“Campus Sustainability: Empowering New Culture”

<table>
<thead>
<tr>
<th>TITLE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-campus: applying the ecocity model to develop green university and college campuses</td>
<td>Emerald Insight</td>
</tr>
<tr>
<td>Higher education’s sustainability imperative: how to practically respond?</td>
<td>Emerald Insight</td>
</tr>
<tr>
<td>Towards a campus culture of environmental sustainability Recommendations for a large university</td>
<td>Emerald Insight</td>
</tr>
<tr>
<td>Toward systemic campus sustainability: gauging dimensions of sustainable development via a motivational and perception-based approach</td>
<td>Springer Link</td>
</tr>
<tr>
<td>TITLE</td>
<td>SOURCE</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Eco-campus: applying the ecocity model to develop green university and college campuses</td>
<td>Emerald Insight</td>
</tr>
</tbody>
</table>
Eco-campus: applying the ecocity model to develop green university and college campuses

Jessica Finlay
Department of Geography, Queen’s University, Kingston, Canada, and
Jennifer Massey
Student Affairs and Department of Geography, Queen’s University, Kingston, Canada

Abstract

Purpose – The purpose of this paper is to argue that Richard Register’s ecocity model offers a strategic framework to help guide sustainability initiatives in North American higher education (HE) institutions.

Design/methodology/approach – This conceptual paper examines the theory of the ecocity and investigates the implications for its proposed building strategies for university and colleges, as institutions seek to create more sustainable campuses. The paper examines previous efforts to achieve sustainability and how the concept of the eco-campus can be practically and productively applied.

Findings – There is no single campus that has fully embraced every facet of sustainability, but numerous HE institutions are strong leaders in diverse areas. The eco-campus model provides concrete principles that proactively address HE institutions’ ecological footprints and develops sustainable community practices.

Social implications – Sustainability is a pressing social issue. As world leaders in research, innovation, and education, universities and colleges are key places to address this global issue and foster progressive action within current and future generations. The eco-campus approach represents an opportunity to initiate a cultural paradigm shift, whereby university and colleges become global leaders in sustainability.

Originality/value – While sustainability is now a cornerstone of research and teaching, North American HE institutions are faced with the challenge of realigning institutional practices, processes and resources to fully institute sustainability on campus. The eco-campus model provides an innovative guide around which to hinge the development of sustainable institutional practices, structure progressive action, and foster meaningful change.

Keywords North America, Sustainable development, Higher education, Framework, Ecocity, Environmental stewardship

Paper type Conceptual paper

1. Introduction

Universities and colleges are important sites of transformation as centres of discourse and vehicles of social change. As world leaders in research, innovation, and education, they are key places to address global issues and foster progressive action within current and future generations (Moore, 2005; Clarke and Kouri, 2009). Sustainability is one issue that has become a central focus of teaching and research within universities. Concern for the environment and sustainability within institutions of higher education (HE) has grown since the early 1970s when academics recognized that ongoing degradation of the environment had ominous social and economic consequences.
North American universities and colleges have responded by developing degree programs and courses that teach ecological literacy and principles of sustainability. Academic research has grown to incorporate an interdisciplinary curriculum involving the environment, economics, and society – the three pillars of sustainability (Gibson, 2006). However, while sustainability is now a cornerstone of research and teaching, North American HE institutions are faced with the challenge of realigning institutional practices, processes and resources to fully institute sustainability on campus.

In many respects, university and college campuses are microcosms of the broader complexities, environmental issues, concerns and challenges in North American towns and cities. Institutions of HE can have significant environmental impacts on- and off-campus, including air and water pollution, waste, the use of hazardous chemicals and habitat degradation (Dahle and Neumayer, 2001). Campuses also have indirect impacts through the import of materials such as construction supplies, food, energy sources and paper. The extraction and production of these materials can have resounding environmental, social and economic impacts (Clarke and Kouri, 2009). Finding a model around which to address these issues and hinge the development of sustainable institutional practices would help to structure progressive action and foster change. This paper argues Register’s (2006) innovative ecocity approach can be strategically applied on a smaller scale to guide sustainability initiatives in HE. Through the application of structured sustainable strategies, universities and colleges can actively build an eco-campus that fosters ecological and social awareness while reducing the institution’s impact on the environment.

2. Sustainability initiatives and institutional change

Sustainability is as a popular concept that has influenced the attitudes and practices of HE and greater society. Public concern for sustainability arose in North America in the early 1970s with the awareness that degradation of the environment detrimentally affects international goals of prosperity and economic justice (Clougston and Calder, 1999). The subsequent environmental movement has challenged governments, corporations and institutions, including universities, to be more socially and environmentally responsible. As the educators of the majority of society’s leaders, universities and colleges have a profound responsibility to increase the awareness, technologies, and tools necessary for a sustainable future (Wright, 2002; Clarke and Kouri, 2009).

The university is an important site to implement sustainable development, in part, because the autonomy of the governance structure and local politics are less complex than they are at the scale of the city. With a smaller scale and more structured administration, universities can better reduce the cumulative effect of local environmental problems, an area where cities sometimes struggle. For example, the Heart of the City project in the Strawberry Creek area of downtown Berkeley was conceived in 1997 but to date has not eventuated (Ecocity Media, 2011). The plan was to restore the existing urban fabric with a public plaza, pedestrian streets, social housing adjacent to the main transit station, solar greenhouses and rooftop gardens. A total of 40 small businesses and organizations joined a coalition with over 100 citizen groups to explore and facilitate the idea. Ecocity Builders organized two small international conferences in support of the project and sought to amend Berkeley’s city planning laws (Ecocity Media, 2011; Downtown, 2009). However, the complexity and political
complications of city development has thwarted its development. Practical and bureaucratic limitations have similarly prevented the Los Angeles EcoVillage from developing (Downtown, 2009).

Campuses across North America have made attempts to achieve a systemic commitment to an environmentally, socially and economically sustainable landscape that has not been achieved at a citywide scale. For example, the majority of buildings at the University of Colorado have been retrofitted for energy efficiency, and the university purchases renewable energy credits, carbon offsets and local foods. The university spends 19 percent of its food budget on local and organic foods, and donates surplus equipment to low-income schools (University of Colorado at Boulder, 2010; Sustainable Endowments Institute, 2011). Other universities, such as the University of Arizona and University of British Columbia, have supported greener transportation alternatives in recognition that commuter transportation to and from campus has led to congestion, air quality and noise problems. Full-time UBC students receive an 85 percent discount on unlimited public transit passes. The campus has car-sharing programs and a bicycle co-op. Furthermore, the roads in the centre of the UBC campus are closed to vehicle traffic (University of British Columbia, 2011). Amherst College (MA) and Stanford University (CA) have reduced carbon dioxide emissions and air pollutants released due to the burning of oil and natural gas to heat water and control building temperatures. These universities have enforced operational procedures such as carbon dioxide reduction practices, emission control devices, sustainable building construction, and local food purchasing (Sustainable Endowments Institute, 2011).

The influence and resources that universities can apply to issues of sustainability place them in a unique position to become key leaders in the promotion of sustainable development. HE institutions represent a large economic engine: American institutions have an operating budget of over $200 billion, which is larger than all but 20 of the world’s economies (Eagan et al., 2008; Betts, 2001). The combined endowment assets of the 322 American and Canadian schools surveyed by the College Sustainability Report Card (Sustainable Endowments Institute, 2011)[1] totaled more than $325 billion. The American HE sector represents approximately 3 percent of US GDP and 2 percent of the workforce (Eagan et al., 2008; Clarke and Kouri, 2009). Furthermore, the university is positioned with immense social capital in the value of its social networks and influence. In Higher Education in a Warming World (Eagan et al., 2008), David W. Orr states:

[... ] no institutions in modern society are better equipped to catalyze the necessary transition to a sustainable world than colleges and universities. They have access to the leaders of tomorrow and the leaders of today. What they do matters to the wider public (p. 4).

Given the social, economic and cultural capital of HE institutions and their role in educating the next generation of leaders, the institutional practices present on campus should lead the sustainability movement by being ecologically sound, socially just, economically viable and humane for present and future generations (Nicolaides, 2006; Clougston and Calder, 1999).

3. Levels of institutional commitment to sustainability
The 1990 Talloires Declaration formally recognized the commitment of HE to provide leadership and support in addressing the unprecedented scale of environmental degradation. It provides a ten-point action plan for colleges and universities to promote...
sustainability through teaching, research, operations and outreach (Shriberg and Tallent, 2007). For the first time, HE institutions were expected to orient curricula around issues related to the environment and sustainable development. They also became obligated to alter physical operations and honour commitments made in signing national and international declarations of sustainability (University Leaders for a Sustainable Future, 2001).

The 432 universities that have signed the Talloires Declaration to date have undertaken diverse routes in an attempt to become world leaders in developing, supporting, and maintaining sustainability (University Leaders for a Sustainable Future, 2001). There is no single campus that has fully embraced every facet of sustainability, but numerous HE institutions are strong leaders in diverse areas. The College Sustainability Report Card 2011 highlighted the achievements of eight schools that have undertaken enormous measures to achieve a more sustainable campus (Table I).

While these examples exemplify strong sustainable practices, this institutional commitment is not uniformly present across North America. The process of changing the institutional landscape is often slow, complex, and contested. The concept of a “sustainable university” has faced political setbacks, bureaucratic roadblocks and general unawareness and disinterest (Sustainable Endowments Institute, 2011; National Wildlife Federation, 2008; Velazquez et al., 2006). Lozano (2006) states many universities are still ignorant of sustainability’s principles and have done little or nothing to incorporate them into education, research, and outreach. For example, College of the Ozarks (MO) has minimal policies and initiatives relating to campus-wide sustainability. The College Sustainability Report Card (Sustainable Endowments Institute, 2011) awarded the college an F because at the time of the survey it had not made any public steps to address resource efficiency, conservation, green building policies, or alternative forms of transportation. The one area that the school has made some progress is in the cafeterias: 2 percent of its annual food budget is spent on local items, such as local milk and ice cream. The Green Thread Dining Services program claims to be committed to local, organic, and natural foods. It advocates a commitment towards reducing the institution’s environmental footprint while delivering “exceptional operational results” through green buildings, waste management, responsible procurement and energy and water conservation. However, the college does not provide any examples of concrete programs or results (University of the Ozarks, 2011).

The most common weakness is that HE institutions lack a coordinated approach that can accurately assess campus initiatives and provide well-grounded strategies for success to overcome institutional barriers (Shriberg and Tallent, 2007). Campuses often excel in traditional operational measures, including recycling and energy/water conservation, but are struggling to successfully implement challenging projects, such as a large-scale shift to alternative transportation or energies (National Wildlife Federation, 2008; Sustainable Endowments Institute, 2011). Numerous barriers are hindering the implementation of sustainable practices. These obstacles include inadequate financial resources needed for initial investment and a prevailing social culture of inaction. Rigid conservative attitudes of faculty and administration and the lack of expertise and tradition can hinder change (Nicolaides, 2006; Thomas, 2004). Students and staff it uninterested or too busy to participate in sustainability programs, as the change creates extra work in addition to the institution’s daily activities
Brown University (Providence, RI)
The Brown is Green (BIG) Campaign coordinates initiatives within four primary foci: research and teaching, university commitments, student groups and initiatives, and community collaborations (Brown University, 2011). Brown has promoted alternative transportation by offering parking discounts to carpoolers, ride-matching, a shuttle to off-campus destinations and free access to local public transit. Bike racks and showers have been installed to encourage cycling, running, and walking to campus. The university has also installed water-saving technologies, such as dual-flush toilets, and vegetated roofs for stormwater management (Sustainable Endowments Institute, 2011; Brown University, 2011).

Dickinson College (Carlisle, PA)
Dickinson’s approach to sustainability encompasses environmental, social and economic systems within a strategic plan to sustain valued resources (Dickinson College, 2011). The campus features a biodiesel plant, and central energy boilers were recently converted to burn waste and vegetable oil. The college installed a swimming pool filtration system to capture evaporated water for reuse. Dickinson spends 50 percent of its food budget on local items, including vegetables and herbs from the campus farm and hormone-free dairy products (Sustainable Endowments Institute, 2011; Dickinson College, 2011).

Luther College (Decorah, IA)
The Campus Sustainability Council focuses on programs ranging from local water metering on campus to regional cooperation. The college has undertaken energy conservation measures such as energy management systems, electric metering, energy-efficient lighting, temperature setbacks and vending machine sensors (Sustainable Endowments Institute, 2011). Luther has been converting used fryer oil to fuel some of the grounds equipment since 2007. In 2008 the school commissioned a study on the feasibility for a biomass boiler, and it now generates geothermal energy on campus. The school has converted a large barn into a reuse store that hosts monthly reuse sales to sell items no longer needed by the college (Luther College, 2011).

University of Minnesota (Minneapolis, MN)
Launched in 2009, the university’s conservations program It All Adds Up has reduced carbon dioxide emissions by 25,000 tons and saved the university more than $2.25 million. In its first year, the program collected 10,000 pledges from students, faculty and staff committing to energy-saving behaviours such as turning off the lights and using the stairs instead of an elevator (University of Minnesota, 2011). The university fleet includes approximately 200 alternative-fuel vehicles, and the U-Pass and Metro Pass offers students and employee a discounted transit pass. The school estimates that it has reduced more than 50,000 vehicle miles and saved more than 2,000 gallons of gasoline daily (University of Minnesota, 2011).

Oberlin College (Oberlin, OH)
Oberlin aims to be carbon neutral by 2025. The college has installed two solar arrays and heats three buildings with geothermal pump systems (Sustainable Endowments Institute, 2011). The “Campus Resource Monitoring System” in 18 residence halls and ten student houses allows students to monitor energy and water use, especially during inter-dorm conservation competitions (Eagan et al., 2008). Oberlin’s endowments are currently invested in renewable energy funds, community development loan funds, and on campus eco-efficiency projects (Oberlin College, 2011).

Table I.
Top eight schools of the 2011 College Sustainability Report Card

(continued)
In order to overcome these barriers, the first step should be to make sustainability explicit in the universities’ academic and research policies, institutional mission, and planning. The office of sustainability at the University of New Hampshire is located prominently in the central campus administration and clearly outlines the university’s strategy to address climate change and greenhouse gas emissions. Chancellors of four schools in the University of Wisconsin system (Green Bay, Oshkosh, River Falls and Stevens Point) have outlined clear strategies to achieve their mission of becoming energy independent by 2012 (Eagan et al., 2008). Cornell University (NY) has included sustainability components in its master plan and ten-year strategic plan (Sustainable Endowments Institute, 2011). For sustainability to be most effective, it needs to become a part of everyday life on campus, not an abstract concept that does not relate to the institution’s activities. This will help resolve any discrepancies between the attitudes and behaviours of students and staff. Staff training is a key aspect to altering people’s perceptions of social, environmental and economic implications of institutional practices (Lozano, 2006). Small groups of committed individuals should begin initiatives and, if successful, build on this instilled confidence and momentum throughout the entire university. For example, small students groups played a key role in building sustainability initiatives at Queen’s University (ON). The movement on campus began with the efforts of students dedicated to environmental and social justice. In response to their successes, a growing number of student groups formed, and in 2008 an official Sustainability Office was created (Queen’s University, 2011).

Institutional benchmarks and successes of sustainability programs need to be shared, such as financial savings, enhanced public relations and greater student engagement. Examples of successful strategies include:

**Table I. Eco-campus: applying the ecocity model**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pomona College (Claremont, CA)</td>
<td>Green Bikes Shop is a student-run bicycle shop that provides 60-80 students with a bike for an entire semester free of charge, as well as free maintenance and repair services (Pomona College, 2011). A website coordinates carpool groups, and employees are offered cash incentives to commute by environmentally preferable means. More than half of the vehicles in Pomona’s fleet are 100 percent electric (Sustainable Endowments Institute, 2011)</td>
</tr>
<tr>
<td>University of Wisconsin-Madison (Madison, WI)</td>
<td>UW Madison has issued bonds totaling $48 million USD to invest in energy conservation projects over the last four years. Water-saving technologies include weather-informed irrigation and high-efficiency laundry systems. The university calculates that it has reduced campus greenhouse gas emissions by 16 percent since 2006 (Sustainable Endowments Institute, 2011; University of Wisconsin-Madison, 2011)</td>
</tr>
<tr>
<td>Yale University (New Haven, CT)</td>
<td>A particular strength of Yale’s sustainability model is sustainable building design. The university mandates that all new construction and renovation project designs meet LEED Gold standards or higher. A total of 14 buildings are currently LEED certified (Yale University, 2011). Yale has installed dual-flush toilets and greywater systems to conserve water, as well as vegetated roofs and swales to manage stormwater (Sustainable Endowments Institute, 2011)</td>
</tr>
</tbody>
</table>

(Lozano, 2006). Many people lack relevant and comprehensive information on sustainable development and consequently are unaware of their misconceptions and how to incorporate sustainability into their work and lifestyle habits (Thomas, 2004; Nicolaides, 2006).
recruitment (Nicolaides, 2006). These programs provide employment and training opportunities as well as fairly paid work. By using local goods and services wherever possible, initiatives promote community partnerships and ethical purchasing (Downey, 2004). Investments in resource efficiency and clean energy will yield returns and savings that will compound over the years (Eagan et al., 2008).

A school’s implementation plan needs to be specifically tailored to the institution and sensitive to its culture, opportunities and strengths (Shriberg and Tallent, 2007). The definitions and interpretive approaches to sustainability have varied significantly among universities depending on the institution’s perspective and interests. The strategies are concerned with the management of extant systems and how to make them work efficiently and fairly (Downtown, 2009). The ecocity model provides a useful guiding framework to proactively address institutions’ ecological footprints and develop sustainable community practices.

