nature of the research project and requesting that he/she nominate a staff member who might be interested in participating. If there was no response to this email, faculty websites and course handbooks

were reviewed to find professors who engaged in EfS and they were contacted directly via email. The interviews covered the professors' knowledge of and viewpoints on sustainability within their specific discipline, the extent to which the faculty engaged in EfS and the manner in which they did so (see Appendix 1). During interviews the data was recorded through taking extensive notes. In the case of an e-mail interview, the list of questions was e-mailed (in a simpler form) and the professor would simply fill in their answers and send the answered template back.

See Table 2.1 Professors Interviewed

2.3.3 Analysis Process

Both the data from the course handbooks and the data from interviews were analyzed to compare each discipline and each university as to the extent to which EfS has been implemented and whether the universities were teaching *for* or *about* sustainability. The interview data alone was synthesized to analyze staff's perceptions, drivers and inhibitors of sustainability, as well as proposed future improvements in the integration of sustainability. The handbook data alone was analyzed to see if course goals reflected concepts of EfS.

3.0 Results:

3.1 Opinions of Sustainability Held by Staff

See Table 3.1. “Is Sustainability a Priority for Staff in Your Department?”

All staff, except one, interviewed maintained that it was critical for all members of their field to have at least a basic understanding of sustainability with the discipline. Many professors, such as Professor of Architecture at Sydney University, Bruce Forwood, felt that if the discipline as a whole is going to survive, it is imperative for future graduates to be able to contribute to the field sustainably (2007, pers. comm., 26 April). Professor Brennan at Swinburne University of Technology described her staff as “environmental evangelists” (2007, pers. comm., 20 April). Unlike Professor Brennan, not all staff felt that their co-workers shared their commitment to sustainability. The single interviewee, an Engineering professor who did regard sustainability as a priority, felt that environmental issues are to be addressed by environmental engineers as opposed to civil engineers.

3.2 Course Goals

See Table 3.2 Sustainability within Course Goals

University of Melbourne’s Architecture course aim discussed principles such as energy efficiency and community responsibility, but did not explicitly mention sustainability or any of its broader themes.

3.3 Extent of Integration of Sustainability into the Curriculum

See Table 3.3 Extent of Integration of Sustainability into Curricula

Architecture: University of Melbourne has integrated sustainability into core and elective courses in a limited context, meaning that while concepts such as energy efficiency and sustainable materials are addressed, some of the broader concepts of sustainability are not covered. Sustainability is also considered in some student projects and skill assessment.

University of Sydney requires that sustainability be an aspect of all studio projects as part of skill assessment. They address concepts such as sustainable materials, water management and environmental control. The course stresses the importance of decision making within the field and teaches sense of place with environmental framework.

Business: Griffith Management reported that integration was primarily the lecturers' choice (Ramsay 2007, pers. comm., 1 May). One of the units that covers sustainability is entitled "Corporate Social Responsibility" and addresses aspects of sustainability throughout the unit.

Swinburne Marketing incorporates sustainability throughout the course through case studies and examples in the form of TBL, social responsibility, analyzing alternative policies, importance of innovation and consciousness of local and international environments and sustainability reporting. Melbourne Marketing and Management's integration is very limited. In one of the two courses that addresses sustainability, the topic is only addressed in a one-hour lecture (Samson 2007, pers. comm., 23 April). Similarly, University of Sydney's Management's two courses that address environmental awareness, the concepts are simple stand alone topics of environmental issues and minimal sustainability education.

Economics: Swinburne's environmental economics unit does not explicitly address sustainability. It does focus on sustainability, subsequent courses that incorporate the concepts and further electives.

Engineering: Griffith's integrated units are present throughout all 4 years of the degree including an introductory unit devoted to sustainability and at least 2 projects later in the course include mandatory consideration of sustainability. Moreover, sustainability is part of student projects and skill assessment. Social and ethical responsibility of an engineer, environmental awareness and TBL are all addressed. Swinburne Engineering integrates sustainability heavily into the core curriculum in the 3rd through 5th year of the course. Additionally, sustainability is one aspect of student projects and skill assessment. Two of University of Melbourne's engineering units that explicitly cover sustainability do so in a theoretical manner. In University of Sydney' engineering unit that addresses sustainability, only renewable energy is discussed (though it is discussed in detail). The unit that is devoted to sustainability stresses the importance of decision making within the field. University of Sydney introduced a course to address wider ethical, environmental and social sustainability issues that were traditionally ignored within the department, in part because of pressure from IAE. The course emphasized the role of an engineer as a decision maker and the implications of specific choices. It was designed to use decision-making scenarios and collaboration to educate students on how the concept EfS is applied within the profession (El-Zein et. al., pp. 3-4). The course engages the students in 'deep' learning through the workshops where the students act as the decision makers (p.5).

