

ENVIRONMENTAL LITERACY AND SUSTAINABILITY AS CORE REQUIREMENTS: SUCCESS STORIES AND MODELS

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Abstract *At a number of colleges and universities, the core General Education requirements for all degrees include an in depth exposure to environmental literacy. Many colleges are also including a degree requirement in the area of social responsibility and/or civic engagement. Colleges include sustainability curricula using a variety of models. The first baseline national surveys have collected information about the percentage of institutions incorporating sustainability into curricula, course design and content, faculty development and outcomes. What does the data to date describe in terms of the models for inclusion of environmental literacy, social responsibility and sustainability in higher education?*

For many colleges, it is politically difficult to add additional courses for degree requirements. Some higher education institutions have solved this dilemma by integrating environmental literacy, social responsibility and sustainability course materials into existing liberal arts and specialty courses. Models have been developed that are flexible, inexpensive and fun to implement within a variety of disciplines or as part of an interdisciplinary learning community. According to research, for both teachers and students, these models reduce apathy, and instill attitudes and skills required to be positive change agents for the society.

Research results support students using these models developed an:

increased caring about the future of society,

increased belief that they can make a difference,

increased willingness to participate in solving societal and environmental problems.

This chapter reviews some successful models for requirements and strategies to infuse the curricula with environmental literacy, social responsibility and sustainability. These models and strategies include degree requirements, infusion across the curricula, development of interdepartmental minors, sustainability in other sectors as the latent curricula, and integration into the mission statement. This chapter also includes a discussion of implications from the national surveys, a list of needs for future research, a highlighted course curricular project useful for a variety of disciplines, and additional resources for the educator or researcher.

Introduction

This project about how to envision and help create a more humane and environmentally sound future was a very positive experience. I am glad I got to be part of it. It goes to show you that an education isn't just about showing up to class and getting a grade. It is about applying what you have learned toward your everyday life. I was made more aware that I can actually make a difference in the world. (Rowe 1999 pg. 3)

This quote is a part of a collection of anonymous students' evaluations about a course project concerning sustainability. Through this course project, which is highlighted later in this chapter, the student gained both some of the skills and the attitudes needed to be a positive change agent for society.

In higher education, there is an accepted norm to produce analytical thinkers (Hilliard, 1989; Kuukendall, 1992), but there is not an equal commitment to teach the "change agent" skills required for positive societal changes. Many students and graduates feel overwhelmed

by our society's environmental problems. They feel that the problems are so large and complex they cannot do anything about it, and decide to give up and just take care of themselves. Apathy and cynicism often become the dominant attitudes. Knowledge should be empowering our students to help create a better society instead of making them passive. How do we turn this around while teaching our traditional courses?

It is important that higher education institutions teach students to be more than "armchair pontificators". Armchair pontificators critique but do not have the motivation or skills to help solve societal problems. "A genuine liberal arts education will foster a sense of connectedness, implicatedness, and ecological citizenship, and will provide the competence to act on such knowledge"(Orr 1992 p.101). Positive change agents become engaged in creating solutions. They can:

- cope effectively with change,
- care about societal problems and solutions,
- envision and are willing to help create positive scenarios for the future,
- experience a strengthened political efficacy, and know how to effectively implement change (Rowe, Bartleman, Khirallah, Smydra, Keith and Ponder, 1999).

Developing graduates who help implement a paradigm of sustainability is a crucial need for society, yet educational curricula often do not adequately address this need (Cortese 1999). [Learning about sustainability in this chapter refers to learning how to create both a more humane as well as an environmentally sound future for society. Sustainability at its best is about both an environmentally healthy future and a more equitable future (Ibid 1999). Therefore, for a college or university to be considered to have included sustainability in the curricula, this author looked for both an environmental literacy component and a social responsibility/civic engagement component.] All students, as the consumers of the future, need to know about environmental problems and how to help create an environmentally healthy and more humane world. Recent national surveys show that most institutions of higher education have done nothing to systematically provide this knowledge. In other words, at most institutions of higher education, students can graduate with an undergraduate degree and be both environmentally illiterate and unaware of resource distribution inequities (McIntosh,Cacciola,Clermont, Keniry, 2001; Wolfe, 2001). Isn't it time that sustainability concepts such as environmental literacy and social responsibility/civic engagement become an integral part of all higher education degrees?