4. Eco-campus: modeling the ecocity
Richard Register’s ecocity concept represents a holistic vision of the city as an organic ecological society in harmony with nature. The theory incorporates ideas about housing, urban planning, transportation, health, energy, economic development and social justice. Register (2006, p. 1) argues that “cities are by far the largest creations of humanity. Designing, building, and operating them has the greatest destructive impact on nature of any human activity”. Cities must become more central in the global agenda of sustainability due to their sizeable ecological footprints from the amount of energy and resources necessary to support the urban population and loss of sensitive habitat (Beatley, 2000). Ecocities propose a fundamentally new approach to building and living in cities, towns, and villages, a potentially more cohesive vision for human settlements. They present new opportunities to apply innovative green technology to areas such as public transit, district heating, building and design, as well as encourage major lifestyle changes in reducing resource consumption and unnecessary waste. The built environment needs to become as trim and resource-efficient as natural ecological systems invariably are (Register, 2006). The framework offered by sustainability cannot only be a matter of concern at the governmental level; rather, all institutions need to take an active role in achieving the goal of sustainability.

University and college campuses resemble cities on a smaller scale, thereby enabling the strategic application of the ecocity theory. Parallels between campuses and cities include an independent governing body, diverse-use infrastructure, a security force and legal system, a unique history and culture, and an independent communications network. They generally strive to produce aesthetically pleasing features through building design and landscaping, including parks, outdoor recreation facilities, garden plots and tree-lined streets. Both have structured housing, utilities, sanitation, land usage and transportation systems that service over 60,000 people in particular institutions (Eagan et al., 2008). HE institutions employ a stratified sample of society ranging from academic professors and professionals to custodial staff and construction workers. The financial influence and environmental impact also mirror that of cities on a smaller scale. Operations can generate greenhouse gases and waste as well as contributing to sprawl, inefficient resource use, and social, environmental and economic injustices (Betts, 2001). While these parallels are not all encompassing,
HE institutions, like cities, outsource the remainder of their needs to either state or provincial governments, or larger municipalities.

Campuses can incorporate Register’s ecocity concepts to focus on developing more economically, socially and environmentally sustainable practices. Much of campus’ existing building stock was constructed in an era of inexpensive energy with little regard of efficient heating, cooling, lighting or ventilation. HE’s built environment in the USA in 2008 consisted of more than 240,000 buildings with five billion square feet of floor space (Eagan et al., 2008). The building strategies follow ten principles in order to restore damaged urban environments, revise land-use priorities, promote social responsibility and create compact green cities (Register, 2006; Roseland, 1997). The principles can be applied to retrofit existing campus infrastructure with innovative appropriate technology. They also provide a reference for developing institutional assessment tools that identify and benchmark leaders and best practices. This will communicate common goals, experiences and methods while providing a directional tool to measure progress toward the concept of a sustainable campus (Shriberg, 2002). The ecocity model represents an ambitious checklist on how to redesign consumption, purchasing, transportation, design, construction and purchasing policies. It integrates diverse elements of university or college structures: education, economics, safety, health, the natural environment, mobility, the social environment, government and politics, recreation and culture (Downtown, 2009). This complements Register’s (2006) overarching ecocity goal to create environmentally friendly, diverse, and secure communities (Table II).

In particular, the eco-campus represents an opportunity to guide the implementation of innovative environmental measures in areas such as public transit, heating, design and construction. The expansion of university and college campus has had a similar environmental impact to that of city development: loss of sensitive habitat, damaged productive farmland and forestland, and high economic and infrastructural costs (Eagan et al., 2008). The eco-campus can also become a model for the external community by gathering and sharing effective ideas and practices. Universities can promote a positive image to the greater society that is increasingly concerned with the environmental movement.

1. Revise land-use priorities to create compact, diverse, green, safe, pleasant and vital mixed-use communities near transit nodes and other transportation facilities
2. Revise transportation priorities to favor foot, bicycle, cart, and transit over autos, and to emphasize “access by proximity”
3. Restore damaged urban environments, especially creeks, shore lines, ridgelines and wetlands
4. Create decent, affordable, safe, convenient, and racially and economically mixed housing
5. Nurture social justice and create improved opportunities for women, people of color and the disabled
6. Support local agriculture, urban greening projects and community gardening
7. Promote recycling, innovative appropriate technology, and resource conservation while reducing pollution and hazardous wastes
8. Work with businesses to support ecologically sound economic activity while discouraging pollution, waste, and the use and production of hazardous materials
9. Promote voluntary simplicity and discourage excessive consumption of material goods
10. Increase awareness of the local environment and bioregion through activist and educational projects that increase public awareness of ecological sustainability issues

5. Sustainable universities: from concept to practice

The ecocity model can be adapted to colleges and universities to meet the growing number of university leaders who value sustainability and are instituting structures to broaden and maintain engagement campus-wide (National Wildlife Federation, 2008). This movement has transformed existing campuses and moved from experimental to mainstream. Over three-quarters of the North American schools graded by the College Sustainability Report Card (Sustainable Endowments Institute, 2011) have full-time staff dedicated to sustainability. More than half of the schools have an office or centre that is focused on guiding and achieving campus sustainability goals. In accordance with Register’s (2006) ecocity principle to work with businesses to support ecologically sound activity while discouraging pollution and waste, over two-thirds of schools have adopted policies and contracts to purchase a variety of environmental and ethical items, including paper products, electronics, local foods and appliances. Of the 667 American schools surveyed by the Campus Environment 2008: National Report Card on Sustainability in Higher Education, the majority continues to set and review campus-wide goals for energy conservation, building environmental performance, natural habitat protection and waste reduction. This commitment mirrors Register’s (2006) ecocity strategy to promote recycling, innovative appropriate technology and resource conservation while reducing pollution and hazardous wastes. For example, California Polytechnic State University in San Luis Obispo, CA, has developed a master plan that clearly articulates campus sustainability goals and targets. The university has reduced energy use per square foot of building space by approximately 15 percent. The campus has purchased solar photovoltaic (PV) array and is constructing a cogeneration facility. The university has diverted 70 percent of solid waste from landfills and is committed to on campus composting facilities to handle campus dining food waste (California State Polytechnic University, 2010; National Wildlife Federation, 2008).

The ecocity model can structure and facilitate the greening of physical operations, thereby encompassing facilities management, emissions reduction, resource conservation, transportation, ecological restoration and sustainable landscaping (Beringer et al., 2008). The model suggests using technologies that can be strategically applied to retrofit previously built campus infrastructure. For example, the Green Team at the College of Charleston (SC) renovated dormitories and other campus buildings in 2006 within three categories of alternations: low or no cost, moderate, and expensive or labour-intensive. The purpose was to involve every member on campus regardless of economic status. For example, low or no cost options were placing water bottles in toilet tanks and refrigerators, checking pipes for leaks, outlet plugs, heating, ventilation and air conditioning (HVAC) system filters, and water heater insulation jackets. Energy Star appliances, nontoxic cleaning products, and programmable thermostats could be installed at a moderate cost. Expensive or labour-intensive building retrofit measures included Non-VOC paint, ceiling insulation, storm windows, tubular skylight, waterless urinals and recycled carpeting (Zimmerman and Halfacre-Hitchcock, 2006). Register (2006) cautions against sites with extensive impervious surfaces, such as concrete parking lots and rooftops because they can generate high levels of stormwater runoff and contribute to a heat island effect. The ecocity principle discusses how to restore damaged environments, particularly creeks, shore lines, ridgelines and wetlands. Vegetation can mitigate these measures by directly shading heat-absorbing surfaces and indirectly through evapotranspirational cooling.
(McPherson, 1994). At the University of Alabama, porous pavement, retention ponds and vegetated swales are utilized to manage stormwater. Drexel University (PA) has developed green roofs and collects rainwater for toilet flushing to reduce stormwater runoff (Sustainable Endowments Institute, 2011).

Energy efficiency, recycling and resource conservation are major elements of the ecocity model that colleges and universities across North America have made concerted efforts to address. Schools have reported lighting, water, HVAC, and information technology energy upgrades (National Wildlife Federation, 2008; Sustainable Endowments Institute, 2011). Many schools have implemented efficiency design standards, LEED certification and audits to analyze retrofit opportunities. Comprehensive efficiency initiatives across entire campus have been launched to conserve resources. For example, Texas A&M University’s “Campus-wide Metering, Retrofits and Continuous Commissioning Program” reduced energy consumption by 33 percent and saved more than $50 million USD in electricity and water costs over ten-years (Eagan et al., 2008). Tufts University (MA) reduced the energy consumption of the ubiquitous cold drink vending machines on campus. Vending misers reduce the power input by 46 percent without compromising the products within. With a passive infrared sensor, the vending machine powers down when not in use while monitoring the ambient temperature to cool the machine at appropriate intervals. Furthermore, the university has invested in alternative energy by purchasing renewable energy credits and installing solar panels and solar hot water systems on campus buildings. Overall, the university has reduced greenhouse gas emissions by 27 percent from 2005 levels and aims to achieve a 75-85 percent reduction from 1990 levels by 2050 (Tufts University, 2010; Sustainable Endowments Institute, 2011). About 79 percent of the schools evaluated by the College Sustainability Report Card (Sustainable Endowments Institute, 2011) identified the sources and tonnage of their carbon emissions.

In accordance with ecocity design guidelines, campuses can convert to zero or lower-carbon energy sources by installing onsite generation and switching to lower-carbon fuels such as natural gas and biofuels. Universities should target the biggest energy consumers first: Eagan et al. (2008) suggest that laboratories, swimming pools and older buildings are usually the worst. Campuses can take measures to replace inefficient fume hoods, steam traps, fans and motors, as well as upgrading the efficiency of boilers and chillers. Reducing the need for heat, light and air conditioning can cut the energy requirements of each building. For example, implement thermostat setbacks that make adjustments for day, night, weekends and holidays. Retrofitting insulation, upgrading insulation, and weather sealing building exteriors, and increasing the use of daylight and natural ventilation further limits energy demands. Harvard University (MA) has completed green renovations to historic buildings on campus and earned LEED platinum certification on their Blackstone Office project. The building includes a ground-source cooling system, energy-efficient fixtures, Energy Star reflective roof and sophisticated ventilation controls. Construction and demolition waste was 99 percent recycled. More than half of the schools surveyed by the College Sustainability Report Card (Sustainable Endowments Institute, 2011) had at least one LEED-certified green building or were in the process of constructing one. About 79 percent had adopted campus-wide green building policies that specified certain minimum performance levels, however only 24 of schools reported having at least one Energy Star-certified building.
Renewable energy is a primary method to reduce pollution and hazardous waste while promoting resource conservation. Campuses opt to purchase megawatt-hours of renewable energy in the form of Renewable Energy Certificates (REC's). This is an inexpensive way to reduce campus emissions and support the development of clean energy and usually the local economy (depending on the location of the energy generation site). However, REC's should be an interim strategy while planning facilities to produce solar, wind, biomass, geothermal, and other renewable forms of energy generation on campuses (Eagan et al., 2008; Betts, 2001). In 2006, Monmouth University (NJ) installed a 454 kW solar electric system that covers 33,000 square feet on the roofs of four campus buildings. The assembly produces 468,500 kWh and saves $150,000 USD in costs annually. Wright Community College in Illinois uses sunlight to heat water for its cafeteria and science labs. The passive solar heater, installed in 2007, is mounted on a ten by 25 foot awning and produces up to 400 gallons of hot water a day. St Olaf College (MN) erected a 1.6 mega-watt wind turbine on college farmlands adjacent to the campus. It replaces one-third of the school's energy needs and saves $300,000 per year in utility costs. Mt. Wachusett Community College (MA) replaced electric heat with a biomass electric heating plant in 2003. By using woodchips, it provides 85 percent of the entire campus' heating needs. Richard Stockton College (NJ) has a large closed-loop geothermal HVAC system that was installed in 1994. Since then it has reduced the college's electricity consumption by 25 percent and natural gas consumption by 70 percent (Eagan et al., 2008; Sustainable Endownments Institute, 2011; National Wildlife Federation, 2008).

The ecocity model provides strategies that promote voluntary simplicity and discourage excessive consumption of material goods. Almost every campus in Canada and the USA has initiated a diversified recycling program (Sustainable Endownments Institute, 2011; National Wildlife Federation, 2008). Institutions are recycling paper products, metals, plastics, construction waste, food scraps and landscape trimmings. For example, the Warren Wilson College (NC) recycling program has grown to process trash and over 25 different recyclables since 1981. The campus composes all pre- and post-consumer food waste from campus dining, offers reused materials through the campus Free Store and Surplus Program, and sells hand-crafted notebooks made from waste paper. Pacific University's (OR) recycling centre processes paper, cardboard and other recyclables on campus. The centralized location reduces the number of trips garbage and recycling trucks are forced to make (National Wildlife Federation, 2008). About 98 percent of the schools surveyed by the 2011 College Sustainability Report Card devoted at least a small portion of food budgets to purchasing from local farms and producers. About 70 percent had campus community gardens and farms from which dining halls sourced vegetables, herbs and other foods. Fair trade coffee, cage-free eggs, hormone and antibiotic free milk were other methods taken by schools such as the University of Connecticut to promote sustainable diets University of Connecticut, 2007; Sustainable Endownments Institute, 2011).

North American campuses have complemented resource conservation and recycling efforts with green landscaping and grounds management. Schools have integrated native landscaping, pest management, invasive species removal and the provision of food and shelter to attract wildlife. Michigan State calls its campus a “5,000 acre arboretum” (Eagan et al., 2008). Campuses have allocated portions of land for natural areas, such as forest, wetland, nonagricultural fields and prairie. This has provided
campuses with a variety of benefits: carbon sequestration, reduced stormwater and pollutants, increased biodiversity, groundwater recharge and enhanced stream and water quality (National Wildlife Federation, 2008; Sustainable Endowments Institute, 2011). Seattle University (WA) has maintained the university’s 48 acres without the use of any pesticides since 1986. Weeds and pests are controlled through building healthy soil, native plant selection, biological controls and the use of insecticidal soaps and vinegar. The campus maintains a wildlife refuges as well as a 12,000 square foot ethno-botanical garden that was formerly turf grass (Seattle University, 2008; National Wildlife Federation, 2008). Arizona State University has adapted the campus landscape for a desert climate by planting species that are drought tolerant and adapted to harsh desert conditions, thereby requiring minimal water and fertilizers (Eagan et al., 2008).

Register (2006) advocates a revision of transportation hierarchies to favour foot, bicycle and public transit over cars. In general, more than half of North American schools have instituted bicycle-sharing programs, offering an alternative to those who drive short distances to campus. The University of Arizona has made campus bike-friendly with over 11,000 bike parking spaces and safe bike routes. In 2007, students at Willamette University (OR) founded a bicycle repair co-op and rental program that is free to university students and staff (Eagan et al., 2008). Campuses have also promoted car-sharing programs and reduced-fare passes for public transit. The University of California Los Angeles organizes a vanpool program and offers discounted parking passes to commuters who carpool or use electric vehicles. The university operates a free shuttle system with buses that operate on natural gas (Sustainable Endowments Institute, 2011). Schools’ fleets have been converted to alternative-energy including hybrids, electric carts and vehicles fueled with biofuel and other flex-fuel. Students at Appalachian State University (NC) voted in 2005 to build a “closed-loop” processing system for biodiesel fuel. This includes solar-thermal water heating and a solar PV system to meet all necessary electricity and hot water needs, as well as a greenhouse with aquatic habitats to treat wastewater. An 80-gallon processor converts waste vegetable oil to biodiesel and then blends it with regular diesel to fuel campus vehicles (Eagan et al., 2008). The University of Washington’s award-winning transportation program offers a variety of transport options to cut the school’s carbon footprint. The U-Pass provides unlimited access to public transit, discounts on bicycle and pedestrian safety equipment, emergency ride home program, and merchant discounts on items ranging from ice cream to theatre tickets. Car and vanpooling is subsidized, and parking discounts are available for drivers who commute by more sustainable alternatives most of the time. The UCAR program offers hybrid vehicles at an hourly rate to individuals conducting university business. More than three-quarters of the campus commutes using an alternative to driving alone (University of Washington, 2011; National Wildlife Federation, 2008).

In many HE institutions, students are a driving force behind campus sustainable development. This takes the form of interest groups, sustainable residences, pledges, jobs, and career fairs (Beringer et al., 2008). Many schools have Eco-Reps or other similar programs to promote voluntary behavioural change on campus. Student orientations now include an awareness and educational component, such as zero-waste meals, discussions, and active volunteer projects. Schools offer green residences where students reduce their resource consumption and learn strategies first-hand to live sustainably (Sustainable Endowments Institute, 2011). For example, students residing in Columbia
University’s (NY) GreenBorough House can experiment with sustainable living. Student groups have worked to develop a green purchasing program, energy-saving competition, the distribution of efficient lightbulbs, and a community garden. At Indiana University, a conservation competition resulted in 2,530,958 gallons of water savings and an 800-ton carbon emissions reduction. Engineering students of Johns Hopkins University (MD) work on recycling and biodiesel projects on campus as part of their Engineers for a Sustainable World program (Sustainable Endowments Institute, 2011).

These programs ensure that future generations will have the chance to gain a deeper understanding of social, economic and environmental issues beyond theoretical knowledge. Students learn from everything around them, and these activities form a complex web of experience and learning (Cortese, 2003). Education, fieldwork and research, on campus amenities, and university operations all affect the university experience. The focus on the university itself engages students in understanding the “institutional metabolism” and impact of materials, goods, services and daily activities (Cortese, 2003, p. 19). Students can be made more aware of their ecological and social footprint and become actively engaged in the practice of sustainable living.

6. Conclusions
While there is no single system that will simultaneously deliver social justice, economic success and ecological sustainability (Low et al., 2005), colleges and universities are striving to find the best combination of imperfect mechanisms to guide future development. The ecocity building sequence starts with the community foundations and a local focus on land use patterns. It provides a map and guide to promote ecological sustainability, regeneration, economic success, and social justice (Register, 2006). The HE campus is the ideal location to apply Register’s innovative ecological principles and establish comprehensive across-the-board stewardship in both educational and operational areas. Sustainability is a broad and general topic that needs to be better integrated into the economy, society, politics, culture and overarching structure of the university. HE institutions should view this as a unique opportunity to become innovative green leaders. Universities and colleges are major places to build social culture, and should not be under-estimated as the ideal ground to educate, motivate and model sustainability.