3.4 Teaching about or for Sustainability

See Table 3.4 Teaching *about* or *for* Sustainability in the Core Curriculum

Architecture: The studio nature of many architecture units lends itself to teaching *for* sustainability (Bull 2007, pers. comm., 23 May).

Business: Griffith Management's CSR class includes a project in which they choose a topical issue and through role play looked into different perspectives including environmental

perspective (Ramsay 2007 pers. comm., 1 May). This activity teaches for sustainability, but the rest of the curriculum does not. Marketing only covers the concept briefly in a few classes. According to Professor Linda Brennan (pers. comm., 20 April), sustainability is embedded throughout the curriculum in a manner that teaches *for* sustainability; however, this was not evident in the course handbook. The Universities of Melbourne and Sydney are learning about sustainability, but in a very limited context.

Engineering: University of Sydney's unit devoted to sustainability utilizes case studies and collaborations that put the student in the position as the decision maker, providing an education *for* sustainability, but only within this one course.

3.5 Drivers of Integration according to Staff

See Figure 3.1 “What Do You Think is Driving Integration of EfS?”

Almost half of the staff mentioned passionate professors, accreditation bodies and codes of ethics and societal expectations as crucial in driving EfS.

3.6 Obstacles of Integration according to Staff

See Figure 3.2 “What Do You Think is Inhibiting Integration of EfS?”

Structural obstacles within the curriculum are clearly the greatest inhibitor of EfS implementation as almost $\frac{3}{4}$ of the staff acknowledged its importance. Structural obstacles include perceptions of the curriculum as being “full” and preference in time and resources being given to more traditional topics. Lack of resources, which, includes funding, specialized staff, and teaching materials was also commonly mentioned.

3.7 Future Change

See Figure 3.3 “What Changes Would you Like to See Implemented in the Future?”

Over half of the professors expressed the desire for increased integration of sustainability into the curriculum. In fact, the majority of staff members reported that they expect to see further accomplishments in the integration of EfS in the next 5-10 years. Additionally, eight of the twelve faculties are planning to soon embark on a new curricular plan that will increase EfS at least indirectly through opening the doors for curriculum restructuring. All professors who suggested an elective course stream on sustainability are professors at University of Swinburne, where professors across disciplines are actively taking the initiative to produce this stream. In fact, it should come into existence in the next few years (Wilson 2007, pers. comm., 18 April).

4.0 Discussion

4.1 The Extent of Sustainability Integration into the Curriculum

4.1.1 Variability between Disciplines among the Universities

While no discipline reviewed claimed to have achieved complete integration of sustainability, some areas of study have clearly made greater progress in the integration of sustainability than others. Among the four disciplines studied, Architecture clearly exhibits the most integration of EfS. This could be due to the fact that environmental design has been a pervasive concept since the 60's, while in other disciplines an incorporation of environmental awareness is much newer and less accepted. The manner in which EfS has been approached in Architecture addresses some aspects of 'innovation' proposed by Tilbury et. al. (see section 1.5), such as action-oriented skills for change and critical reflection, but there is no evidence of collaboration within the curriculum.

Engineering seems to also have experienced more integration than Business and Economics, especially at Swinburne and Griffith. Engineering at these universities and the one sustainability unit at University of Sydney seem to have achieved Tilbury et. al.'s concept of 'innovation'. Even at University of Melbourne where EfS was not as heavily integrated, it is explicitly mentioned in the course goals.

Based on the data collected, it appears that Business and to an even lesser extent Economics, are yet to integrate sustainability into their curriculum. Business course handbooks exhibit a limited presence of SE across the board. While it seems that the concepts are clearly known (they are addressed as stand alone topics within a few units at every university) there has been a lack of success integrating it into the curriculum. This could be due to the lack of emphasis placed by accreditation bodies or a lack staff commitment within business academia.