Some institutions are responding to this need by making important changes in their curricula and degree requirements, setting important precedents for other higher education institutions. This chapter reviews some of the models and strategies used to incorporate sustainability into higher education curricula. Reviewed approaches include: sustainability concepts as part of the degree requirements, the infusion of the sustainability paradigm across the curricula, development of interdepartmental minors, use of sustainability in other sectors of the institution as the latent curricula, and integration into the mission statement. This chapter also includes a discussion of whether to select from or combine the various models and strategies, the needs for future research, a course curricular project about sustainability that is easily implemented into a variety of disciplines by novice faculty, and additional resources for the educator or researcher.

Sustainability included in degree requirements

The core General Education requirements for undergraduate degrees have been changed at some colleges to include an in depth focus on sustainability, including an environmental literacy component as well as a civic engagement/social responsibility component. In order to get a degree at these colleges, students must have at least one course that focuses in depth on how to create a sustainable, healthy environment and a more humane society. Some higher education institutions only address one of the two components of sustainability: environmental literacy, or social responsibility/civic engagement.

Two national surveys have been completed recently, establishing a baseline of knowledge regarding the extent to which sustainability concepts have been incorporated into higher education. In "A survey of the environmental education of students in non-environmental majors at four-year institutions in the USA" (Wolfe, 2001), chief academic officers at four-year institutions in the USA were surveyed electronically to examine: the extent to which their institutions provide for the environmental education of students in non-environmental majors, and to identify various approaches for increasing environmental literacy at the college level. In this survey, environmental literacy was defined as "a basic understanding of the concepts and knowledge of the issues and information relevant to the health and sustainability of the environment as well as environmental issues related to human health". Of the 1,172 institutions contacted, (84% of four year institutions), 496 institutions responded, representing a 42.3 percent response rate. Of the respondents, 11.6 percent indicated that an "environmental literacy" course was required of all students, and 55.0 percent reported that such a course was not required but was available and countable toward the institution's general education requirements. In other words, only 11.6 percent of institutions are requiring environmental literacy for their graduates, and at 45% of the institutions, non-environmental majors don't even have the option to include environmental literacy courses as electives for part of their general education.

The National Wildlife Federation's Campus Ecology program offers training clinics, fellowships and publications to aid in greening college and university campuses. The program recently conducted a separate survey entitled "State of the Campus Environment: A National Report Card on Environmental Performance and Sustainability in Higher Education" (McIntosh, Cacciola, Clermont, Keniry, 2001). This survey of both two and four year colleges in the United States showed that 8% of higher education institutions have an environmental literacy undergraduate requirement, with another 5% that have this requirement for most of their students. An additional 3% are planning to build in this requirement in the future (with a confidence interval of $\pm 5\%$). In engineering and education programs, the survey found that only 12 percent and 11 percent respectively offer undergraduate environmental courses.

Mark Van Putten, President and CEO of the National Wildlife Federation explained the situation:

While a number of colleges and universities stand out for educating students in all disciplines about sustainability, the survey found that, unless they are majoring in biology or environmental studies, students in many institutions may complete their studies without gaining basic environmental literacy. (McIntosh, Cacciola, Clermont, Keniry, 2001 p. iii)

While curricula stands out in the survey as a crucial area where more incorporation of sustainability is needed, there are a number of good models and strategies already available for institutions that are moving in this direction. The following sections describe a variety of models in each of the following approaches: sustainability degree requirements, across the curricula infusion approaches, interdepartmental sustainability minors, sustainability efforts

in other sectors of the institution as the latent curricula, and integrating sustainability into the institution's mission statement.

Institutions with sustainability degree requirements

The following are examples of U.S. institutions with environmental literacy degree requirements for all undergraduates, some with a concurrent social responsibility or civic engagement requirement. These examples do not include all of the institutions in the United States with these requirements, but reflect a lot of activity, particularly in the past ten years, to include environmental literacy and civic engagement/social responsibility requirements.

In the example of Minnesota, the changes occurred at the state level. All state universities and colleges in Minnesota have been a part of the Minnesota Transfer Curriculum since 1995. This curriculum, required for all undergraduates, includes the teaching of ten competencies for the General Education component, with each course covering up to two competencies. Two of the competencies are "Civic Responsibilities" and "Humans and the Environment".

In addition, since 1994, the University of Minnesota has required undergraduate students to take at least one course in each of four themes. Two of those themes are "Environment" and "Citizenship and Public Ethics". Courses go through a curricular approval process to qualify to cover these themes. The environment theme has been approved for social science and humanities as well as natural science courses, involving faculty from all over the university in the teaching of environmental literacy. At the University of Northern Iowa, undergraduates have been required to take the course "Environment, Technology and Society" since 1988.