Note
1. The College Sustainability Report Card 2011 evaluated the 300 colleges and universities in the USA and Canada with the largest endowments, as well as 22 additional schools that applied for inclusion. The schools are located in all 50 US States, the District of Columbia, and eight Canadian provinces.

References


Further reading


About the authors

Jessica Finlay is a graduate of the Department of Geography at Queen’s University in Kingston, Canada. She is working as a Research Assistant for the Geography Department and Department of Student Affairs to focus her research on sustainable resource management and geographies of higher education. Her other research interests include cultural geography, human ecology, environmental conservation, human dimensions of global environmental change, social and environmental justice, and human-environmental systems. She will pursue graduate studies in the Department of Geography at the University of Minnesota. Jessica Finlay is the corresponding author and can be contacted at: 6jmf1@queensu.ca

Jennifer Massey is the Director of Career Services, Research & Assessment and Graduate Student Life for the Division of Student Affairs and an Adjunct Assistant Professor for the Department of Geography at Queen’s University. Her research interests include: geographies of higher education, student development, co-curricular programming and academic achievement, community engagement, social capital, bodies and embodiment and gentrification. She has several years of experience as both a Researcher and Project Manager working for a variety of institutions including the University of Illinois at Urbana-Champaign, University of St Andrews, and the University of Windsor. She is Chair of the Canadian Committee for the International Association for the Exchange of Students for Technical Experience, she serves on the Queen’s University General Research Ethics Board, the NASPA IV-East Assessment, Evaluation, and Research Knowledge Community Advisory Group, and is a member of the Editorial Board of the *Journal of Student Affairs Research and Practice*.

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints
<table>
<thead>
<tr>
<th>TITLE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher education’s sustainability imperative: how to practically respond?</td>
<td>Emerald Insight</td>
</tr>
</tbody>
</table>
Higher education’s sustainability imperative: how to practically respond?

Kevin J. Krizek
College of Architecture and Planning, University of Colorado Boulder, Boulder, Colorado, USA

Dave Newport
Environmental Center, University of Colorado, Boulder Boulder, Colorado, USA, and

James White and Alan R. Townsend
Institute of Arctic and Alpine Research, University of Colorado Boulder, Boulder, Colorado, USA

Abstract
Purpose – The purpose of this paper is to describe four phases for how universities have addressed a sustainability agenda and offer specific lessons for how and where experiences on one campus, the University of Colorado Boulder, have been met with success and other challenges. The authors offer general reflections for executing university-wide sustainability initiatives with a central intent of illuminating central barriers against, and incentives for, a coordinated and integrated approach to campus sustainability.

Design/methodology/approach – The approach for arriving at four phases and a description of the University of Colorado Boulder is based on experiences from learning, teaching, and administering within universities–collectively for almost a century among the authors–and lessons from “war room” discussions.

Findings – Sustainability initiatives on campus may evolve through a series of phases labeled: grassroots; executive acceptance of the business case for sustainability; the visionary campus leader; and fully self-actualized and integrated campus community. The University of Colorado Boulder, while a leader in many respects of sustainability (research, student activities, facilities management) has experienced serious challenges for coordination.

Originality/value – The four phases are a relatively novel contribution for the specific literature on sustainability education. Second, the tangible examples from University of Colorado Boulder demonstrate how coordination is difficult in these situations; these examples allow readers to better relate to and understand such challenges. Finally, the authors reflect on central issues according to three categories: self-reflection, recommendations, and advantages.

Keywords United States of America, Higher education, Universities, Sustainability, Campus framework, Coordination, University administration

Paper type Research paper

I. Universities as challenging places for sustainability
Sustainability continues to emerge as a marching banner for all walks of life and all types of organizations. Notwithstanding its sometimes ambiguous and pliable definitions, sustainability has an instinctive logic to it that many find compelling – if not an imperative. Yet, the larger and more complex the organization, the greater
the challenge of operationalizing the concept and daily operations of sustainability. Individual corporations, responding to emerging global issues of environmental degradation, social injustice, and changing economic realities, are examples of organizations that are successfully using sustainability principles and practices to influence their core business models (Volkswagen Group, 2008; Dow Jones Sustainability Indexes, 2010; Lubin and Esty, 2010). Their culture of responding to bottom lines and accountability coupled with largely ministerial decision-making (notwithstanding shareholders) allows for such success.

Institutions of higher education are different. While they have stakeholders, not shareholders, they are otherwise not immune to many of external drivers behind the corporate shift to sustainability (Bardaglio and Putman, 2009; Lubin and Esty, 2010; Wright, 2010). Yet, implementing sustainability practices across all walks of the campus often proves to be considerably more challenging than in a corporate environment because campuses have additional pressures (Velazquez et al., 2005; Walton and Galea, 2005; Ferrer-Balas et al., 2008; Bardaglio and Putman, 2009). For example:

- Institutions of higher education are typically tasked with the trinity of education, research and service; these three and sometimes competing orientations may dilute a focused orientation and create competing priorities.
- Different constituents demand different services. Universities are largely comprised of four personnel bodies – students, faculty, staff and alumni – each of whom have varying, and sometimes competing, priorities in terms of sustainability. For instance, recycling efforts offer some experiential learning for students, but may contribute little towards advancing formal curricula. Likewise, cross-cutting sustainability-oriented courses are on the rise, but may be insufficient to advance campus renewable energy installations. It is often difficult to uncover cross-constituency synergies between these constituents.
- Campuses face management challenges akin to small cities as they must provide an array of support services in an increasingly complex environment – thereby prompting a sprawling horizontal organization, sometimes with diffuse focus.
- New domestic competition from for-profit enterprises increasingly commodifies educational products and cuts into market share. Campuses may be less likely to move forward on sustainability if programs and revenues are shrinking.
- With recession economies the “new normal,” campus professionals are asked to cut costs, increase employee productivity but not payroll, and recruit and cultivate a new generation of administrative leaders to supply quality leadership succession.
- The typical structure of universities – including power concentrated at several levels and a philosophy of protecting tradition and academic freedom – hinders sweeping change. By contrast, corporations can often streamline and focus on core products or services with comparative ease. University structures account for many of their good attributes, but their inherent structure may impede the wide-sweeping changes that are needed.

This paper’s purpose is threefold. The authors first describe four phases for how universities have addressed a sustainability agenda and offer specific lessons for how and where experiences at the University of Colorado Boulder (UCB) have been met
with success and where efforts have fallen short. The authors conclude by positing general reflections for executing university-wide sustainability initiatives. The primary methodology rests on two approaches:

(1) Distilling various “war-room” discussions with faculty, students, administrators over the course of many decades to present four phases.

(2) Reflecting in depth on one-case – UCB – to document the progress (and processes) that have been made and the challenges that lie ahead.

The central intent is to illuminate central barriers against, and incentives for, a coordinated and integrated approach to campus sustainability. The general reflections provide essential understanding for universities aiming to formalize their efforts. At a minimum, it helps develop the burgeoning literature on higher education’s response to develop, implement, and administer policies and programs that will help universities become international models for best practices in campus sustainability operations and programs.

II. Phases of university approaches to campus sustainability

For as long as there have been pressures to promote the concepts of sustainability, there have been approaches employed by universities to do so. The authors have intimate experience championing campus efforts with respect to sustainability in a variety of capacities. Collectively, these experiences include, but are not limited to: chairing academic programs (undergraduate and graduate), managing student-led efforts, directing campus-wide research institutes, interacting with campus operations (e.g. housing and dining, facilities management (FM)), participating in campus-wide sustainability steering committees, serving as campus sustainability coordinators, and teaching sustainability focused courses. Based on experiences learning, teaching, and administering within universities – collectively for almost a century – and lessons from “war room” discussions, the authors have observed four phases that may typify or predict campus responses to sustainability. Identification of these four phases represents the authors’ collective judgment and understanding, useful in processes gauging and understanding the comprehensives of a university’s endeavors. These phases are not discrete or exclusive. Elements of each may be found at any one time on any individual campus.

First phase: grassroots

In the first phase, grassroots efforts are king. Grassroots campus champions advocate for various sustainability-related services and policies – and campus leadership either resists the requests or is only minimally responsive. In response, advocates then organize and launch their own ad hoc efforts. Such activities as single department recycling programs, bicycle campaigns, faculty creating new coursework, campaigns to limit pesticides, campaigns to limit sweatshop athletic apparel sold by the university or bearing its logo, campaigns to boycott plastic water bottle sales, etc. evolve from myriad different constituencies across campus. Elements from this phase can linger and feed subsequent phases as new initiatives are brought forth by grassroots champions.

Grassroots and ad hoc activities and programs that are spawned during this phase by disparate campus entities can become ongoing, entrenched efforts. Should campus leadership fail to respond to the evolution of these efforts in a timely fashion, these programs become the de facto definition of the culture of sustainability efforts
on a campus; in this case, it is difficult to integrate subsequent efforts into emerging over-arching governance structures, as their disparate origin renders them difficult to coordinate. They may even work at cross-purposes to one another. Accordingly, it is important that the first phase be kept at a minimum.

Second phase: executive acceptance of the business case for sustainability

In this phase, campus leadership accepts some – but not all – aspects of the business case for sustainability. Leadership easily sees the value of efficiency programs that inspire cost savings and improve campus reputation. Accordingly, energy efficiency, water conservation, and green branding/public relations programs are supported by campus leadership.

Most often, the operations department (e.g., FM) roots the response toward sustainability which is directed at resource conservation. A sustainability coordinator, most often a staff member, may engender greater collaboration within the daily operations of a unit. There is, however, a parallel in developing a curriculum where a group of faculty may influence chairs and deans to create a new program (major, minor, certificate, etc.) and have it accepted and funded by the administration because it meets student demands. More generally, in this phase a sustainability committee may be assembled to help identify and direct needed efforts. However, while new initiatives may be brought forward by campus champions and/or the committee, campus leaders test them for cost savings and if found lacking, these suggestions are prioritized down.

In general, campus leadership accepts suggestions that enhance efficiency/cost savings and/or enhance brand/reputation. They are less supportive of sustainability initiatives that require broad-based stakeholder inclusion and transparency practices, or require broader life cycle and/or full-cost evaluation perspectives. Costs still trump many other considerations and economic terms guide most decisions. The most notable characteristic of this phase is that the push for best sustainability practices is still derived from campus constituencies that may not include most upper-level executives.

Third phase: the visionary campus leader

In this phase, campus leaders – including the highest level executives – openly promote a sustainability vision and rally behind it as a central element of their platform. These leaders embrace the concept as a central value of the administration’s goals and strategic plan and are supported or at least tolerated by their trustees. As part of this phase there is full executive leadership on sustainability, a keen understanding of its tenets, and an articulated vision for the future. Examples of executive level university leaders who have embodied this dimension include President Michael Crow (Arizona State University), and immediate past or outgoing Presidents David Shi (Furman University) and Mitchell Thomashow (Unity College).

The visionary campus leader reprioritizes sustainability efforts and is supportive of stakeholder engagement/inclusion, robust transparency/goal setting, and prospective full-cost evaluation practices. A visionary campus leader, furthermore, elevates sustainability professionals from mid-level coordination roles to the executive level – or at least reporting to the executive level. For example, Arizona State has a Science Policy Advisor to President Michael M. Crow; this person also serves as Executive Director for Strategic Institutional Transformation in the Office of the President. Dartmouth University was operating with a position of sustainability coordinator
who reported to an Assistant Vice President; recently, the university hired a full time Director of Sustainability who now reports directly to the Provost. Rochester Institute of Technology in Rochester, New York, launched a newly-created position of Senior Sustainability Advisor to President William Destler.

The visionary campus leader grapples with a campus sustainability apparatus that may be mired in any one of the following conditions:

- poorly-coordinated silos;
- legacy *ad hoc* programs;
- constituencies/activities leftover from the phase one;
- the fundamental incompatibility of sustainability’s systems-thinking; and/or
- an interdisciplinary approach at odds with the reductionist, turf-heavy culture that earmarks the academe’s traditional paradigm.

In turn, entrenched campus interests may at first bide time in hopes that “this person won’t last” and all will return to the status quo after the visionary leader possibly moves on to other posts. The visionary campus leader may stimulate revolutionary change, but it may come at a cost (e.g. substantial body count in his/her wake). Indeed, as sustainability becomes popular, the political stakes increase, consequences and political maneuverings have greater consequence for both the executive and the campuses’ historic sustainability advocates.

### Fourth phase: fully self-actualized and integrated campus community

The fourth phase is not a phase with which the authors are acquainted — but one that universities can aspire to and encourage others to do so as well. Select universities across the globe exhibit attributes demonstrative of the fourth phase. For example, Leuphana University, Germany (the first zero-emission campus), Birkenfeld from University of Applied Sciences Trier, Germany, and the University of Gothenburg, Sweden, are useful case studies to consider as fully self-actualized and integrated campus communities around sustainability. This fourth phase is characterized by engaged, visionary leadership and a fully integrated sustainability approach; this approach enhances educational outcomes by synergizing them with sustainability-related operations, student life, staff, and community engagement activities. Hence, the educational experience is coherent inside and outside the classroom; students learn about sustainability in all majors — and they observe and learn from the campus which physically models sustainability’s principles and practices.

In this “nirvana” phase, systems-thinking and interdisciplinary cooperation would be the central mission of all campus departments. Sustainability operations, student activities, and community partnerships are coordinated, coherent, and high quality. Sustainability futures may be visioned collectively across all stakeholders after the deliberative analysis and mapping of internal and external forces and data iterates appropriate and effective new pathways that converge and synergize the sympathetic but necessarily discrete foci of various stakeholders. Innovation, entrepreneurship, and creativity is empowered across the operation and then channeled into tangible and focused evolutions. Sustainability becomes integral to the university. This is an enormously challenging goal, but yet critical to achieving true and lasting sustainability practices.
III. Experiences at the University of Colorado Boulder

The third part of the paper focuses on the experiences at UCB, in which the authors have most familiarity. The focus is on this campus as a setting to further explicate examples of initiatives that have grown to receive national prominence but also to learn why other efforts have had difficulty “growing wings.” The intent is to spotlight educational programs and experiences – pointing to variations in resources, staff, materials – and describe some of the factors that explain how or where aspects of sustainability education came to fruition or still bear challenges ahead. These reflections ultimately shape many of the conclusions offered in the final section (part IV).

In short, sustainability efforts at UCB have received decades of attention and have made progress, including examples of most of sustainability’s common elements and phases but also path breaking institutional achievements. The common theme is that most have been extremely successful at the grassroots level. The resulting sustainability capacity at UCB is accordingly large, horizontal, and – for better or for worse – driven as much by legacy inertia as by deliberate planning. The irony is that such successes are arguably now proving to be major challenges to overcome. The first section provides a general and historical context to set the stage for the more current detailed accomplishments and subsequent challenges, highlighting academic, student, and administrative perspectives.

Roots

In the area of curricular development and degree creation, in 1951 a major in Conservation Education was first offered through the joint Department of Geography and Geology with a required interdisciplinary set of coursework in geography, biology, journalism and communication. In 1972, the major was replaced as Environmental Conservation and continued to be interdisciplinary but shifted to a more science-based curriculum. In 1995, the curriculum was strengthened by requiring more fundamental courses in the physical sciences, policy, economics and ethics, and the university created an independent Environmental Studies Program (White, 1995). Over succeeding decades, this academic and research seed helped sprout robust geosciences, environmental studies, and related academic and research efforts via separate departments and research institutes. Not coincidentally, UCB is now among the nation’s top ranked universities in environmental and geosciences research funded by the National Science Foundation, the environmental studies program is consistently ranked among the top handful of similar national programs, and myriad sustainability-related and focused courses are appearing in over half of the campuses academic units (Sustainability Tracking, Rating, and Assessment System (STARS, 2010).

In the area of student involvement, the CU Environmental Center (EC) was founded by students on Earth Day 1970 and has grown in the succeeding 40 years into a robust sustainability operations and service platform employing over 100 students part time, eight full time professional staff, and generating an annual budget of ca $US6 million. Over four decades, the students have continued to push for and ultimately funded and launched numerous unilateral efforts towards sustainability. Consider that the EC:

- launched the nation’s first collegiate recycling program (1973);
- launched the nation’s first alternative transportation/prepaid bus program (1991);
launched the nation’s first collegiate renewable energy purchase program (2000);
launched the nation’s first zero waste football stadium (2008);
won a carbon neutrality commitment first from student government, then the Administration (2007);
won a LEED green building standard requirement for all campus construction (2003); and
crafted CU’s first campus sustainability plan (Blueprint for a Green Campus, 2000).

The EC’s student-led advocacy has historically been met with resistance from the administration. Yet after a period of controversy, the administration has seen the wisdom of the EC’s suggestions and at least tolerated their implementation. In recent times, the administration has sought to assume a primary role in moving forward on issues such as carbon neutrality, zero-waste, and other programs the EC historically championed and the Administration resisted. The Administration recently named a campus sustainability director to coordinate ongoing activities. However, navigating that transition has been difficult for numerous reasons – and brings to light the challenges a campus may face from spending too long in phase one.

Cross disciplinary research institutes and faculty hires
In the area of research, starting in the 1950s the university created cross disciplinary research institutes with the purpose of providing faculty with an outlet for interdisciplinary research efforts. Examples in the field of sustainability include the Cooperative Institute for Research in the Environment, a joint institute with the National Oceanic and Atmospheric Administration, the Institute of Arctic and Alpine Research and the Institute of Behavioral Sciences. Notably, these institutes were meant to be more than a side research outlet for faculty; to strengthen them, the university allocated faculty positions to the institutes, although not the status of tenure home, stimulating the institutes to partner with more traditional and disciplinary departments.

The result was significant in two ways for the actions suggested herein this manuscript. First, the institutes hired interdisciplinary scholars that may not have been the top choice for disciplines, inoculating the campus with scholars that embrace the interdisciplinary core of sustainability, and second, these interdisciplinary scholars helped to nudge the disciplinary departments towards a broader campus point of view with greater acceptance of cross campus initiatives such as sustainability.