Data collected on Economics was incomplete, because no interviews were conducted at three of the universities. Yet, based on course handbook data, EfS is clearly not well integrated into any curricula. Even at University of Melbourne, where an e-mail interview was conducted, the concept of environmental economics must be seen as peripheral if it is only addressed in electives. Because Economics was noted as different from the other disciplines studied due to its more theoretical nature as a social science, it is interesting that Economics curricula display the least amount of EfS integration. One might suggest that Economics' lack of EfS integration as meaning that the current theoretical framework of Economics is not conducive to the integration of EfS. In an interview, Lata Gangadharan (2007, pers. comm., 23 April), Professor of Economics at Melbourne University, stated that this was a perception amongst many economists a few decades back; however, "these perceptions have changed due to more and better research in the area of Environmental (and) Ecological Economics". The results could suggest that more professional based disciplines lend themselves to EfS more than theoretical disciplines. Unlike the buildings of architects and the technologies produced by engineers, economists have a much less conspicuous affect on sustainability. Maybe this has prevented the wave of pressure that the other disciplines have experienced to incorporate sustainability. Additionally, unlike the other disciplines, economics lacks a body of accreditation to pressure such a transition; however, research on other disciplines of a similar nature would be necessary to draw this conclusion.

Swinburne marks an exception to the general lacking of EfS within the discipline of Business. While there was limited discussion of the topics in the course descriptions sustainability was present in the Business and Economics course goals. Moreover, an interview with Professor Brennan (2007, pers. comm., 20 April) revealed a very much stronger integration of EfS than the course handbook. This discrepancy could be due to two different scenarios. One

possibility is that sustainability is well incorporate into the curriculum and the handbook simply does not have sufficiently extensive descriptions. This is supported by the fact that even the unit Prof. Brennan teaches did not have mention sustainability despite her extensive incorporation of the concept into case studies and examples. The other possibility is that while sustainability is a course goal and professors such as Prof. Brennan are making a concerted effort to include the concept, it is not as heavily integrated as she has been lead to believe. If the former is true, Swinburne University will act as a good model for other universities to work to integrate sustainability in the same manner. Because sustainability is also addressed in the course aims of Swinburne's Economics course handbook, it might be embedded to the same extent as it is for Business, but further research would be necessary to draw such a conclusion. I would surmise, however, that it is not a major component or sustainability would have been mentioned more than once in the course handbook, as it was in all other disciplines.

4.1.2 Variability between Universities among the Disciplines

The data shows that universities are not necessarily consistent across different disciplines. For example, Griffith and Swinburne's commitment to EfS based on the course handbook ranges from the faculty of Engineering, which exhibits integration across all 4 years of the curriculum to no the faculty of Economics, which does not mention of sustainability at all. Universities of Melbourne and Sydney follow a similar pattern. Architecture exhibits an extensive integration, followed by Engineering, with Business and Economics trailing behind. At the University of Melbourne, there are three classes devoted to environmental economics, but they are all electives. Electives are one step in the right direction, but most of the time, they are only taken by the students who already interested in the topic. Therefore, they fail to educate the students who are most ignorant of the concept and need it the most. Still, the presence of the units shows

that the resources and materials are available, at least to some extent, to achieve EfS more fully in the department.

The interviews and course goals help to clarify the university's integration, especially in the cases where course handbook information on sustainability is limited. All Griffith and Swinburne professors interviewed did express deep commitment to further improvement to integration of EfS. As discussed above, Swinburne Business suggests that the topic of sustainability is often addressed in the curriculum without any mention in the course descriptions, possibly among multiple classes. Based on interviews, in the area of Business, the Universities of Melbourne and Sydney seem to be trailing behind Griffith and Swinburne. While Swinburne only has one more unit that addresses sustainability, it is the manner in which and Griffith cover it that differentiates the two sets of schools. At Melbourne and Sydney sustainability is simply a stand alone topic, briefly addressed in each of the units. In this sense, students are barely learning about sustainability at all. On the other hand, the units at Griffith and Swinburne incorporate sustainability as a concept throughout the material, presenting environmental concern as integral within the subjects, as opposed to being peripheral in nature.

University of Sydney provides an interesting case study, because of the information provided by the Environmental Education Project of 1990. Based on the findings of the project, Architecture had already reached its current state of integration at that time. Engineering shows progress, as the sustainability unit has been introduced since then. In Economics, however, the environmental issues have since been moved out of the core curriculum and into environment specific elective courses. While it is an improvement to have units that are completely devoted to environmental issues and sustainability, it displays regression in that the subject was taken out of the core curriculum

In general, no university has achieved the community integration proposed by Cortese (see section 1.5). While EfS has integrated into many units across the curricula, universities are yet to bring the concept to such a locally community focused level. Based on the data, progress in the way Cortese proposed seems to be a relatively unrealistic goal for the near future.