Private religious colleges have tended to have within their institution's value system a commitment to teach social responsibility. Some private colleges have also recognized the importance of graduating environmentally aware students who have the skills and perspective to create positive changes. At Alverno College, for the past twenty-five years students have been required to take a course that teaches sustainability perspectives and change agent skills. Presently, all students have to take a course entitled "Globally Effective Citizen".

Some small liberal arts colleges have also taken the lead toward sustainability. Northland College has a required environmental component of their curricula as well. At Wilson College, every student must take at least one environmental studies class prior to graduation.

At Unity College, all students, regardless of major, have a general education requirement of five interdisciplinary core courses that all focus on "ecoliteracy", plus a capstone Environmental Stewardship course in which all students are required to demonstrate the knowledge, skills, and commitment necessary to be responsible citizens. At Naropa, all Bachelor of Arts students have to take a six credit hour requirement in Complex Systems, of which 3 must be in Environmental Studies. At Guilford College, as part of the General Education requirements, students are required to take 3 critical perspective courses. One of those is social justice/environmental responsibility, which focuses on race, class, gender, sexual orientation or the environment.

Some community colleges have also developed requirements to nurture proactive engagement with environmental and social problems and solutions. At Oakland Community College, the General Education requirements for all degrees include ten core attributes. Two of these attributes are "global environmental awareness" or environmental literacy, and "an

increased commitment to social responsibility”. In order to get any degree at the college, students must have at least one course that focuses in depth on the environment and a course that focuses on social responsibility.

In addition to the above examples, the National Wildlife Federation’s survey results includes the following institutions in their survey as leading schools offering majors and minors and requiring at least one environmental course for all or most students:

Alaska Pacific University
Albion College
Arizona State University
Dominican College of San Rafael
Humboldt State University
Tri-State University
University of the Incarnate Word
University of LaVerne
University of Minnesota-Twin Cities
University of Wisconsin-Stevens Point (McIntosh, Cacciola, Clermont, Keniry, 2001)

Unlike many higher education institutions, which offer an increasing array of courses in environmental studies and environmental science as majors or electives but have no requirement for all undergraduates, the above institutions demonstrate models of how to require courses in the environment and in civic engagement for most if not all undergraduates. In addition to the above models and the percentages reported from the surveys above, hundreds of higher education institutions have signed declarations of commitment to sustainability, and an increasing number of them are considering the requirement of environmental literacy in their degree offerings (Wright, 2001).

Infusing sustainability across the curricula models

Another approach to teaching sustainability is to infuse environmental literacy and social responsibility/civic engagement throughout the curricula. A number of colleges have infused environmental literacy and social responsibility/civic engagement into courses in multiple disciplines. Instead of adding environmental literacy as an additional degree requirement, these higher education institutions have decided to try to shift the dominant paradigm within the college’s curricula from nature as an unlimited set of resources to be used and conquered, to a paradigm of sustainable development and the ongoing challenge of creating a more humane and environmentally healthy future society. These institutions provide students with multiple exposures to the sustainability paradigm throughout their education.

This “across the curricula” approach has already been developed at a number of higher education institutions in order to incorporate writing or critical thinking throughout the curricula. Faculty experience with this model might help increase the internal political acceptance required to teach the sustainability paradigm in an across the curricula approach. Understanding environmental problems and potential solutions and developing the civic engagement/social responsibility attitudes and skills required to help create a more humane and environmentally sustainable future is necessarily an interdisciplinary venture. The following representative examples describe this approach at a variety of institutions where interested faculty started building a program to promote sustainability via faculty sharing and professional development.

At Northern Arizona University, the Ponderosa Group, an assemblage of faculty from academic disciplines across the university, works towards the common goal “to increase the sustainability effort at NAU” via an across the curricula approach. In the past few years,

faculty, administrators and staff have been working together to make significant changes in the course content of dozens of liberal studies classes and have raised the general awareness of the campus towards sustainability. The participants strategize about how to reach the greatest number of students and discuss the successes and failures of revisions to their courses. NAU is a good example of an institution that is changing the organizational climate via both the attainment of environmental literacy by faculty across the disciplines, and the use of professional development to help faculty integrate sustainability concepts into courses. This is a powerful strategy to help students internalize the sustainability paradigm. Part of the faculty at Northern Kentucky University is also attempting to include sustainability concepts in multiple disciplines by following the NAU model, with assistance from Second Nature (Stephenson 2001).