Operations
Finally, related to the physical campus, CU FM and Housing and Dining Departments (HDS) have in the last decades evolved credible sustainability initiatives that now either synergize, partner with, or in some cases conflict with legacy efforts from the student-led EC (see above). Overall, mutual efforts have been productive and have led to achievements such as a 23 percent total energy reduction campus wide from 2005 to 2009. However, coordination inefficiencies and planning conflicts persist among these units as discrete needs and circumstances may not be currently unified behind a common campus vision for sustainability.

The example of UCB’s flagship recycling program – the nation’s first – personifies the barriers evolved from horizontal growth in sustainability capacity. The EC, FM, and HDS
each have roles in operating and managing the campus recycling system. However, as each unit has emerged as a sustainability player, each asserts standing and authority over current and future elements of the program. Now trying to plan the transition to a campus-wide zero waste system, the units are somewhat at loggerheads over the nature and scope of that effort. Accordingly, planning stalls and conflict emerges.

On a broader level and as has been seen in other leadership universities, a perhaps inevitable power play emerges as sustainability activities become politically popular. The campus’ historic sustainability champions or early adopters may be squeezed out as leadership recognizes the intrinsic power of these efforts and seeks to take control of – and credit for – sustainability successes.

Current status at UCB
Thus, UCB is now facing the increased realization that enhanced coordination between these and similar efforts is necessary, and that the inertia created by these initiatives coupled with the horizontal legacy efforts present barriers to change. Likewise, pathways to integrate academic, research, operations, and community sustainability efforts are far from clear.

Notwithstanding some bumps in the road, UCB is seeking to divine an overarching integration vision and coordination structure that guards against a central “command and control” philosophy but also weaves cohesiveness into the largely fragmented efforts. Combined with visionary leadership, UCB could then be well on the way to achieving the fourth phase of campus sustainability. Indeed, based on the recent assessment compiled under the STARS in which UCB was the first major research institution achieving a Gold rating, the university is arguably as advanced as any US university in all aspects of sustainability (STARS, 2010). However, as reflected above, that historical momentum may itself be an impediment to the UCB moving into the fourth phase because the decades of lower-level organizational capacity spread horizontally across disparate campus units have created strong and independent organizations that provide inertial barriers to the robust integrative model that must attend a fourth phase effort.

Examples of this inertia are plainly visible. Courses using the campus as a laboratory for sustainability have emerged, flourished for a few semesters, and then been dropped, in part due to difficulties in coordinating activities between the faculty and the campus facilities management. Student-led efforts to increase sustainability have met resistance in the administration over costs and control, despite the fact that both student-led and administrative efforts in sustainability are extensive and successful. Highly successful efforts in recycling and sustainable food services in campus dining halls go largely ignored in courses that touch on sustainable food supplies, a situation that students remark upon frequently in their course evaluation comments.

As noted above, part of the problem is the success of the various independent efforts. An analogous situation can be found in the academe across the US where the strongest departments are often the most resistant to change such as incorporating interdisciplinary efforts (e.g. sustainability); their rationale is that because they are strong, they consider their activities as cherished and there is little reason to change. There is no cross-fertilized institute for sustainability along the lines of those mentioned above. Part of the problem also lies in the campus reward structure. There is little reward, for example, in FM for cooperating with faculty on sustainability courses.
Unless administrators value and reward such efforts (e.g. increasing resources, raises linked to key activities, employee awards) the incentive for continuing these efforts lies primarily in personal satisfaction – a situation that is increasingly untenable in difficult budget times when all are asked to more with less. Finally, a large part of the problem lies in the fact that there is an extremely weak culture of crossing the lines between the faulty, facilities and student efforts, and thus no formal structure by which to do it.

Lacking an integrating framework, a recent inventory tallied in excess of two dozen committees, programs, efforts, or initiatives at UCB that directly addressed dimensions of sustainability. In response, the campus is acting to ensure that the sometimes disparate efforts are better coordinated. The first step was to create a new position of “campus integrator” – not beholden to any specific organizational unit – charged with finding synergies and integrative pathways that leverage the campus’ various sustainability domains. Owing to the curricular, research, and political dimensions required as part of the coordination, it was determined that a tenured faculty member would be best suited for such a position. Ultimately, funding for the part time (0.10 full time equivalent and a course release) “Education Outreach Coordinator (EOC)” position was derived from students, facilities, and the Provost.

The EOC position is a notable, but only a first, step towards a campus strategy to suitably address and synergize sustainability efforts. Coordinating the bountiful and powerful efforts ongoing at one of the nation’s pre-eminent environment and sustainability universities is obviously larger than a single person’s part time efforts. Therefore, the time is ripe to pursue and install more comprehensive administrative structures. The literature has numerous papers offering background information and valuable research outcomes, that have helped inform this work. However, it is difficult to learn of a major research university well into the fourth phase and thus there is little literature sharing empirical information related to organizing a fourth phase campus (Sharp, 2002). Section IV of the paper therefore turns to outlining possible components and benefits of such a structure.

**IV. Lessons for executing university-wide sustainability initiatives**

There is enough evidence nationwide to detect an arms-race of sorts among universities competing for green status. Recent national campaigns related to carbon neutrality, green buildings, local food, renewable energy and sustainability reporting have boosted sustainability activities at campuses across the globe. Studies now show that upwards of two-thirds of prospective college freshman look at campus green rankings as a factor in college choice (Pryor et al., 2008; Princeton Review, 2010); it is often cited as one of the top three reasons why UCB students made their decision for where to attend university. But in university settings, being “greener” or “sustainable” means something broader than widespread dual flush toilets, award winning recycling programs, and installing a wind farm on campus. Such agendas need to formidably weave through curriculum, research, service, operations, and campus/community life (Velazquez et al., 2005; Ferrer-Balas et al., 2008).

Just as sustainability is an emerging global mega-trend that is fundamentally redefining business in the private sector; it can be – and should be – a touchstone for all walks of life on campus. Organizations – and universities – ignore the sustainability imperative at their own peril. As suggested in the *Harvard Business Review*
(Lubin and Esty, 2010), albeit largely aimed toward corporations, there are also direct implications for higher education:

Why do we think sustainability qualifies as an emerging megatrend? Globalized workforces and supply chains have created environmental pressures and attendant business liabilities. The rise of new world powers, notably China and India, has intensified competition for natural resources (especially oil) and added a geopolitical dimension to sustainability. “Externalities” such as carbon dioxide emissions and water use are fast becoming material—meaning that investors consider them central to a firm’s performance and stakeholders expect companies to share information about them.

These forces are magnified by escalating public and governmental concern about climate change, industrial pollution, food safety, and natural resource depletion, among other issues. Governments are interceding with unprecedented levels of new regulation—from the recent SEC ruling that climate risk is material to investors to the EPA’s mandate that greenhouse gases be regulated as a pollutant.

Further fueling this megatrend, thousands of companies are placing strategic bets on innovation in energy efficiency, renewable power, resource productivity, and pollution control. What this all adds up to is that managers can no longer afford to ignore sustainability as a central factor in their companies’ long-term competitiveness. Megatrends require businesses to adapt and innovate or be swept aside (emphasis added).

Accepting the premise that sustainability is an almost unavoidable megatrend, an outstanding question emerges: how to get the most out of this megatrend within university cultures? Subscribing to Naisbitt’s quote, “Trends, like horses, are easier to ride in the direction they are going,” suggests that one strategy is to ensure that the campus is indeed on a horse. However, more can be gained by ensuring that all horses are indeed pulling in the same direction.

The central issue, as described above, is that universities embody multi-headed monsters, each with unique recipes for success. The contributions herein shed light on important issues in three respects by first hypothesizing four phases of university activities that summarize approaches to materialize sustainability on campus. These descriptions are a relatively novel contribution to the specific literature on sustainability education, building on themes expressed elsewhere (Chambers, 2009). Second, the article provides tangible examples from UCB of how coordination is difficult in these situations; these examples allow readers to better relate to and understand such challenges.

The final contribution is to share some implications for central issues to overcome for successful pursuit of university sustainability, classified into three groups:

1. Self-reflection – challenging goals that despite their daunting nature should still be publicize.
2. Recommendations – readily achievable goals based on experiences of aspects that can work well in current university structures.
3. Advantages – goals that can have financial implications.

Self-reflection
Traditional disciplinary structures, ubiquitous in universities, tend to stifle the growth of interdisciplinary efforts required of sustainability. For example, deans of academic units often protect the strong departments within their colleges, and new, interdisciplinary programs such as sustainability fail to fit into this structure and thus must fight for
resources on an unequal playing field. Taken to the extreme, academic units represent silos that run counter to the systems integration required. When multiple and firmly entrenched silos exist, successful integration may become virtually impossible without substantial structural overhaul; in the experience of the authors, the challenge of siloed structures increases with the number in existence and/or their dominance in the university setting. At the same time, it is important to recognize the benefits that siloes provide to prevent over-centralization; there is a balance to strike.

The traditional power structure within universities includes considerable authority and autonomy at the college and dean level, unlike the business world where in general, top management clearly runs the show. This structure means that colleges are slow to change; deans protect their colleges and directional change that will benefit their students/faculty/staff and are rewarded for doing so. There is typically less reward, if any, for thinking more broadly about the benefits of campus wide initiatives such as sustainability. Given the structures into which they are placed, it is often difficult to fault college-level leaders for failing to promote cross-college initiatives; doing so runs the risk of them meeting the very terms of their employment.

Much as some visionary leaders have recognized the need to alter individual faculty reward structures to promote interdisciplinary success and effective communication to public spheres, so too much campus top executives “free up” their college leaders to promote creative campus-wide initiatives that ultimately can result in a rising tide. In practice, this would require shifts in the standard models for financial distributions and rewards for faculty that are employed in most universities. Absent such changes, however, efforts such as sustainability are likely to hit a glass ceiling, one that can only be partially broken from above by the efforts of a bold and dedicated top-level executive (e.g. the third phase described above). Providing top administrators and deans with the evidence of such to push interdisciplinary programs is difficult; it would, however, not only help them grow, but could help overcome the organizational cacophony that multiple, disparate grassroots efforts often create.

These are challenges for the fourth phase and they are not easy, but they contain notable opportunities. Campuses who would achieve the fourth phase can redefine many societal challenges as opportunities to hone sustainability as a doctrine. There is an analogy from the adaptation to climate change: sustainability provides a driver that refocuses academic, operational, and research interests behind a more integrative unifying pursuit. This re-framing creates hope, increases knowledge, advances solutions, and synergizes the campus integration sustainability demands. It also enhances the campus “moral license to operate” thus improving the academe’s lot among the communities it serves.

Universities may be buffered from the more rapid cycles of boom and bust evidence by corporations, but they too must adapt or die. Many of the world’s most innovative and successful corporations have seen the writing on the wall. They have recognized that sustainability does not represent the preachings of overly green and extreme sector of society, but rather the principles of a successful organization, whether that be an individual company or the human enterprise as a whole. In the decades to come, those universities willing to embrace the challenges of sustainability thoroughly will redefine the nature of higher learning for the better. By doing so, they will keep the tradition of educating future leaders in society, but redefine critical aspects of what that leadership must become. In the end, embracing this challenge will be a “win-win” for the
universities that choose to take it on: they will become the most prominent institutions in the eyes of both their direct constituents (students, faculty, and staff), and the community at large.

**Recommendations**

On a much more tangible level, there is evidence to suggest the following approaches seem to work (Comm and Mathaisel, 2005; Walton and Galea, 2005) to get key campus sustainability stakeholders to find better ways to resolve issues:

- **Communicate a consistent institutional stewardship philosophy.** People react well to sustainability as a core value because of its altruistic motives that match well with higher education’s best qualities.

- **Detail clearly defined roles and responsibilities.** A sustainability performance system (such as STARS) helps identify shared goals, develop buy in, improve coordination, and boost morale. Sustainability fosters the systems-thinking needed to help the academe move from its traditional hierarchical organizational approach to better compete in the increasingly network-oriented world.

- **Feed off of professional memberships/organizations.** In helping establish a university-wide philosophy, membership as part of a network such as Association for the Advancement of Sustainability in Higher Education or the COPERNICUS Alliance (European Network on Higher Education for Sustainable Development) provides invaluable resources that in part, help spur a positive arms-race of sorts.

- **Foster an environment of innovation and creativity.** Asking the campus community to pioneer sustainability implementation has proven an inspiring task. People feel good about themselves when their work is connected to making the lots of everyone involved better. That translates into increased productivity, innovation, and individual leadership.

- **Value people and reward them.** Sustainability, by definition, is about being outside oneself. Rewarding that altruism raises organizational spirit and improves execution.

- **Value measurable goals and objectives.** Procedures are put in place to ensure sustainability metrics now map to all campus business outcomes. By understanding sustainability’s influence on the breadth of campus business outcomes, investment can be more appropriately directed – and the roles of all campus players better understood, integrated, and boosted.

- **Make clear the vision, mission and values.** Sustainability principles and practices inform a comprehensive ethical compass by which campus leaders can steer. Sustainability spans education, research, and service outcomes thus uniting higher education’s traditionally disparate mission. Sustainability must become part of the fabric of the basis for the institution – the mission, vision, and values of the institution.

**Advantages for integrating sustainability**

Finally, in such an article, it is important to point out that an unwavering and legitimate focus on sustainability can help unite some varied and increasing challenges universities face. For example:
• Sustainability values help unite disparate units in the organization. To the degree that sustainability becomes a broadly embraced campus vision, workers within silos can better see their role in fulfilling a common agenda.

• Over the relatively short term, perceived “green” campuses differentiate themselves from their competitors. And sustainability’s central transparency value meshes well with the emerging “iCollege,” open-source world.

• Sustainability systems foster intra-organizational coordination thus increasing efficiencies and decreasing business risks.

• Declining public support and increasing unfunded mandates coupled with increasing legislative oversight confound campus leaders’ ability to respond to emerging challenges at an accelerating pace of change. Proper execution of a sustainability performance system includes a constant feedback loop about current performance and emerging challenges. Sustainability leaders will see challenges and solutions sooner – and subsequently can lead a more attractive organization in the process.

• Sustainability often produces unanticipated synergies. The experiences of the authors with interdisciplinary graduate programs ranging from small and short-term (e.g. NSF-IGERT funded) to larger and lasting (e.g. the Environmental Studies graduate program) shows that creating mechanisms for cross-disciplinary student interactions brings the faculty in tow, and that it is the latter who often struggle more initially, but ultimately are capable of launching longer-term new directions within the university. One caveat to this principle: there is no substitute for in-person time. Finding new synergies across disciplinary entities requires the development of new common languages, and that requires focused, unpressured time for stakeholders to interact in deep and meaningful ways.

• Sustainability planning includes more robust full cost assessment matrices that identify hidden costs and hedge future risks more effectively than traditional low bid, first cost approaches. Personnel engaged in these activities will become more broadly skilled in the strategic and tactical practices that help inform leadership.

Conclusions
This paper offers perspectives and recommendations designed to promote campuses’ ability to move into the fourth phase. These observations are first directed at developing an integrative vision that can span and unite disparate campus units. It also offered pathways to organizational changes that will enable robust campus implementation of sustainability-related principles and practices.

With respect to integrative vision, sustainability is best articulated by campus leadership as a more pronounced foci across campus academic disciplines in order to engage the breath of interests a campus represents and seed the integration on which sustainability relies. This is no small task but a great opportunity to multiply sustainability’s sweep to the order of magnitude impacts needed to effect change at the campus and, as a result, at societal levels.

Organizational realignment, however modest, would flow from that integrative vision. The reflections above offer observations relating to the manifold benefits of a sustainability performance system that defines and quantifies sustainability’s
influences on campus systems. Developing a culture of sustainability sufficient to break
down organizational barriers to change and integration is also no small task. However,
in a few circumstances where glimmers of the power of this synergy can be seen, they
further inspired to pursuit of the Holy Grail.

In the end, despite some of the daunting challenges discussed above, there is
optimism about trends in sustainability at universities such as UCB and beyond. What
was once nothing more than a buzzword largely associated with groups on the fringes of
power at best is now a guiding principle in some of society’s most successful economic
engines. Similarly, universities that once relegated sustainability to the provinces of
grassroots efforts that were largely ignored at the top are now making serious structural
and philosophical changes in recognition of the challenges and opportunities a
resource-limited world brings.

Indeed, universities are often relied on to serve as the wellspring of innovation and
success, particularly for the sciences and engineering; for centuries they have been
precisely that in nearly any field that has played a role in the remarkable success of
twenty-first century humanity. Now they must embrace and foster a new direction of
innovation: how universities can sustain the success they have achieved. This article
summarizes some of the barriers that are present to that goal, but also some of the
successes already achieved and the opportunities waiting to be seized.

References

Bardaglio, P. and Putman, A. (2009), Boldly Sustainable, National Association of College and
University Business Officers (NACUBO), Washington, DC.

institutions of higher education”, Sustainability at Universities: Opportunities, Challenges
and Trends, W.L. Filho, Frankfurt.

universities”, International Journal of Sustainability in Higher Education, Vol. 6 No. 2,
pp. 134-46.

sustainability-index.com/07_htmle/sustain ability/corpsustaina bility.html (accessed
December 20, 2010).

Ferrer-Balas, D., Adachi, J., Banas, S., Davidson, C.I., Hoshikoshi, A., Mishra, A., Motodoa, Y.,
transformation across seven universities”, International Journal of Sustainability in Higher

No. 5, pp. 42-50.

New York, NY.

editions of its annual college guides and website profiles of schools”, available at: www.

The American Freshman: National Norms for Fall 2008, Higher Education Research
Institute, Los Angeles, CA.