4.2 Drivers EfS Implementation

Professors' thoughts on factors driving integration of sustainability into the curriculum were consistent with past literature. Moreover, they were reflected within the relative success in different departments; those that displayed the drivers were more likely to exhibit integration of EfS. The three drivers emphasized were staff support, executive leadership and accreditation bodies. While these factors are crucial other drivers mentioned such as society, industry, the publicizing of current environmental issues and political climate, most likely play a more indirect role by driving these bodies to acknowledge the importance of sustainability and take action in integrating EfS.

4.2.1 Staff Influence on EfS

The importance of professors embracing sustainability in implementing EfS, as promoted by Thomas (2004), can be seen throughout the universities studied. Although there are great outside pressures, it is the professors who ultimately determine what the students are learning. For example, Geoff Frost, Professor of Accounting at University of Sydney, when asked what is driving the implementation of EfS, replied that an interested and committed staff is crucial. He mentioned that there was yet to be a strategic push to integrate sustainability into the Accounting curriculum (2007, pers. comm., 3 May). This is reflected within the lack of integration of EfS in the Accounting discipline at Sydney. On the other hand, Philip Williams of Griffith University's Engineering faculty, when asked if sustainability was a commonly discussed and accepted

concept within the Engineering faculty, responded yes, largely to the efforts of a very committed staff member (2007, pers. comm., 1May). Griffith exhibits a relatively extensive EfS within Engineering. These accounts stress the importance of bottom-up action in EfS implementation.

4.2.2 Top Down Leadership for EfS

Top-down initiative, also promoted by Thomas (2004), seems to be equally significant in curriculum development. As previously discussed, Griffith and Swinburne have made further accomplishments in integration of EfS in the faculties of Engineering and Business. This is reflected in a more committed executive leadership within the universities. Six years ago, Swinburne opened the National Center for Sustainability. The Center boasts committed staff with the primary concern of helping Swinburne incorporate sustainability into curriculum, research, and the campus itself. Even more, the Vice Chancellor has an environmental science background and displays a high level of commitment to sustainability (D. Moore 2007, pers. comm., 20 April). Griffith University, according to Professor of Business Arthur Shacklock (2007 pers. comm., 20 May) also has a Vice Chancellor committed to sustainability. He also explained that Griffith Business School has developed the Ethics Education Project, a new agenda to include sustainability into the curriculum. Shacklock predicted that mandatory core elements devoted to sustainability should appear in the curriculum as soon as next year. Additionally, Griffith and Swinburne both have engaged in top-down leadership towards EfS through the development of the EfS CD Roms. The universities both display an effective mixture of top-down leadership and bottom-up support that will ultimately assist them in a more comprehensive integration of sustainability into the curriculum.

4.2.3 Accreditation Bodies

The data also supports the literature of Cowton (2004) which stresses the importance of accreditation bodies in determining the level of EfS implementation. Architecture and Engineering have both displayed a greater extent of EfS integration than other disciplines. Interestingly, both UIA and IAE, the accreditation bodies for architecture and engineering, have outlined EfS as key. Business accreditation bodies are yet to take this initiative to outline sustainability as a critical aspect of the discipline as is reflected in the limited integration of EfS seen at most universities studied. Clearly, accreditation bodies play an important role on determining what staff and institutions perceive is important to the discipline and what content is implemented into the curriculum.

4.3 Obstacles of EfS Implementation and Confronting Barriers

4.3.1 Structural Obstacles in the Curriculum

Structural obstacles were by far the most common inhibitor of sustainability mentioned in staff interviews. It seems that once a curriculum has been designed, it is seen as full, preventing improvements from being implemented. Prof. Bull of Melbourne Architecture (2007, pers. comm., 23 May) referred to this as the “inertia of existing course scheduling”. For example, at University of Sydney the Engineering department chose to simply add a course devoted to sustainability rather than integrate it throughout the curriculum because of the “difficulties of introducing such large-scale multi-actor change” (El-Zein et. al., p. 2).