At Emory University, professional brown bags and informal meetings have been organized by interested faculty to create interdisciplinary discussions about how to incorporate sustainability into the curricula, with growing success. At Tuskegee University, the long term objectives of the institution include a commitment to integrate sustainability and environmental concerns into all academic disciplines and thereby foster environmental stewardship. Faculty workshops have been developed for faculty from Tuskegee with outreach to and inclusion of other Alabama higher education institutions to help all the participants integrate sustainability into courses across the curricula.

In house professional development resources for infusion of sustainability

According to the National Wildlife Federation survey, half of the higher education institutions have programs supporting their faculty's professional development on environmental topics (McIntosh, Cacciola, Clermont, Keniry, 2001). At all of the institutions studied that are attempting to integrate sustainability throughout the curricula, professional development opportunities for faculty seems to be a key component for success. Professional development is needed for faculty to learn about sustainability, to develop and refine their course revisions and to share their attempts to integrate these concepts into their courses. At institutions where ample resources do not exist for professional development, implementing environmental literacy and sustainability can definitely be challenging. At Prescott College, the adult degree program (undergraduate and/or Teacher Certification for at a distance students) utilizes faculty sharing to supplement more extensive professional development.

At some higher education institutions, ongoing support for faculty to integrate sustainability into their courses is provided by an in house institute. At MIT, the Program on Environmental Education and Research (PEER) acts as a resource for faculty, staff and students who are interested in developing new content for their courses and performing environmentally-related research to directly impact environmental policies, people's behaviors, or educational systems. At Tufts, the Tufts Institute for the Environment (www.tufts.edu/tie) is available for faculty use. At the University of New Hampshire, the Center for Sustainability helps faculty create the paradigm shift. Many of these institutes have materials available to faculty in other institutions as well.

Developing interdepartmental minors in environmental sustainability

Another approach to teaching sustainability is to develop a wide variety of interdepartmental minors. To address the growing need for students at Ball State University in Indiana to increase their environmental literacy, a group of interdepartmental minors has been designed

to offer new interdisciplinary opportunities for students to study environmentally sustainable practices. Minors include Environmental Policy, The Environmental Context for Business, Sustainable Land Systems, and Technology & The Environment. An advantage to developing interdepartmental minors in environmental sustainability is the opportunity to support cross-disciplinary work in environmental studies and to bring together students to share their diverse perspectives as they contribute to a common, integrated, closing course of this cluster. The disadvantage of offering these minors as a sole strategy is that only the students who choose these minors receive these benefits instead of requiring sustainability courses for all undergraduates or infusing sustainability across the curricula to support the internalization of the sustainability paradigm.

Sustainability in other sectors of the institution as the latent curricula

It is outside the scope of this chapter to address in detail the opportunities to incorporate the sustainability paradigm into the other domains of higher education institutions: research, operations, student activities and college-community partnerships. It is worth noting that these other domains help establish the cultural norms and organizational culture or what has been called the latent curricula at the institutions (Bloom, 1982). The latent curricula reinforces the manifest curricula to help students internalize and utilize the concepts of sustainability. There are outstanding examples of institutions and programs which have included the research component and college-community partnerships (University of Georgia), the operations component (SUNY at Buffalo) and the student activities component (National Wildlife Federation's Campus Ecology program) to build a strong latent curricula that supports the teaching of sustainability.

Integration into the mission statement

According to the National Wildlife Federation survey, although only 8% of higher education institutions have an environmental literacy degree requirement, 21% of colleges or universities (24% four year and 14% two year) include environmental responsibility as part of the academic mission. Over 34% either have educating students about environmental responsibility as part of their academic missions, or plan on developing this in the future. Building a commitment to sustainability in the mission statement can produce administrative support for sustainability efforts at multiple levels of the institution, and help to move the organizational culture to include a sustainability paradigm.

Emory University's new environmental mission statement outlines general education curriculum requirements, including a vision that:

all students, faculty, and employees are provided opportunities to become environmentally literate and where environmental leadership is seen as a continuous, participatory process of learning; environmental studies are available through strong undergraduate programs, graduate-level and professional specialization in environmental issues, and diverse opportunities for environmental learning across the curriculum; and environmentally-oriented faculty and student research is encouraged and supported (Second Nature, 2001)

At Olivet College, faculty member Maria Kortier Davis shared the importance of changing the vision of the college to include a commitment to sustainability. "While the campus had a student-led recycling program and an active environmental awareness organization for almost 10 years, the changes implemented in the re-visioning process were deeper and farther reaching" (Davis 2002).