**About the authors**

Kevin J. Krizek is Associate Professor of Planning, Design, and Civil Engineering at the University of Colorado where he also serves as Director of the PhD Program in Design and Planning and as the Education Outreach Coordinator for sustainability-related efforts on campus. Kevin J. Krizek is the corresponding author and can be contacted at: Krizek@colorado.edu

Dave Newport is the Director of the Environmental Center at the University of Colorado at Boulder. Previously he was the Director of the Office of Sustainability at the University of Florida. He also serves as Secretary of the Board of Directors for the Association for the Advancement of Sustainability in Higher Education (AASHE) and is one of three original co-creators of AASHE’s Sustainability Assessment, Tracking and Ratings Systems (STARS), the USA’s first consensus set of sustainability metrics for higher education.

James White is Director of the Institute of Arctic and Alpine Research and Professor of Geological Sciences and Environmental Studies. He has also served as past Co-Director of the Carbon, Climate and Society Initiative, an NSF IGERT graduate training program and Chair of the Polar Research Board of the National Academy of Sciences.

Alan R. Townsend is a Professor at the University of Colorado and Director the Environmental Studies Program. He co-directed CU-Boulder’s Carbon, Climate and Society Initiative, serves on the Ecological Society of America’s Rapid Response Team, was named an Aldo Leopold Leadership Fellow in 2001, and one of the inaugural Google Science Communication Fellows in 2011.

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints
<table>
<thead>
<tr>
<th>TITLE:</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards a campus culture of environmental sustainability Recommendations for a large university</td>
<td>Emerald Insight</td>
</tr>
</tbody>
</table>
Towards a campus culture of environmental sustainability
Recommendations for a large university

Brett L.M. Levy
School of Education, University of Michigan, Ann Arbor, Michigan, USA and
School of Education, University of Wisconsin-Madison, Madison, Wisconsin, USA, and

Robert W. Marans
Institute for Social Research, University of Michigan, Ann Arbor, Michigan, USA

Abstract

Purpose – The authors led an interdisciplinary team that developed recommendations for building a “culture of environmental sustainability” at the University of Michigan (UM), and the purpose of this paper is to provide guidance on how other institutions might promote pro-environmental behaviors on their campuses.

Design/methodology/approach – The authors synthesize research on fostering environmental behavior, analyze how current campus sustainability efforts align with that research, and describe how they developed research-based recommendations to increase environmental sustainability on the UM campus.

Findings – Analyses of prior research suggest that there are five factors that influence individuals’ pro-environment behaviors: knowledge of issues; knowledge of procedures; social incentives; material incentives; and prompts/reminders. Given these factors, UM should pursue three types of activities to support the development of pro-environment behaviors: education, engagement, and assessment.

Practical implications – The specific recommendations in this report are for the University of Michigan. However, other institutions interested in fostering a culture of environmental sustainability might benefit from undertaking similar comprehensive assessments of how they could support community members’ development of pro-environment behavior and knowledge.

Originality/value – The paper builds on prior research to offer a new vision for how to develop a culture of environmental sustainability on a large university campus.

Keywords United States of America, Universities, Sustainability, Environmental management

Paper type Case study

Many colleges and universities have undertaken large-scale environmental sustainability efforts, but few have developed comprehensive plans to address the cultural or behavioral aspects of environmental sustainability on their campuses. Recently the University of Michigan (UM) commissioned a committee to develop recommendations for how campus community members could begin to behave in more environmentally sustainable ways and thus develop a “culture of environmental sustainability.” The purpose of this paper is to describe these recommendations, their theoretical basis, the process by which they were developed, and how they relate to other efforts across the USA. The authors hope that other institutions interested in reducing
their environmental impact will also embark on the process of comprehensively addressing the behavioral aspects of environmental sustainability.

**Background and objectives**

Like many campuses across the USA and elsewhere in the world, the UM has undertaken various efforts to reduce its negative environmental impact. Until recently, however, these initiatives put little emphasis on the cultural or human dimensions of environmental sustainability. In the 1980s, building performance teams surveyed campus buildings and conducted tune-ups to reduce energy consumption. In the 1990s, the university participated in the EPA’s Energy Star Program, which resulted in several energy conservation measures, including replacing incandescent light bulbs with compact fluorescent light bulbs, launching a recycling program, and upgrading water-cooled condensing systems. Also at this time, university staff launched an awareness campaign by placing posters in numerous campus buildings to encourage students and staff to reduce energy usage by wearing heavier clothing during the winter, turning off lights, and conserving energy in various other ways.

The last decade has witnessed an acceleration of energy conservation efforts on campus. In 2003, UM President Mary Sue Coleman established an Environmental Task Force which subsequently recommended that the university conduct and release a sustainability report that would include a set of social, economic, cultural, and aesthetic indicators. Since 2007, several environmental reports with selected indicators have been published annually, but none of these reports contained indicators reflecting the behaviors and thoughts of members of the university community (UM, 2007). Thus, to this point, cultural issues had not been given a central role in the university’s assessment of progress in environmental sustainability.

However, in 2008, President Coleman launched a six-point plan for environmental sustainability, which included environmental reporting, renewable energy, alternative transportation, green purchasing, new construction and renovation projects, and Planet Blue. The latter sought to conserve energy within current buildings and included a study to understand the conservation-related thoughts and actions of faculty, staff, and students in five UM buildings. Findings published in this journal indicated that campus community members often do not practice individual conservation behaviors (leaving office lights on, etc.) but would be willing to accept collective conservation efforts, such as higher building temperatures during summer months or motion-sensor lighting in hallways (Marans and Edelstein, 2010). Further examinations have indicated that when faculty and staff were more aware of UM’s conservation efforts, they were more likely to engage in conservation behaviors (Edelstein et al., 2011). These studies suggest that although conservation behaviors at the university are suboptimal, campus-wide efforts towards environmental sustainability and awareness thereof can strengthen the adoption of such behaviors.

During the fall of 2009, in response to student demand, President Coleman announced the university’s ambitious Sustainability Initiative, which included a strong cultural component. To establish the UM as both a leader and laboratory in environmental sustainability, this initiative aims to influence teaching, research, and operations in order to reduce the institution’s environmental impact. As part of the effort to effect changes in operations, university officials commissioned an integrated assessment (IA). The IA strategy, which has been employed to address a wide array of environmental
challenges (Scavia, 2010), includes both experts (e.g. scientists) and stakeholders (e.g. community members) in designing solutions to large-scale collective problems. Similar to certain environmental management systems employed by business leaders (Daily and Huang, 2001), the IA process aims to maximize input and buy-in in the development of strategic plans.

UM’s IA involved seven teams, and their areas of focus were: energy, buildings, transportation, food, purchasing and recycling, land and water, and culture. Each team was charged with:

- assessing the environmental sustainability of the campus within their domain;
- recommending actions to be taken on campus in that domain; and
- summarizing their findings and recommendations in a report for UM administrators.

To complete these tasks, the teams, which included one faculty lead and five to eight students (including one student lead), met weekly and conducted relevant research. The charge of the authors’ team, the culture team, was to develop research-based recommendations that would promote a “culture of environmental sustainability,” that is, a campus community in which individuals understand major environmental challenges and act to resolve them. Whereas previous research had studied the efforts to promote environmental sustainability in industry through fostering employees’ environmental behavior (Brio et al., 2008; Harris and Crane, 2000; Jabbour et al., 2008; Renwick et al., 2008), the authors’ team examined how a decentralized university could influence not only its tenured and non-tenured employees but also its students. The culture team’s development of research-based recommendations is only one step towards developing a stronger culture of environmental sustainability, but carefully designed plans can be crucial to the widespread adoption of cultural changes (Jabbour, 2010).

Methods
To complete the assessment and recommendations, the authors’ team of eight students and one faculty member collected and analyzed three types of information:

1. research and theory on environmental behavior and psychology;
2. efforts to build a culture of sustainability on other campuses; and
3. the status of the culture of sustainability on our campus.

To develop a theoretical understanding of environmental behavior, the team consulted with academics on campus, reviewed and analyzed relevant literature, and discussed their ideas. Developing an understanding of current campus sustainability efforts required our team members to review campus sustainability reports from 70 colleges and universities from around the country. In addition, to learn about efforts on our own campus, the authors assigned one culture team member to attend the weekly meetings of each of the other six teams. By analyzing and discussing findings at the team’s weekly meetings, the group developed recommendations that aligned with its theoretical understandings of human behavior change. The team’s analyses enabled them to make recommendations that the authors believe will be useful to leaders at UM and beyond.
Theoretical foundations

Over the last few decades, empirical studies have shown that several factors support environmentally responsible behavior, such as recycling or energy conservation. Among these are:

- understanding challenges;
- procedural knowledge;
- prompts;
- social motives; and
- material incentives.

Any one of these factors alone may be sufficient to influence some individuals to act in environmentally responsible ways, but because humans are motivated differently across time, combinations thereof are often most effective in sustaining environmentally responsible behavior (Abrahamse et al., 2005; Parnell and Larsen, 2005).

First, evidence indicates that understanding environmental issues positively influences one’s likelihood of undertaking environmentally responsible actions. In their seminal meta-analysis of behavioral research, Hines et al. (1986-1987) found 17 studies indicating that individuals are more likely to act in environmentally responsible ways when they understand environmental problems and/or their potential solutions. Meanwhile, De young’s (2000) review suggests that individuals make more environmentally responsible choices when they feel competent – and thus have the know-how – to successfully undertake such actions. These two types of knowledge – declarative (knowledge of the problem) and procedural (how to address the problem) – are both important for effecting behavior change (Ramsey and Rickson, 1977).

Although understanding environmental issues and how to address them is a vital step in fostering pro-environmental behaviors, it is insufficient for sustaining such behaviors over an extended period of time. Individuals often need to be reminded to behave in an environmentally responsible manner. Numerous studies have documented the power of providing such reminders or prompts. For example, Katzev and Mishima (1992) found that when signs about recycling were posted near waste receptacles in a college mail room, paper recycling increased. Likewise, Aronson and O’Leary (1982-1983) found that when signs promoting water conservation were posted in a shower room, individuals decreased their water usage. Ayotte and her colleagues (2006) found that small prompts on light switches and computers succeeded in encouraging energy conservation on their college campus. Thus, if individuals possess knowledge but are still not undertaking environmentally responsible behaviors, deploying prompts can help to effect change.

Evidence also indicates that another powerful motivator for behavior change is social motives, including perceived social norms and stated commitments (McMakin, 2002). Studies show that when individuals commit to acting in an environmentally responsible way, they tend to keep their word. For example, Katzev and Pardini (1987) found that when community members committed to recycling their newspapers, they were more likely to undertake these activities than those who received material rewards for recycling. Also, in their meta-analysis, Hines et al. found six studies documenting a strong relationship between individuals’ written commitments to act environmentally and their actions. This research suggests that people strive to align their actions with their words.
Perceived social norms can also have a large effect on an individual's behavior (Cialdini, 2003). In Fishbein and Ajzen's (2010) theory of reasoned action, an individual's perception of social norms is one of the strongest predictors of behavior: when someone perceives something as a “normal” way of acting, that individual is more likely to pursue that behavior. Various studies have found that when individuals work together towards environmental goals – thus creating norms of pro-environment behaviors, these individuals begin to behave in more environmentally sustainable ways (Hopper and Nielsen, 1991). For instance, Staats et al. (2004) found that when people worked with neighbors to discuss ways to reduce their energy consumption and trash generation, they were successful in achieving these goals. Likewise, De Young (1989-1990) found that when university staff members were given responsibility for monitoring their buildings’ energy usage and promoting energy conservation (on a voluntary basis), energy use in their building areas declined substantially. Also, in a study of small-scale sustainability initiatives, Irvine and Kaplan (2001) found that individuals were willing to change their unsustainable behaviors if community members asked them to do so and explained the rationale.

Although social incentives, prompts, and awareness seem to be the most powerful means of promoting sustained environmentally responsible behaviors, there is some evidence that material incentives such as cash or gifts can play a role, as well (Geller, 1989). These should be employed cautiously, however, because research suggests that behavior changes motivated by material rewards will last only as long as the reward is issued. Katzev and Pardini (1987) for example, found that households recycled regularly while receiving a material reward but substantially reduced their recycling frequency once that reward was removed. Likewise, Ryan and Deci (2000) found that providing material incentives for individuals' performance of certain tasks can undermine their intrinsic motivation to complete those tasks. However, if the material incentive is modest and carefully targeted to encourage specific behaviors, its use may work well when paired with other strategies to jump-start behavior change in the short-run.

Human decision-making is motivated by various factors, so fostering a culture of sustainability on a large university campus may require a variety of approaches. Because of the unique circumstances in each community, some scholars have proposed that each intervention be treated as a small-scale experiment (Irvine and Kaplan, 2001). Nonetheless, as the culture team designed their recommendations, they considered the central principles evident in prior research on environmental behavior and examined efforts to promote sustainability on campuses nationwide.

**Efforts to promote a culture of sustainability on campuses nationwide**

Numerous colleges and universities throughout the USA have undertaken efforts to promote a culture of sustainability on their campuses. Many of these efforts involve strategies that are supported by research on environmental behavior and psychology. In this section, the authors describe how various efforts nationwide (including those at UM) relate to this research.

**Knowledge of issues**

Many colleges and universities have promoted sustainable behavior by supporting students’ increased understanding of major environmental issues and how to address them. Most institutions have long offered students opportunities to learn about these
issues through coursework in engineering, natural and social sciences, and the like, but now schools are increasingly integrating such learning more into individuals’ regular routines or trajectories. For example, at a number of institutions, including the University of Georgia, Bucknell University, and Furman College, students are required to complete a course in environmental issues in order to graduate. In addition, at many colleges and universities, campus community members are able to learn about significant environmental issues through peer education programs (e.g. University of Maryland), training in sustainable building design for employees (e.g. University of California, Berkeley, and University of Pennsylvania), and outreach teams of innovative engineering projects, like solar cars (e.g. UM, University of Waterloo) (UC Berkeley, 2010). Thus, there have been an increasing number of opportunities for students to learn about major environmental issues on their campuses. UM offers many options, but as of this writing, no coursework or activities in environmental sustainability are required for graduation.

Procedural knowledge
Students, staff, and faculty around the USA have a variety of opportunities to develop procedural knowledge on a range on environmental issues – both directly and indirectly. Most prevalent are campus recycling programs, which often include literature explaining the methods and rationale for recycling materials. During the winter of 2011, about 630 colleges and universities participated in Recyclemania (2011), a nationwide recycling competition that includes students, faculty, and staff. In addition to recycling, campus community members can learn other methods for conserving resources while on campus through green orientation programs (e.g. University of Maryland), guides on greening one’s workplace (e.g. University of Vermont, Harvard University), and programs for purchasing green office and cleaning supplies (e.g. California Institute of Technology, Princeton University). Also, some colleges and universities indirectly teach their campus community members about environmentally sustainable procedures with descriptive displays of their solar panels and sustainable building practices. Whereas our own campus does the latter, it has no solar panels on public display. UM does have recycling available in all campus buildings and provides written information for freshmen, but it has not developed programs to prepare new students or employees to practice environmentally sustainable behaviors on campus.

Social incentives
There are also many programs that allow campus community members to become socially engaged with others in environmental learning and action, and these programs may support the development of social norms for environmentally sustainable behaviors. Needless to say, most institutions have numerous volunteer organizations in which students can opt to become collectively involved in various environmental issues and actions. In addition, several schools have initiated programs that organize students and employees to positively influence their peers as “sustainability ambassadors” (e.g. University of Chicago, Massachusetts Institute of Technology), “conservation advocates” (e.g. University of Virginia), or “eco-reps” (e.g. Dartmouth College). Yet other colleges and universities have living and learning residential communities for students (e.g. Earth House at Pennsylvania State University), gather pledges for energy saving goals (e.g. University of Wisconsin, Madison), and employ
“recycling monitors” (e.g. Bucknell University). The UM has about a dozen student environmental organizations, but it currently has few other programs that include social incentives for pro-environment behaviors, so there are many opportunities for change in this domain.

Material incentives
Many institutions have promoted environmental sustainability via material incentives. This has been especially prevalent in the domain of transportation. For example, it is common practice for schools to offer students free bus ridership (e.g. University of Texas), and some offer free bike rentals. Claremont McKenna College even pays individuals who bike, walk, or carpool to campus whereas other universities offer bike share programs (e.g. New York University). To encourage electricity conservation, various schools hold energy reduction competitions between dorms (e.g. Notre Dame University) and lightbulb exchanges through which campus community members can trade their incandescent bulbs for more energy efficient bulbs (e.g. University of California, Los Angeles). Also, some institutions have “green funds” through which students and employees can secure funding for environmental improvement projects (e.g. Duke University). Meanwhile, some campus administrators have required building contractors to abide by national Leadership in Energy and Environmental Design (LEED) standards in new construction and renovation of campus buildings (e.g. Princeton University, Cornell University). In these areas, the UM has been quite active, providing free bus transportation to the campus community, requiring large new buildings to be LEED-certified, and administering small grants for environmental projects (through the Graham Institute).

Prompts
While the aforementioned programs specifically support campus community members’ pro-environment issue knowledge, procedural knowledge, social incentives, and material incentives, many of these programs have prompts integrated into their work. For example, recycling and energy conservation programs on our campus and elsewhere commonly involve extensive signage (often physically close to the location of the decision) to remind individuals to enact specific behaviors, such as turning off lights when leaving a room. However, given humans’ capacity to behave unsustainably in the absence of such prompts, it is important for colleges and universities to include these in their plans to develop cultures of environmental sustainability.

Looking back, moving forward
Indeed there are many outstanding efforts nationwide to reduce the environmental impact of university life and to promote a culture of sustainability. However, the culture team’s review of activities at over 70 campuses indicated that these efforts to support cultural change tend to lack two central features:

1. comprehensiveness; and
2. systematically measured outcomes.

The team found little documentation indicating the extent to which changes in recycled materials, energy use, transportation costs, and/or organic food consumption were, at least in part, attributable to changes in the behaviors of students, staff, or faculty.
Nor was there any evidence showing that the actions taken at the schools had shifted the mindsets of campus community members. Thus, in our recommendations for the UM campus, the culture team suggested a comprehensive, research-based approach to shifting cultural norms as well as systematically monitoring our progress towards developing a culture of sustainability.