It seems that the most effective way of overcoming this obstacle is by integrating sustainability when there is already a program redesign being conducted or, rather, designating a complete program design with sustainability as one of the core objectives. This can be seen in the actions taken by University of Sydney’s Architecture program. The curriculum has been redesigned so that all students graduate with Masters in Architecture. This new structure has 3

major themes, one of which is sustainability. The entire University of Melbourne is following a similar path, but with less explicit emphasis on sustainability. The Melbourne Model, as the new curriculum is called, revamps the entire curriculum so that all students graduate with a Masters in their chosen field. The model is based on six broad undergraduate programs followed by a professional graduate degree, research higher degree or entry directly into employment (University of Melbourne 2007). The majority of staff interviewed at U of Melbourne described the redesign as an opportunity to better integrate sustainability into the curriculum. Even more, one of the 6 bachelor degrees that all students must chose from is Bachelor of Environments. This will result in a much larger proportion of students receiving a firm environmental education before entering their graduate degree, hopefully allowing them to better apply sustainability into their chosen profession.

4.3.2 Lack of Awareness

During research only one staff member interviewed stated that sustainability was not a necessary aspect of their discipline and should be left to those who specialize in environmental science. The staff member was unaware of actions being taken within the curriculum to teach sustainability and had no thoughts on what is driving sustainability. Because the methods used to contact interviews led more environmentally focused subjects' participations, it is reasonable to believe that many other professors across Australia maintain this mentality. This clearly acts as an impediment to EfS. If the staff is unaware of sustainability, it is impossible for them to educate the students on its importance. A lack of awareness can be tackled through the work of passionate staff members educating co-workers to some extent, but for those who are particularly skeptical or ignorant of the concept, top-down directives to educate staff is critical.

4.4 Limitations and Shortcomings to Research Methods

As noted above, the methods used to contact staff members for interviews led to more environmentally focused subjects' participation. This was in part because I contacted professors who were teaching the units pertaining to sustainability, so that I could get accurate information of the extent of EfS, but also is due to the fact that those interested in sustainability were more likely to agree to participate. More environmentally conscious staff members might have displayed a bias in assuming that other staff members shared their feelings on EfS. Additionally, the interviewer affect could have pressured professors to speak more positively of their departments. While this might have occurred to some extent, professors are used to the academic process and are therefore, probably minimally susceptible to interviewer affect on this type of topic. Secondly, although the course handbooks are normally quite accurate in their descriptions, they do not provide comprehensive lists of all topics covered within each unit. Both of these issues could have been avoided through interviewing more staff within each faculty. However, time constraints prevented this measure from being taken.

Another issue in experimentation is that an interview was not conducted (in person) for each faculty studied. There is an inconsistency because some interviews were delivered in the form of an email, as opposed to orally, which prevented clarification or elaboration on some issues. Although it would have been preferable to interview all professors in person, I do not think it greatly affected the quality of the data. The bigger issue lies in the discipline of Economics, in which only one interview was conducted due to lack of staff availability, willingness to participate or awareness of EfS within their faculty. This greatly hindered my ability to analyze the extent of integration of EfS within the discipline. A more complete data set for the discipline might have yielded a more heavily integrated curriculum than the course handbooks suggested, as occurred with Swinburne's Marketing faculty.

Finally, Architecture is not offered at Griffith and Swinburne, providing a small sample base (only 2 universities) on which to base the extent of EfS integration to the discipline of Architecture as a whole.

5.0 Conclusion

5.1 Current Accomplishments in EfS

The research has shown that sustainability as a concept has definitely infiltrated passed the halls of the environmental science buildings on campus. Sustainability is incorporated, at least as a stand alone subject or an elective in 12 of the 14 faculties analyzed. In fact, at least one professor from the each faculty in which an interview was obtained addressed sustainability within the lecture they taught. While integration has clearly begun, EfS is far from reaching its complete potential at any of the universities. Architecture, it seems, has made the most improvement, displaying extensive integration across the curricula in lecture material and student projects. Engineering has made considerable achievements at Swinburne and Griffith, where, like Architecture at the other two institutions, it is incorporated across all four years and within student projects. Both disciplines emphasize the implications of professional's role as a decision maker in hopes of preparing students to work toward achieving sustainability in their future professions. Despite high levels of integration, sustainability is sometimes approached in a more narrow definition, excluding broader concepts of sustainability which are crucial to achieving sustainability in the future.

In the faculties of Business and Economics sustainability has achieved a much more basic level of integration (except for possibly Swinburne Business). There is a general push, however, mostly at Griffith and Swinburne, to improve EfS integration in Business and Economics faculties. In fact, Griffith and Swinburne have made more progress across disciplines, in part due to the universities' committed executive staffs' top-down action complementing bottom-up support.