Practical recommendations

Given prior research on supporting the development of pro-environment behaviors (as described above), the team developed recommendations in three areas:

1. Education and training;
2. Engagement; and
3. Assessing and monitoring.

Whereas the educational and engagement recommendations are intended to help campus community members to develop knowledge and behaviors that are aligned to environmental sustainability, the latter set of recommendations is intended to gauge the short-term and long-term impact of these and other efforts at our university.

Education and training

The culture team recommended several types of education and training for campus community members. First, UM students and employees should develop knowledge of environmental issues and procedures by completing an online tutorial in basic environmental knowledge. This could be similar to the AlcoholEdu tutorial for students or the PEERRS certification for faculty and research staff (for IRB-related issues), which provide background and practical information in their respective areas. A tutorial that focuses on environmental sustainability could inform campus community members about the rationale and methods for recycling, traveling by bus, and conserving electricity, among other behaviors. Second, the university should provide numerous opportunities for faculty to learn how issues of environmental sustainability can be integrated into their courses; including luncheon workshops, multi-day institutes, and a central web site through which faculty can share curricula and syllabi. Once there are a sufficient number of courses with substantial sustainability content, we recommended requiring every student to complete at least one course emphasizing environmental sustainability. Through the development and enactment of such courses, both students and faculty could develop greater knowledge of environmental issues.

In addition, the team recommended that the UM Housing Office work with the Office of Campus Sustainability and the School of Education develop and implement training programs in environmentally sustainable living for residential advisors and specialized “eco-reps” for each residential hall floor. Eco-reps would be responsible for teaching others on their floors about the importance of environmental issues and demonstrate how to live more sustainably – thus supporting social incentives for environmentally sustainable living. Finally, the culture team recommended that Procurement Services work with the Office of Campus Sustainability to develop a staff training program to support environmentally sustainable purchasing of products such as recyclable paper, cleaning supplies, soy-based inks, and the like. Currently over 4,000 employees purchase products through university accounts, and many do so through one campus web site which could be adjusted to easily support environmentally sustainable purchasing.
Through appropriate training programs, employees could develop knowledge of environmentally sustainable processes.

**Engagement**

The culture team recommended that UM establish organizational arrangements to support the increased active engagement of students, faculty, and staff in improving the sustainability of our campus community. To do this, the UM should hire a full-time cultural liaison to regularly solicit conservation-minded ideas from students, faculty, and staff; evaluate their ideas; and help bring feasible ideas to fruition by communicating with administrators and providing organizational support and resources. Many individuals throughout our campus have helpful ideas about how to increase the effectiveness of recycling programs, decrease consumption of materials and energy, and engage their peers and colleagues in such activities. With adequate support, a cultural liaison could productively harness new ideas for improving community members’ environmental behavior – and could also lead to small-scale studies of these ideas.

In addition, the team recommended that the provost require each academic unit to develop a sustainability plan for its operations and that employees of those units assume responsibility for implementing the plan; employee evaluations should then be related to their work in this area. Meanwhile, the Office of Campus Sustainability should design competitions designed to provide fun, interactive solutions to the challenge of increasing sustainability practices on campus. These could involve building or floor competitions to reduce waste, electricity use, or driving, and should be accompanied by community-created information campaigns to encourage broad participation and procedural knowledge.

To reduce the amount of unnecessary equipment and materials on campus (e.g. printers, copiers), the culture team recommended that the Office of Campus Sustainability design a system of incentives to encourage offices to share equipment. Finally, to address the large amount of waste and energy used in laboratories, the team recommended that the Office of Campus Sustainability work collaboratively with relevant schools and departments, such as the medical school and the chemistry department. This should be an arena in which labs throughout the campus can set attainable sustainability goals and share ideas about how to achieve them. Through the above activities, members of the campus community can develop knowledge of various environmentally responsible processes and also experience social incentives to employ such knowledge. Also, depending on the employee- or student-developed ideas, there may be substantial material incentives to support the development of more sustainable behaviors.

**Assessing and monitoring**

To measure our progress in building a campus culture of sustainability, the culture team recommended that UM carefully assess and monitor various aspects of this culture. The university should support the development of a set of cultural metrics or indicators aimed at such measurement. These indicators – which should be developed through focus groups with the campus community and pilot-testing – could include aspects of community members’ (including alumni) knowledge, behavior, and engagement and would provide useful information to UM about how it might improve its efforts to foster a culture of sustainability. In addition, the administration should report these indicators publically as part of the UM’s annual sustainability report.
Furthermore, the culture team recommended that the UM undertake several small-scale studies to assess the effects that certain sustainability interventions have on individuals. For example, if the cultural liaison oversees the development of a composting program or if Planet Blue tries to reduce energy consumption in several buildings, the university should examine the effects that such programs have on individuals’ environmental behavior, knowledge, and/or attitudes. At a more basic level, such studies could determine how much of dorm composting or energy savings is attributable to behavioral change. Furthermore, UM should examine potential barriers to the development of pro-environment behaviors by administering periodic surveys to relevant community members, such as employee and students who drive to campus and do not take advantage of the bus system. Finally, to assess the environmental behavior of occupants of new and renovated buildings, UM should conduct post-occupancy evaluations (POE), an established procedure in architectural research that can determine the extent to which design objectives have been met (Table I). Such assessments would provide useful information about the extent to which the university’s efforts to create a culture of environmental sustainability succeed.

Summary and conclusion
Throughout the USA, many colleges and universities have undertaken serious efforts to reduce their negative environmental impact while also reducing their energy costs. At many institutions, the efforts to influence individuals’ behavior have often not been prioritized as highly as technical adjustments. When there have been efforts to influence the cultural aspects of environmental sustainability, they have been neither comprehensive nor carefully assessed. The UM’s recent initial efforts to address the cultural and behavioral aspects of environmental sustainability thus represent a unique approach to addressing the environmental impact of campus communities.

In this paper, the authors described how their team at the UM developed research-based recommendations for developing – and monitoring progress towards developing – a culture of environmental sustainability among UM students, faculty, and staff. Whereas the culture team recommended education and training programs to strengthen campus community members’ issue-based and procedural knowledge, they recommended specific engagement strategies for both building campus community members’ knowledge and provide social and material incentives to behave in

<table>
<thead>
<tr>
<th>Method/goal</th>
<th>Issue knowledge</th>
<th>Procedural knowledge</th>
<th>Prompts</th>
<th>Social incentives</th>
<th>Material incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education/training</td>
<td>Coursework; eco-certification; faculty development</td>
<td>Eco-reps; eco-certification; procurement training</td>
<td>Cultural liaison; competitions; unit initiatives</td>
<td>Cultural liaison; competitions; unit initiatives</td>
<td>Competitions; unit initiatives</td>
</tr>
<tr>
<td>Engagement</td>
<td></td>
<td>Cultural liaison</td>
<td></td>
<td>Cultural indicators; POE</td>
<td>Cultural indicators; barrier surveys</td>
</tr>
<tr>
<td>Assessment/monitoring</td>
<td>Cultural indicators; alumni survey</td>
<td>Cultural indicators; alumni survey; POE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table I. Summary recommendations for fostering a campus culture of sustainability, categorized by method and goal
environmentally sustainable ways (Table I). Meanwhile, the culture team strongly recommended that the UM study the impact of the interventions it chooses to implement by designing, piloting, and employing assessments to measure cultural change. The authors expect that the UM will pursue several of the team’s recommendations as it selects among the numerous recommendations (in various categories, such as food purchasing and new construction policies) of the entire IA.

When institutions consider how to become more environmentally sustainable, it is important that they consider the cultural aspects of environmental sustainability. Whereas technical adjustments can help to reduce energy costs in the short term, widespread awareness of and engagement in environmental sustainability may lead to ongoing progress towards reducing waste, energy use, and resource depletion. The authors believe that the work of the culture team at the UM can serve as a guide for how institutions interested in fostering a culture of environmental sustainability might approach this potential transition. Because of their recommendations’ grounding in research, these or similar recommendations may be useful at other institutions of higher learning or perhaps in other educational or corporate contexts. Such institutions must first consider their existing capacity, needs, and programs, and then can explore how to leverage those resources to support cultural change. If institutions worldwide were to undertake this cultural challenge, we may witness the vital long-term progress necessary for environmental sustainability.

References


Further reading


Sustainable Endowments Institute (2008), College Sustainability Report Card 2009, Sustainable Endowments Institute, Cambridge, MA.


About the authors

Brett L.M. Levy recently earned his doctorate in Educational Studies at the University of Michigan and is currently a visiting Assistant Professor at the University of Wisconsin-Madison. His research examines how educational programs and institutions can support individuals’ and communities’ environmental and civic engagement, and he has worked on environmental and civic education programs in Michigan, California and other parts of the USA. Brett L.M. Levy is the corresponding author and can be contacted at: bmlevy@wisc.edu

Dr Robert W. Marans is a Research Professor at the Institute for Social Research and a Professor Emeritus of Architecture and Urban Planning in the Taubman College of Architecture and Urban Planning at the University of Michigan. He is the author or co-author of eight books and more than 100 articles and technical reports. He currently serves on the editorial boards of several professional journals and has lectured extensively throughout the USA and in Europe, Asia, South Africa, South America, Australia, and the Middle East.

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints
Toward systemic campus sustainability: gauging dimensions of sustainable development via a motivational and perception-based approach

SOURCE

Springer Link
Toward systemic campus sustainability: gauging dimensions of sustainable development via a motivational and perception-based approach

Sharmila Rani Moganadas · Victor Corral-Verdugo · Santhi Ramanathan

Received: 8 November 2012 / Accepted: 13 March 2013
© Springer Science+Business Media Dordrecht 2013

Abstract Universities have long borne an influential role in sustainability. Nonetheless, the affinity toward eclectic and piecemeal practices has been addressed as oxymoron to the essence of sustainable development, and the need to hone campus members’ buy-in is credited to be cardinal for systemic transformation. Major attributes for systemic campus sustainability are identified, incorporated, and proposed via a conceptual model. Those attributes are key sustainable development areas as well as perception and motivation on the topics that must be taken into consideration by universities to be able to adhere to a more pragmatic and inclusive sustainable development. Thus, the central intent of the authors is to offer a mechanism which may facilitate as well as elevate systemic campus sustainability. An extensive review of the literature in the area of sustainability, perception, and motivation is conducted, which includes articles, journals, conference proceedings, university reports, books, and materials from websites. By extracting and integrating crucial constituents of sustainable development from various studies, this paper contributes to the existing literature on sustainable development providing an input to the implementation of systemic campus sustainability.

Keywords Sustainable development · Systemic campus sustainability · Key dimensions · Perceived importance · Perceived implementation · Motivation

S. R. Moganadas (✉)
Centre for Diploma Programme, Multimedia University, Jalan Ayer Keroh Lama, 75450 Melaka, Malaysia
e-mail: sharmila.rani@mmu.edu.my

V. Corral-Verdugo
Department of Psychology, University of Sonora, Luis Encinas y Rosales S/N, 83000 Hermosillo, Sonora, Mexico

S. Ramanathan
Faculty of Business, Multimedia University, Jalan Ayer Keroh Lama, 75450 Melaka, Malaysia

Published online: 27 March 2013
1 Introduction

The advent of civilization has streaked an impetus in *Homo sapiens* to interact with and gradually exploit every possible spring on earth to survive. However, being in the realm of increasing astuteness and egocentrism, the world hitherto encountered a quantum transformation that unleashed numerous benefits to mankind, which transcend the basic purpose of survival. Ironically, some scientists and scholars view and critique human evolution from a different perspective. According to Walsh (2012, p. 60–61), the human race is currently living in an epoch called *Anthropocene*, or *the age of man*, that demands a dramatic change toward environmentalism. The *Planetary Phase of Civilization* hypothesized “growing human population and economies inevitably must butt against the resource limits of a finite planet” (Raskin et al. 2002, p. 6). At the root of these diverse sources, there is an underpinning consensus pertinent to the impact of an omnipresent human domination on the limited resources of the earth (Walsh 2012; Raskin et al. 2002). This can also be described in the milieu of a fundamental economic problem or *scarcity*—human infinite wants hitting up against finite resources (Arnold 2008), which will be reflected in higher prices that reduce demand (Raskin et al. 2002). Consequently, resource scarcity poses risks that manifest as economic and social problems, such as war and conflict, especially for poor people and fragile states in the world (Evans 2010).

Consistently, Morrigan (2010) encapsulates the present global shifts in a broader perspective as in the following excerpt from the article *Peak Energy, Climate Change, and the Collapse of Global Civilization*:

> The world is beginning a rapid and volatile transition: currency and trade wars; deteriorating wars in the Middle East and elsewhere; countless regional and international conflicts and coups; rapidly shifting and volatile geopolitics; the mobilization of extremist movements; the decline of the West and East; exponential population and economic growth; soaring food prices; increasing natural resource scarcity; energy shortages; accelerating rates of extinction; and accelerating environmental degradation and climate change (Morrigan 2010, p. 221).

The preceding transition imposes caveats that impel the human race to learn to live within their means (Morrigan 2010). Indeed, such enlightenment is deemed paramount for the survival of the future generation. This has ignited an outcry for a more just and sustainable world. The call for such transformation has set forth trajectories for an array of pioneer efforts, which include promoting sustainable development thinking via a World Conservation Strategy (1980), the *Brundtland Report* (1987), and the United Nations Conference on Environment and Development in Rio (1992), along with national government planning, wider engagement from business leaders as well as non-governmental organizations of all kinds (Adams 2006, p. 1). Henceforth, the tipping point for sustainable development in terms of its concepts, goals, and researches that was grounded in the pillars of triple bottom line—economy, society, and environment—was evident. More recently, the term “green economy” has been linked closely to sustainable development that aims at improving human well-being without undermining the resource base that current and future generations depend on for their livelihoods (Ababa 2011). In spite of its broad and pliable interpretation, this paper articulates the inherent makeup of sustainable development as in the following analogy:

> A lifelong journey (sustainability) that encompasses challenging pathways (environment, economic and social factors) that entail mutual discovery, cautiousness and infinite allegiance from the explorers (humankind).
Eventually, the reverberation of sustainability kindled a plethora of practices across nations, which include incorporation of stringent policies and succinct guidelines to permeate sustainable embracement among citizens. The emergence of eco-efficient and socially responsible approaches among businesses and consumers is also apparent, including green supply chain management, green marketing, paperless interaction, recycling, green purchasing, healthier lifestyle, and many more.

2 Research background

Notwithstanding the endemic and explicit adoption of sustainability, some scholars argue on its inherent aspects which are somehow obscure and heterogeneous. In this facet, Kates et al. (2005) point out that, due to its openness to interpretation, the meaning and importance of sustainability can be easily altered and construed differently by nations, organizations, and people from all walks of life according to their own circumstances. For instance, a recent McKinsey Global Survey (2010) reveals that most respondents (72%) report that their companies incorporate sustainability to maintain or improve corporate reputation and brand. Other reasons include meeting consumers’ expectations; strengthening competitive position; regulatory risk; pressure from non-governmental organizations (NGOs), and so on. These reasons are heterogeneous, indeed, but share a common factor: They look at external sources of reward (i.e., beyond the individual or the organization) in order to help people or institutions to maintain a pro-environmental effort.

Although these reasons somewhat contribute to the implementation of sustainability, a more “inborn” approach is absent for a promising sustainable future. In view of this, Corral-Verdugo (2012) accentuates a positive and intrinsic approach as the emerging strategy for sustainable implementation in the near future. Such approach enhances the value of internal positive consequences (satisfaction, wellbeing, happiness, self-efficacy) that derive “naturally” from acting pro-environmentally, as factors that incite and maintain sustainable practices among citizens and societies. Unfortunately, the emphasis on the effect of external drivers (status, money savings, legal and social pressure, reputation, etc.) of behaving sustainably predominates in, both, organizational and academic sectors. The differences between these two approaches are not marginal. Although the external consequences have proved to influence the effort toward a more sustainable way of living (Lehman and Geller 2004), they are accompanied by negative side effects or drawbacks: The individual or organization receiving those consequences depends on external sources in obtaining the reward; that is, if there is no available source, the benefit does not appear. One more problem is that if the extrinsic consequence is removed, the sustainable behavior is extinguished (Lehman and Geller 2004). In addition, the events that are used as extrinsic consequences are more related to anti-ecological (Corral-Verdugo 2010) or antisocial (Gifford 2007) behaviors than to sustainable actions. For instance, the provision of material rewards like money is rather an instigator of consumerism than a predictor of frugality or efficiency—two sustainable facets—while social status reinforces inequity rather than a fair distribution of benefits (i.e., equity, one more sustainable facet). Likewise, it has been found that materialistic people—those who are prone to experimenting extrinsic consequences—are less inclined to environmental conservation and more oriented to ambition (money, power) and the exploitation of natural resources (Crompton and Kasser 2009). Thus, a strategy more focused on (or at least more balanced toward) the intrinsic consequences of sustainability is required.
As such, it is integral for all organizations to partake the efforts to ameliorate current sustainable practices and higher education institutions, particularly universities are no exception. Universities form a knowledge platform for the labor market; they contribute to societal development (UNESCO 2005) and are capable of offering solutions for future sustainability (Jones et al. 2008). Further, universities are considered to be the most appropriate leaders for sustainable development (Endut et al. 2011) as they bear a profound moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future (Cortese 2003).

The inception of sustainability in higher education is marked as early as in the 1970s with the Stockholm Conference on the Human Environment (1972), being the first to formally identify the role of higher education in progressing sustainable development at the international level (Tilbury 2011). This verge has gradually evolved into more international declarations till to date that incessantly bring to light the visible commitment and role of higher education in sustainability. In response to such pronouncements, many universities and colleges throughout the world have embarked on various sustainable efforts. Nevertheless, most scholars view such efforts as preoccupied in the scope of merely “greening the campuses” (Endut et al. 2011) via grassroots activities such as developing low-carbon buildings, minimizing waste, and energy consumption as well as generating sustainable goods and services (Tilbury 2011). Most of those efforts focus on the external consequences (prestige, reputation, money, material savings, etc.) that universities and their members get from their pro-environmental commitment to the detriment of the intrinsic benefits that have proved to maintain sustainable behaviors in a more “natural” and sustained way, as Corral-Verdugo (2012) establishes.

In a similar vein, Sharp (2002) opines that universities’ responses toward sustainability are commonly based on rationality-limiting characteristics. These focus on forming visible structural and human resource frameworks to carry out sustainable-related efforts and decision-making. Hence, the excessive focus on ad hoc structures and well-bounded projects may result in members of the universities losing sight of the inherent and long-term focus, which is to institutionalize a university-wide commitment toward sustainability—the systemic transformation (Sharp 2002). Furthermore, Saadatian et al. (2011a) point out that regardless of its multi-faceted nature, the implementation of sustainable development plans and efforts in universities is more inclined toward biophysical environmental aspects compared to other (i.e., social, economic) components of sustainability. Simply put, there is lack of concerted and systemic implementation within universities. The growing number of such near-sighted implementations may upshot in sustainability myopia, which occurs when sustainable development loses its relevance as a strategic vision (Winn and Kirchgeorg 2005).

Apparently, the effort to identify key dimensions of sustainable development serves as a threshold for a systemic implementation (OECD 2008). On the other hand, Fairfield et al. (2011) affirm that the extent to which an organization implements specific sustainability practices will be strongly driven by the importance it places on various sustainability issues as vital to its identity and success. Thus, gauging the awareness, involvement and interest (Velazquez et al. 2005) of the individual employee on the initiatives undertaken by their organizations seems pivotal. For example, an employee in an organization may be required to adopt several sustainable practices, such as recycling; however, to what extent such activity is important to him or her? What are the positive consequences he or she anticipates to obtain from acting sustainably? Different people may possess different views, motives, and priorities on sustainability. Understanding these differences is imperative to persuade and mold the intended behaviors among the organizational members toward
attaining systemic sustainability (Sharp 2002; Guffey and Mccartney 2008; Dyball 2010; Laughland and Bansal 2011).

In view of this, Garland et al. (2009) postulate the challenges and opportunities for universities are to understand the requirements of sustainable development and the transformation that is required. After this, the identification of the (individual, organizational) benefits of such development could be achieved. Hence, the key question is what are the requirements and expected benefits for universities to achieve a systemic sustainable transformation? First, the investigation of comprehensive key dimensions of sustainable development seems paramount to encourage a holistic approach (OECD 2008). However, buffered by assorted frameworks and terminologies, the explanation of sustainable development key dimensions has received little attention in the literature. Second, there is a need to examine employees’ perception and motivation to gauge individual stance (Chai et al. 2006; Eccles and Wigfield 2002) toward sustainable developments initiatives. Nonetheless, most universities are struggling to engage the core members of their institutions into sustainability terrain (Tilbury 2011), and studies pertinent to examining perception and motivation in the area of sustainability are dearth, particularly in higher education.

Furthermore, Feldstein and Glasgow (2008) highlight that the absence of a comprehensive and practical conceptual framework that integrates the key features and predictors of sustainability imposes barriers to successful implementation. This paper, therefore, aims to bridge this gap with twofold purpose, using a preliminary approach: (1) conducting a review of systemic campus sustainability, which includes the key dimensions of sustainable development as well as the roles of perception and motivation in the sustainability movement and (2) proposing a conceptual model to examine systemic campus sustainability via motives to engage in sustainable practices along with the perceived importance/implementation of the sustainable development key dimensions. The following section describes campus sustainability and highlights the necessary provisions for achieving systemic change in campus sustainability.

### 3 Systemic campus sustainability

Most often, adoption of sustainable practices in universities is acknowledged as campus sustainability. This metaphor is further expounded as activities of all affiliates of higher education toward sustainability (Henson et al. 2007). However, the term “campus sustainability” lacks a common and generally accepted definition (Sustainable Campus Information Center). The description of campus sustainability varies according to different sources as highlighted in Table 1.

Obviously, the underlying principles of campus sustainability descriptions (in Table 1) surround the three general aspects of sustainability—economy, environment, and society. Furthermore, the employee, student, and operations components are included. In their model for campus sustainability, Velazquez et al. (2006) further emphasize on the inclusion of a sustainable-related vision, mission, university-wide sustainability committee, and strategies such as education, research, outreach and partnership, and sustainability on campus for fostering sustainability. Nevertheless, for a systemic campus sustainability makeover, the existing viewpoints of campus sustainability somewhat need to take account of the systemic elements. Systemic change has been described by some scholars as in Table 2.
The above sources of systemic change clearly denote the importance of identifying and connecting all components of an organization to achieve a desired outcome. In the ambit of campus sustainability, its extant is evident in the policies, strategies, and enforcements of most universities (as described in Table 1). Still, the establishment of systemic campus sustainability asks for efforts beyond these mechanisms. Applying descriptions in Table 2, the authors presuppose that systemic campus sustainability requires the amalgamation of sustainability ethos into all internal and external components of a university, unveiling a symbiotic obligation and support toward sustainability goals. In addition, the inclusion of all aspects of sustainable development (i.e., natural, human, social, manufactured, and financial capitals) into the implementation warrants a comprehensive approach (Johnston 2007; OECD 2008; Drexhage and Murphy 2010). Correspondingly, Sharp (2002) infers systemic change in campus sustainability as successfully institutionalizing a university-wide commitment that is crucial to support sustainable campus operations. In this vein, the author further avers the need to strike a pragmatic balance between appearing rational (i.e., strategic plans and business models) and operating irrationally (i.e., adaptive and network of trust). Such leverage can be gained via experiential learning of effective approaches in leading green campus initiatives (i.e., management support; effective coordination; planning and decision-making processes; staff and student participation; information systems, etc.) and deepening understanding of the nature of universities (how university strategies, systems, and people work and respond to change) (Sharp 2002). Also, in attaining systemic campus–earth system relationship, Sharp (2005) asserts to integrate accountability for earth

Table 1  Descriptions of campus sustainability

<table>
<thead>
<tr>
<th>Description</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit recognition of the institution’s central role in the degradation or support of the ecological, cultural, and economic fiber of our planet and our species</td>
<td>Shriberg (2002, pp. 67)</td>
</tr>
<tr>
<td>A strategy to improve the sustainable performance within the University and increase awareness among employees and students about sustainability and related issues</td>
<td>Environmental and Social Justice Action Research Group Website</td>
</tr>
<tr>
<td>Campus characterized by social and economic operations, which promote the long-term survival of the environment and our own social structures</td>
<td>Abd Razak et al. (2011)</td>
</tr>
</tbody>
</table>

Table 2  Descriptions of systemic change

<table>
<thead>
<tr>
<th>Description</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>A comprehensive, fundamental change in one aspect of a system that requires fundamental changes in other aspects in order for it to be successful</td>
<td>Reigeluth and Garfinkle (1994, p. 3)</td>
</tr>
<tr>
<td>Recognizes the interrelationships and interdependencies</td>
<td>Jenlink et al. (1998)</td>
</tr>
<tr>
<td>(1) among the parts of the educational system, with the consequence that desired changes in one part of the system must be accompanied by changes in other parts that are necessary to support those desired changes, and (2) between the educational system and its community, including parents, employers, social service agencies, religious organizations, and much more, with the consequence that all those stakeholders are given active ownership over the change effort</td>
<td></td>
</tr>
</tbody>
</table>
system impacts into the institutional drivers, which encompass top management, organizational culture, information systems, decision-making processes, human resources, campus planning and building design, and operational activities. Akin to these insights, this paper concludes that it is necessary to address the specific dimensions of sustainable development and highlight the reciprocal relations and accountability of all campus components including employees, students, operations as well as stakeholders. This paper, therefore, conceives systemic campus sustainability as:

The capacity of an academic institution to explicitly recognize the responsibilities, advocate participation and integrate the functions of all its human resources, students, activities, processes and stakeholders toward conserving and regenerating natural, human, social, manufactured and financial capitals for a continuous future.

Apparently, such systemic approach is underway in several universities throughout the globe. Some universities have even gained notable recognition for adopting a well-balanced practice among scholars such as Linkoping University (Sweden), Technical University of Catalonia (Spain) (Ferrer-Balas et al. 2008), and University of Gothenburg (Sweden) (Krizek et al. 2012). However, lack of emphasis on accentuating the cornerstones for holistic implementation, such as clearly stating the uniform sustainable practices and assessing campus members’ interest, motivation (especially the intrinsic one), and participation (Sharp 2002; Dyball 2010) tend to portray intra-campus and inter-campuses cacophony that is less likely to authenticate systemic transformation of university-wide sustainability. The following segment, therefore, expounds the key sustainable development dimensions and its relevance to campus sustainability.

4 Key dimensions of sustainable development for universities

Over the past two decades, sustainable development has become a non-eccentric and immensely embraced notion among governments, organizations, and communities throughout the world. Despite this immersion, studies have proven that core changes toward sustainable development have not been met due to confusions implicit in the concept (Sjerps-Jones 2007) and difficulty in designing the move from theory to practice (Matthews and Hammill 2009). Similarly, campus sustainable practices are palpable in numerous studies and world sustainable reports. However, their findings reveal that there is no common pattern of sustainable practices and concepts among universities across countries (Ferrer-Balas et al. 2008; Velazquez et al. 2005). This imposes a critical need to comprehend the meaning and essentials of sustainable development to lay out a strong foundation in its implementation. In this sense, Drexhage and Murphy (2010, p. 6) describe that

Sustainable development embodies integration, and understanding and acting on the complex interconnections that exist between the environment, economy, and society.

This is not a balancing act or a playing of one issue off against the other, but recognizing the interdependent nature of these three pillars.

The “Egg of Sustainability” model designed in 1994 by the International Union for the Conservation of Nature (IUCN) (as cited by Guijt and Moiseev in Centre for Environment Education 2007) illustrates that social and economic development can only occur if the environment offers the necessary resources. Simply put, the sine qua non of sustainability is the interconnected relationships of the environment, economy, and society prefectures.
Moreover, some scholars specifically underlined the importance of maintaining or increasing the capital stocks (natural, human, manufactured, social, and financial) under these three pillars (environment, economy, and society) for a transition toward sustainable development (Kollmair and St. Gamper 2002; Goodwin 2003; Ekins et al. 2008; Forum for the Future Website).

These capitals stocks, although instinctively rational with sustainable development, require further work and clarification to become more widely accepted (OECD 2008). Yet, a marginal importance is given to discuss and address sustainable practices according to these individual classifications in the area of higher education. A case-study report on 15 universities of diverse countries by Johnston (2007) addresses dispersed campus sustainability practices in the context of the five capital model (natural, human, manufactured, social, and financial). The central intent of this case-study report (Johnston 2007) is to embolden a common ground for campus sustainability that encompasses endeavors in natural capital (environment); social and human capitals (society); financial; and manufactured capitals (economy). Owing to its guiding disposition toward holistic sustainability implementation and the rationale that these capitals present in the practices of almost all organizations (see Johnston 2007), this writing acclimatizes the five capital stocks into the development of a conceptual model, in which the convergence is labeled as key dimensions of sustainable development for universities. The outlook of each capital stock is described as follows:

**Natural capital** comprises two major aspects: non-renewable resources such as oil, coal, and other minerals; and renewable resources such as ecosystems (Jansson et al. 1994). Imprudent human activities have been rapidly contributing to the depletion and scarcity of these stocks of natural capital. Developing lucid mechanisms via innovative researches that impose a resilient balance between economic development and ecological constraints seems imperative for a sustainable future (Jansson et al. 1994). In response to such circumstance, various corporations and industries have attempted to imbue environmental management systems (EMS) into their core business models. According to Newman and Fernandez (2007), universities are one of the largest energy users in the world, and therefore, they are seen as the ideal platforms for energy efficiency and alternative energy inventiveness. Although the responses of many universities to such calling is present, a number of studies point out on some simple, yet, vastly underutilized approaches such as installing new energy-saving lighting technologies and even activities as easy as turning off the lights and computers when leaving the offices or classrooms (Velazquez et al. 2005; Newman and Fernandez 2007). Such condition, perhaps, may be contributed by unsustainable behaviors of universities’ members, simply because they lack awareness, interests, or due to their total ignorance.

**Human capital** includes the productive capacities of an individual, both inherited and acquired through education and training (Goodwin 2003). It is also professed as the primary determinant of social, economic, and ecological development. Education plays an influential role in human development (Slaus and Jacobs 2011); and thus, the human capital of a country is considered not sustainable if the country’s education and training system are incapable of satisfying generalized skill shortages (Sharpe 2001). Furthermore, the acumens for sustainable human capital have also been extended to the development of values, characters, personality, interpersonal, and psychological skills (Slaus and Jacobs 2011) as well as health and employability (Sharpe 2001), which are vital for the welfare and well-being of society as a whole. Although universities have long earned the credibility in engendering knowledgeable, competent, and amicable human capital to cater to the needs of ever-changing job markets, the recent findings of Ismail and Abdullah (2011)
indicate that the burgeoning trend on pursuing status such as research university, comprehensive university, and focused university (i.e., extrinsic positive consequences) might result in disparate focus on human capital development.

Prominent theorists of social capital which include Pierre Bourdieu, James Coleman, and Robert Putnam point out to the importance of social networks that contribute to corporation and beneficial outcomes (Ottebjer 2005). Essentially, social capital roots from central facets, namely trust and cooperation; reciprocity and exchanges; common rules, norms, and sanctions; connectedness, networks and groups (Bridger and Luloff 2001; Pretty and Ward 2001) that contribute to joint and interdependent efforts to achieve a common goal (Goodwin 2003) and sustainable livelihoods (Pretty and Ward 2001). The sources of social capital include neighbourhood associations, civic organizations and cooperatives (Ekins et al. 2008). Thus, the implicit emphasis of social capital can be described as the individuals’ exposure, readiness, and ability to actively engage, participate, cooperate, and synergize toward a common goal. Although often criticized as tenuous and confusing, social capital is inevitably receiving attention in the formulation of campus-wide sustainable strategies. This is discernible in the report for the University of British Columbia (UBC), in which Reynolds and Wong (2009, p. 7) delineate the aims of social sustainability in a university context:

…to operate through distributing benefits and burdens equitably, developing co-operative and caring relationships, fostering a sense of safety through mutual respect, enhancing civic participation, and adapting to internal and external changes in an efficient and beneficent manner…

Undeniably, universities as the influential stakeholders of a community and country are presumed to harness and invoke aforesaid elements to develop a cohort that takes charge in communal actions toward sustainability. Although bountifully promoted, this element, however, is yet to be engaged in actual implementation in most universities.

Manufactured capital also known as produced and physical capital denotes material goods such as tools, machines, buildings, infrastructures which contribute to production process and usually used for more than a year (Ekins et al. 2003). Conversely, Goodwin (2003) draw attention to the human exploitation on natural capital as the groundwork for the production of manufactured capital that is catered to vast users such as businesses, homes, governments, and non-profit organizations. The findings of Arrow et al. (2003) indicate that the investments of many countries in manufactured capital are inadequate to offset the depletion of natural capital. Alarmed by this vindictive truth which will plausibly deteriorate the stocks of natural capital in the long run, various scholars urge on a more eco-friendly approach and innovation in the designs and systems of manufactured capital. One main initiative that is being encouraged by some scholars in this terrain is compact physical development planning (Abd Razak et al. 2011; Burton 2001) which refers to the “implementation of a space allocation system wherein usage is multi-functional” (Abd Razak et al. 2011, p. 212). In the context of campus sustainability, this principle can be characterized as allocation of residential, academic, business, facilities, and social functionality within the same region (Abd Razak et al. 2011). The benefits of such planning include reduced land and resource usage; reduced vehicle dependency and fuel emissions; promotion of public transport, walking, and cycling; better access to services and facilities; increased capacity and efficiency in utility and infrastructure; and revitalization and regeneration of inner urban areas (Burton 2001; Jenks and Burgess 2000). A case study of four research universities in Malaysia revealed the occurrence of campus design problems (structural layout of campus; accessibility; circulation; landscape and surrounding;
building design; transport and movement; safety and lighting) that are prominent among universities that adopt a wide and dispersed campus planning compared to those that adopt compact planning (Abd Razak et al. 2012).

Financial capital refers to money that enables people and organizations to buy and sell other aforementioned capitals. Two main sources of financial capital are available: stocks, such as cash and bank deposits; and regular inflows of money, such as labor income and pensions (Kollmair and St. Gamper 2002). Relevant sustainable issues at universities include the exigency for more ethical investments and trade, transparent and cost-saving purchasing mechanisms, and procurement methods that support domestic markets. Overall, in the quest of universities that deploy all five capitals into their sustainable practices, it was discovered that very few have achieved such eminence. Most practices are found to be narrowly aligned toward nature-conserving activities (Johnston 2007). Due to the interdependent nature of these five capital stocks, illumination of sustainable development implementation of each dimension seems vital to clearly identify the execution gaps. Therefore, this section derives and classifies current and suggested campus sustainable practices from various studies into the five key dimensions of sustainable development as shown in Table 3. Successful implementation of sustainable development, though, requires a coalesced commitment from the adherents. Reflecting this, the following Sect. 4, 5, and 6 discuss the perception and motivation elements in sustainability.

5 Perception of sustainability: perceived importance and implementation

Perception is a powerful tool that provides humans with accurate information about the characteristics of the world around us (Wade 2005). Two common types of perception studied by scholars are perceived importance and implementation (Guffey and Mccartney 2008; Chong 2006; Chong et al. 2007). In relation to perceived importance, Hsieh (2012) points out that individuals may perceive certain survey items to be more important than others. In other words, the assumption of equal weight seems counterintuitive (as cited by Chou et al. and Hsieh in Hsieh 2012). The use of perceived importance is not uncommon and is accepted in the campus sustainability literature (Chai et al. 2006; Guffey and Mccartney 2008). Hence, this paper stresses the need of assessing perceived importance (e.g., involvement, ability to manage, knowledge, and personal relevance) (Bakar and Mohamed 2004) toward the five abovementioned sustainability dimensions.