5.2 The Need for Increased Integration of Sustainability Education

In general, no university has achieved complete integration of EfS or has even begun to approach community integration proposed by Cortese. Still, Australian Universities are providing their students with at least minimal SE. Moreover, faculties of Engineering at Griffith and Swinburne and Architecture at Melbourne and Sydney have even stepped beyond basic integration by implementing EfS in the form of Tilbury et. al.'s concept of 'innovation'. I would surmise that students majoring in these select faculties will graduate with the capability to work for sustainability in their future (though possibly in the more limited sense). Moreover, the data suggests that within the next 5-10 years Australian Universities will see substantial improvements in the integration of interdisciplinary sustainability education.

5.3 Drivers of EfS

The data collected on drivers of incorporating sustainability into the curriculum is consistent with previous literature. First, it promotes a mixture top-down and bottom-up action as critical in effectively implementing EfS. Secondly, accreditation bodies play a significant role in determining what the university staff and students view as integral to the discipline, thereby greatly affecting the implementation or lack of consideration for EfS.

5.4 Obstacles to Accomplishing EfS

Based on the number of professors who mentioned each issue, structural obstacles of the curriculum are clearly the biggest impediment integration of EfS is currently facing. This barrier has been, and is being confronting through complete curricular redesigns, which removes the perception that the curriculum is "full" and allows effective EfS implementation. A second impediment that needs to be addressed is the lack of resources on EfS and or knowledge of them. Further development of case studies and other materials and further staff development and education (such as the education CD Rom of Swinburne and Griffith) is crucial in order to

improve the level of EfS in the future. By confronting this issue, other important obstacles such as lack of support, difficulty addressing the interdisciplinary nature of sustainability, and improperly skilled staff will indirectly be addressed.

5.5 Suggestions for Future Research

By its very nature, researching four different universities in such a short period of time prevented a truly comprehensive study. For example, only about one staff member from each department at each university was interviewed. To address this issue, one could conduct a case study on a single university's curriculum allowing time to analyze unit syllabi and appropriate course texts, attend some relevant classes and interview more staff. This would yield a more extensive understanding of what the university is doing to incorporate concepts of sustainability into its curriculum. Another option would be to conduct a survey project in which surveys were sent to all staff members within specific departments to get a more comprehensive view of the extent to which the faculty is committed to EfS and what they are actually doing to implement it.

Additionally, the data gained only looks at what is being taught, not the extent to which students are actually learning the concept of sustainability and integrating it into their understanding of the discipline. In order to assure that universities that claim to actively engage in EfS are doing so effectively, one could do a survey project in which they assessed the students' understanding of sustainability within their specific discipline.

Finally, curriculum is only one aspect of sustainability. As previously noted, universities also impact the environment directly through campus activities such as waste production and energy consumption and indirectly through staff research. In further research, one could review one of these aspects of sustainability within the university setting at the same universities and compare the progress in the different areas.

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3.0 Appendices

3.1 Interview questions

1. What are your feelings on sustainable architecture/engineering/ business/engineering? Do you think it is important for all people in your field to understand and practice concepts of sustainability?
 - a. Why or why not?
2. Do you feel that sustainability is a priority or a commonly discussed and accepted concept within your dept?
 - a. In what ways?
 - b. Is this a recent development?
3. (How) is sustainability incorporated into the architecture/economics/business/engineering department curriculum?
 - a. How is it taught? (i.e. As a contested topic for an integral aspect of the discipline)
 - b. How is it assessed in terms of student skills?
4. And the classes you teach specifically?
5. What do you believe are the main drivers to integrate sustainability the curriculum?
 - a. How so?
 - b. Have they been successful?
 - i. Why or why not?
6. What do you believe is inhibiting integration of sustainability?
 - a. Explain
 - b. How can this be avoided/rectified
7. In “A National Review of Environmental Education and Its contribution to Sustainability in Australia: Further and Higher Education” there was a distinction drawn between teaching *about* and teaching *for* sustainability (as if they are familiar with the idea and if not explain that teaching about sustainability is discussing the theory but teaching for sustainability is “creating conceptual framework within students to effectively enact change toward sustainability”). Do you think your department teaches for or about sustainability?
 - a. Please elaborate
8. What changed regarding sustainability education would you like to see within your department?
 - a. Do you see them being put into practice in the near future?
 - i. Why or why not?
9. Anything else you would like to share?