Perceived implementation, in turn, includes facets such as well-defined result areas, goals, objectives, measurement processes, and responsibilities; well-established reviews; evidence of continuous improvement; top management commitment; raising awareness; providing education; developing conservation behavior; a comprehensive implementation blueprint; and information systems (Hacker and Washington 2004; Sharp 2005 Ting et al. 2012). Investigation of these implementation aspects from the perspective of campus sustainability seems integrative. Nevertheless, little is known about the adequacy of perceived importance and implementation weighting in the context of campus sustainability. For this reason, this paper suggests to measure the gap between perceived importance and implementation of campus sustainability. The measurement will allow us to epitomize the magnitude of differences in importance and implementation between dimensions (Chong 2006) of sustainable development derived from the previous literature. By doing so, universities will be able to address and work on the specific dimensions that lack efforts, practices, and attention in order to embrace a holistic approach toward sustainability. Table 4 illustrates some descriptions of perceived importance and implementation:
### Table 3 Classification of campus sustainable practices in five dimensions

<table>
<thead>
<tr>
<th>Dimensions of sustainable development</th>
<th>Current and suggested practices</th>
<th>Authors/s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural capital</td>
<td>Resource waste management systems (e.g., reduction in energy, water, and raw material use)</td>
<td>Krizek et al. (2012); Endut et al. (2011); Yen et al. (2010); Newman and Fernandez (2007); Emmanuel and Adams (2011); Mat et al. (2009)</td>
</tr>
<tr>
<td></td>
<td>Pollution reduction and recycling campaigns and activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formation of environmental research centers and committee</td>
<td></td>
</tr>
<tr>
<td><strong>Society</strong></td>
<td>Development of sustainable-related curriculum and courses</td>
<td>Fien (2002); Ferrer-Balas et al. (2008); Johnston (2007)</td>
</tr>
<tr>
<td>Human capital</td>
<td>Formulation of keep-fit (healthy lifestyle) programmes for faculty and staff</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of healthy and ergonomic working culture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Promote quality work-based learning and lifelong learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Involvement of student government group in decision-making (e.g., allocation of fees)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formation of pro-environmentally skilled professionals</td>
<td></td>
</tr>
<tr>
<td>Social capital</td>
<td>Formation of university-wide sustainability change agents</td>
<td>Fadzil et al. (2012); Newman and Fernandez (2007); Johnston (2007)</td>
</tr>
<tr>
<td></td>
<td>Sustainability-related information and knowledge sharing via media (e.g., email, bulletin, conference, etc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formulation of students and faculty task force to educate and promote campus sustainable initiatives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collaboration with NGOs and consultancy agents to anticipate future needs of and demands on graduates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creation of institutes and projects that ensure equal opportunities and address social problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foster student participation in community and social services</td>
<td></td>
</tr>
<tr>
<td><strong>Economy</strong></td>
<td>Green building design and construction management</td>
<td>Newman and Fernandez (2007); Johnston (2007); Fien (2002); Krizek et al. (2012)</td>
</tr>
<tr>
<td>Manufactured capital</td>
<td>Sustainable transportation systems (e.g., prepaid bus programme, campus bicycle plan)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustainable food management systems (e.g., locally sourced organic foods, minimal use of animal protein sources and processed foods, reusable cutlery and crockery)</td>
<td></td>
</tr>
</tbody>
</table>
6 Motivation for a change toward sustainability: the role of intrinsic and extrinsic consequences

Universities are composed of individuals who behave—at least partially—motivated by the positive consequences they obtain from acting in a specific manner. Two fundamental sources of motivation may be identified: extrinsic and intrinsic. *Extrinsic motivation* (EM) refers to a large number of instrumental actions which a person (or a group) engages in as a means to achieve a goal; those goals usually represent rewards such as money or material gains, pleasure, social reputation, and so on. Extrinsic motives exert a powerful influence on individual sustainable behaviors, as the literature refers (Geller 2002; Lehman and Geller 2004), and as we previously referred, on pro-sustainability efforts of universities. Intrinsic motivation, in turn, implies engaging in activities because the intrinsic value they possess, because they are naturally interesting and fun, that is, by its inherent appeal. Solid evidence exists showing the existence of personal intrinsic motives that result from the practice of sustainable behaviors (De Young 1996; Hernández et al. 2009; Iwata 2002). People obtain a sense of self-efficacy, satisfaction, psychological wellbeing, and happiness from acting pro-environmentally and pro-socially (Corral-Verdugo 2012). Yet, to our knowledge, no study addressing the influence of intrinsic motives on sustainable practices at universities has been conducted.

How intrinsic and extrinsic motives could stimulate the five-dimensional structure of sustainability? Intrinsic motives have been associated to the protection of natural capital. For instance, De Young (1996) and Iwata (2002) report that people who are aimed at conserving natural resources—through a reduced consumption lifestyle—develop a sense of efficacy and satisfaction. In turn, the extrinsic motives associated with the protection of the natural capital include monetary rewards and savings (Lehman and Geller 2004); that is, people take care of natural resources because their conservationist actions result in material gains. The stimulation of human capital, the productive capacities of an individual, also result in intrinsic motivational consequences: The more skilled individuals become, the more their feelings of competence and satisfaction (two intrinsic motives) (De Young 2000) that they experience. Autonomy (feeling independent and able to make decisions), one more intrinsic motive, might also result from the development of human capital (Gagné and Deci 2005). Evidently, the stimulation of human capital also produces an increased flow of extrinsic consequences, in the form of money, status, and prestige for those who increase their productive capacities. Social capital (which relates to the optimal functioning of groups) can be stimulated by “sense of relatedness,” the individuals’

---

Table 3 continued

<table>
<thead>
<tr>
<th>Dimensions of sustainable development</th>
<th>Current and suggested practices</th>
<th>Authors/s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adoption of ethical and life-cycle costing system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of green purchasing policy (e.g., recycled paper products)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of sustainable and responsible procurement practices</td>
<td></td>
</tr>
</tbody>
</table>
inherent propensity to feel connected to others, that is, to be a member of a group (Deci and Ryan 2000); this feeling increases cooperation and connectedness, two essential components of social capital. Of course, social capital might also be increased through external motives such as monetary rewards and prestige (best-functioning groups attract more money and public attention). The protection of manufactured capital, which includes the produced and physical capital (tools, machines, buildings, infrastructures) making possible a productive process, might be stimulated by intrinsic motives of satisfaction and competence, in the same way that these intrinsic consequences promote the conservation of natural capital (De Young 2000). Evidently, a protected manufactured capital leads to material savings, an extrinsic consequence. Finally, financial capital, or money enabling organizations to engage in their productive activities, can be also stimulated via intrinsic and extrinsic motives. In the former case, a prudent and wise use of money should result in

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Classification of perceived importance and perceived implementation of sustainable practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of perception</td>
<td>Description</td>
</tr>
<tr>
<td>Perceived importance</td>
<td>Involvement</td>
</tr>
<tr>
<td></td>
<td>Ability to manage</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>Personal relevance</td>
</tr>
<tr>
<td>Perceived implementation</td>
<td>Well-defined result areas and goals</td>
</tr>
<tr>
<td></td>
<td>Well-defined objectives</td>
</tr>
<tr>
<td></td>
<td>Well-defined measurement processes</td>
</tr>
<tr>
<td></td>
<td>Well-established reviews</td>
</tr>
<tr>
<td></td>
<td>Well-defined responsibilities</td>
</tr>
<tr>
<td></td>
<td>Evidence of continuous improvement</td>
</tr>
<tr>
<td></td>
<td>Top management commitment</td>
</tr>
<tr>
<td></td>
<td>Raising awareness</td>
</tr>
<tr>
<td></td>
<td>Providing education</td>
</tr>
<tr>
<td></td>
<td>Developing conservation behavior</td>
</tr>
<tr>
<td></td>
<td>Developing a comprehensive implementation blueprint</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Classification of motives for sustainability in extrinsic and intrinsic dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of motives</td>
<td>Sources</td>
</tr>
<tr>
<td>Extrinsic motives</td>
<td>Prestige; Funding; Social rewards</td>
</tr>
<tr>
<td>Intrinsic motives</td>
<td>Satisfaction; Sense of efficacy; Members’ wellbeing</td>
</tr>
</tbody>
</table>
intrinsic motives of competence, satisfaction, and self-regulation (as defined by Maddux 2009); whereas the same (prudent, wise) use of financial resources produces material rewards: the conservation of such capital.

Due to the important source of motivation that intrinsic consequences of sustainable behavior represent, they should be studied and stimulated within universities. Of course, this does not mean that the powerful (and necessary) effects of extrinsic drives had to be neglected, since every human being and group require external rewards to maintain a personal or collective enterprise (Lehman and Geller 2004). Therefore, a balance between extrinsic (status, prestige, money) and intrinsic (satisfaction, wellbeing, transcendence) motives is to be achieved. Table 5 exhibits some sources of potential extrinsic and intrinsic consequences for sustainable actions.

These new proposed links between motives and campus sustainability practices differ in a number of ways in the manner in which these interactions have been studied to date:

- In the first place, no attempt has been made to study motives behind sustainable practices along the whole set of the five abovementioned dimensions. In this sense, a motivational model of campus sustainability has not been specified and (so far) tested.
- When considered, the relationship between motives and the five key dimensions have been analyzed in an isolated way (i.e., addressing the stimulation of specific capitals in regard to specific motives).
- A focus on extrinsic motives associated with the stimulation of those specific capitals is detected, in detriment to the investigation of intrinsic motivation. Our approach claims for the incorporation of the two types of (extrinsic, intrinsic) motives in models explaining sustainable practices in universities.

7 Studies in motivation and perception among core actors of campus sustainability

Synergized commitment of core campus members (top management, faculty staff, students, and stakeholders) appears to be the hallmark of systemic campus sustainability (Tilbury 2011). Further to this, the capacity of students, staff, and stakeholders in impelling top management decisions is amply discussed in the literature (Sharp 2002; Thomas 2004; Krizek et al. 2012). For instance, Krizek et al. (2012) posit that faculty staff may influence the top management to create a new sustainability programme so as to meet student demands. Accomplishment of such circumstance unerringly cruxes from individual motives and perceptions of disparate groups of people (i.e., students, faculty, and top management). Uncovering these idiosyncratic motives and perceptions is important to form a concerted human team that espouses holistic campus sustainability (Shriberg 2002; Arbuthnott 2009; Andries et al. 2012). Based on the previous literature, the authors came up with an overview of perceived sustainable practices among core campus members and gleaned the motives behind the members’ willingness to participate in campus sustainability.

Top management with visionary leadership is seen as a significant internal driver that fuels campus-wide sustainability (Thomas 2004; Ferrer-Balas et al. 2008). Most commonly, the top-down support and efforts in campus sustainability are reflected through transparent goal-setting and enforcement that prioritizes sustainability, managing resources, pro-sustainable decision-making, and engendering stakeholder engagement (Krizek et al. 2012; Dola et al. 2009). Some of the (extrinsic) that were found to influence top management’s stewardship toward sustainability are peer pressure (other universities),
external funding (Ferrer-Balas et al. 2008), cost-saving, brand, and reputation enhancement (Krizek et al. 2012).

**Faculty staff** usually encompasses academicians, researchers, and administrative employees. They hold different roles and responsibilities in campus; however, their pooled efforts proved to be the tutelage for campus sustainability (Sharp 2002). Their involvement is apparent in research participation, campus sustainability committee, curriculum development, and collaborating with students in community services or sustainability campaigns. Also, appropriate incentive structure (remunerations, promotions, and granting of tenure) are recognized as motivating (extrinsic) factors for faculty staff to partake university sustainable initiatives (Ferrer-Balas et al. 2008; Emmanuel and Adams 2011).

**Students** as customers have power to demand institutional and behavioral changes concerning the environment (Dahle and Neumayer 2001). Similarly, substantiation of student influence in addressing sustainability issues is also present in campus operations, curriculum, and research (Sharp 2002). Student motives in embracing campus sustainability were found to typically gravitate in the areas of personal mastery, interest, awareness, personal satisfaction, enthusiasm (Sharp 2002)—intrinsic motives; and peer pressure, prestige, external regulations, family, social approval, rewards, or punishments—extrinsic motives (Sjerps-Jones 2007; Asmar 2009). For example, a student may pursue a sustainability course to gain professional prestige (Hansmann 2010) or to satisfy personal interests (Herman et al. 2012). The findings of Asmar (2009) indicate that sustainable behavior practices among Santa Clara University students are mostly precipitated by intrinsic motivation. Conversely, Emmanuel and Adams (2011) reveal the existence of “commitment gap” between students of Alabama and Hawaii in campus sustainability. Clearly, this indicates a discrepancy in student motivation and perception in the context of campus sustainability.

**Stakeholders** of a university consist of government, industries, and community as a whole. The linkages between stakeholders and higher education are becoming increasingly important. For example, under the outcomes-based education (OBE) policy, the engagement of industrial advisory, student alumni, and employers in campus maneuvers is made obligatory (Sekhar et al. 2008). Industries, for example, are capable of inducing universities to develop sustainability courses, adopt green facility management, and creating job markets which entail graduates with sustainability qualifications and characteristics (Ferrer-Balas et al. 2008). Besides that, industries and government also support campus sustainability by providing grants, donations, and funds (Ferrer-Balas et al. 2008). Community, on the other hand, inflicts pressure that demands radical changes in the higher education sector (i.e., quality of graduates and courses related to sustainability), which compels universities to shift away from their status quo (Ferrer-Balas et al. 2008). Nonetheless, the motivating factors of this cohort in the context of campus sustainability are yet to be explored.

Grasping campus members’ motives and perceptions in sustainability complements and determines the effectiveness of campus sustainable strategies, structures, and processes which set forth the route to systemic campus sustainability (Sharp 2002). Even though studies have addressed this, they mainly discuss the perception and motivational elements sparingly and focus more on the environmental aspect of sustainable development, than on the social and economic ones. An inadequate understanding of personal sustainable responsibility among academicians, administrators, and students, and lack of sustainability indicators perpetuates problems in sustainability (Velazquez et al. 2005; Fien 2002; OECD 2008). A comprehensive approach deliberating the motives and perceptions of campus actors in all constituents of sustainable development is yet to receive substantial attention.
in the research schema. Reflecting this, the authors propose a conceptual model for systemic campus sustainability (Fig. 1) which is explained in the ensuing section.

8 A conceptual model for systemic campus sustainability

Drawing from the analysis of the diverse literature (see previous sections), the authors illuminate the following research gaps that ought to be addressed to attain holistic (systemic) campus sustainability:

- Identification and implementation of all key dimensions of sustainable development (natural, social, human, manufactured, and financial capitals) which, respectively, depict the common and broader categories of sustainable development—environmental/ecological, social, and economic (Johnston 2007; OECD 2008).
- Exploration of successful practices of campus sustainability initiatives to maximize its survival and expansion (Sharp 2002);
- Understanding the inherent perceptions and motives (intrinsic and extrinsic) of core campus members appertaining to campus sustainable development practices (Sharp 2002; Corral-Verdugo 2012).

As an introductory effort to address these gaps, a conceptual model (Fig. 1) intended at sketching the potential measures for systemic campus sustainability based on perception and motivational elements is introduced and discussed. The model presumably suggests that, in order to capture a more systemic approach in campus sustainability, sustainable practices of key dimensions that specifically embody ecological/environmental, social, and economic variables, extracted from the preceding literature, need to be measured via campus actors' perceived importance and implementation as well as their motives.
(intrinsic/extrinsic). Indeed, these measurement expedients are reiterated as the preconditions to systemic campus sustainability in various scholarly discourses (as cited in previous sections). Although these evidences ostensibly support this model, such evidence is scarce and scattered. Therefore, the proposed model will have to be validated via empirical analyses that warrant causal correlations of the proposed determinants of systemic campus sustainability.

Despite the significant roles of motives and perceptions in inspiring, integrating, and leading others (students, administrative staff, top management and stakeholders) toward sustainability implementation (Sharp 2002; Malhadas 2003; Boks and Diehl 2006; Saadatian et al. 2011b), their investigation in campus sustainability is scarce. Although Malaysia is at the inchoate phase of sustainability, its practices are conspicuous among universities (Saadatian et al. 2011a; Fadzil et al. 2012). Their effectiveness, especially in the context of systemic campus sustainability, is yet to receive attention from academic researchers. Therefore, as a starting point, this model is suggested to be tested among the academicians of universities in Malaysia. Simultaneously, this model is also recommended to be tested among universities of other parts of the world to verify its usability and credibility in gauging systemic campus sustainability.

9 Conclusions and implications

Prior discussion in this paper highlights encroaches of compulsive human desires and actions that have led to the genesis of sustainable development. However, the demeanor toward sustainability is lacking an avid, uniform, and collective approach that hinders and hollows the implementation. This is also visible in campus sustainability throughout the globe. Since universities are seen as the key enablers and change agents of sustainability, a revolution on current practices seems paramount.

In pursuit of this, a conceptual model comprising the key elements of sustainable development is developed in this paper. The paper suggests campus-confined inertias to be eliminated promptly, by first, addressing the key areas of sustainability in a crystal-clear manner and then gauging campus members’ perceptions and motives (both extrinsic and intrinsic) on the importance and implementation levels of these areas. In doing so, the gap between perceived importance and actual implementation can be identified. The identification of motives to engage in sustainable practices would also make possible the generation and maintenance of pro-sustainability actions and programs within academic institutions. This model is also proposed to be tested quantitatively among all core actors of higher learning institutions in developed and developing countries throughout the globe since empirical evidences seem paramount to feed subsequent foci toward systemic campus sustainability.

Besides setting forth the groundwork for future research, the proposed conceptual model also contributes to systemic sustainability policy-making in higher education sector, corporations, and governments across countries. For a vast outreach, these sectors, via sustainability marketing and operations, can now expand their sustainability efforts comprising the elements highlighted in the model, rather than relegating it to the province of “eco-friendly.”

References


Toward systemic campus sustainability


Springer