At Prescott College, the mission statement includes teaching environmental literacy and building students' commitments to be positive change agents:

"...to educate students of diverse ages and backgrounds to understand, thrive in, and enhance our world community and the environment. We regard learning as a continuing process and strive to provide an education that will enable students to live productive lives of self-fulfillment and service to others. Students are encouraged to think critically and act ethically with sensitivity to both the human community and the biosphere. Our philosophy stresses experiential learning and self-direction within an interdisciplinary curriculum." (Canty, 2001)

This mission statement has included a sense of responsibility to the environment and to the human community since the College's inception in 1966. One of the goals of Prescott's strategic plan is "To achieve learning that educates for competence and commitment to the greater good". The following is part of Prescott's list of objectives, attributes and values.

- Students will learn to balance personal development and service to others
- Students will develop ecological literacy
- Learning outcomes will be oriented toward social and environmental justice
- Faculty will include multicultural and environmental components in all courses
- Multicultural or environmental service learning will be required for graduation (Canty, 2001)

The above statements and other institutions' mission and strategic plan statements that incorporate sustainability can serve as useful precedents for other colleges and universities.

Research results and implications – Comparing approaches to incorporate sustainability into the curricula

When students take courses about environmental and social responsibility, do they get more involved after graduation in creating the solutions? At many institutions with a general education requirement in environmental literacy, most students take only one course that addresses the environment. Is this graduation requirement enough? Wolfe's (2001) research review indicates taking as little as one course in environmental literacy does produce more environmentally responsible behavior. Benton (1993) found that MBA students who took an environmental management course were more aware of environmental issues and more willing to take actions to make a positive difference. Smith-Sebasto (1995) found a significant increase in environmentally responsible behavior among students who took one course in environmental literacy in comparison to those with no course on this topic.

Rowe (1999) found that students who had an interdisciplinary course with a focus on creating a more humane and environmentally sustainable future developed an increased caring about the future of society, an increased belief that they can make a difference, and an increased willingness to participate in solving societal and environmental problems. (Longitudinal data about the long-term impact on the students is still being collected). This study also showed support for inclusion of the following in curricula to help students become better change agents and produce more active and effective citizenship:

- optimism skills to reduce cynicism and apathy (Seligman, 1998),
- efficacy skills (via stories of "average" people making a difference),
- futuring skills (via envisioning future positive scenarios for society)(Smith, 1987),
- implementation skills (change strategies from the 4 D's of doing) (Rowe, 1999).

It is important to understand historically that many current professors were raised and almost all academic research was conducted during a time when the dominant paradigm in society was that resources were unlimited, nature should be conquered to enhance human life, and the earth could withstand easily whatever pollution humans could create. If only one general education course covers the sustainability paradigm, this may be enough to

change some attitudes and behaviors but not be enough to teach the students the sustainability paradigm as the necessarily dominant perspective for the future of society. Even if one course does increase environmental responsibility and action, it may not be the best way to go, because the one course may not be adequate to help a student understand, internalize, and subscribe to the sustainability paradigm long-term. If the other courses taken by the student at the college are taught within the dysfunctional paradigm of nature as an unlimited resource, the student may not retain the sustainability paradigm. For example, if a student takes a literature course that is filled with literary metaphors that nature is to be conquered and harvested by human beings, without attention to polluting effects, and then the student takes both history and political science courses which focus on the U.S. historical commitment to rugged individualism without regard to taking care of ‘the commons’, the student may lose his or her internalization of the sustainability paradigm.

More research is needed in this area, but in the meantime, it seems reasonable to assert that the best approach to teaching environmental literacy and social responsibility /civic engagement is to combine strategies to include sustainability by incorporating multiple approaches simultaneously. In other words, it may be most effective to have general education degree requirements AND to infuse sustainability concepts throughout the curricula AND to offer increased numbers of interdepartmental minors in sustainability AND to recognize the other sectors of the institution as an important part of the latent curricula AND to incorporate a commitment to sustainability in the strategic plan and mission statement of the institution. To continue our example, if all approaches are combined, the student in our example would have required courses in sustainability and would also have their literature teacher, history teacher and political science teacher all point out that the old paradigm of conquering nature and rugged individualism is being questioned by many in society who advocate the sustainability paradigm as a necessary perspective for a positive societal future. The student would also have the option to focus on sustainability in more depth by taking a minor in the area. In addition, the student might see statements during orientation, and signs in their dorms and in their cafeterias throughout the year explaining the college’s efforts to be more sustainable and encourage sustainable behaviors among the staff and students. Finally, published institutional mission statements would reflect and model for the students a commitment to sustainability. This author hypothesizes that such a multi-level approach would have a stronger and more consistent impact on students than just selecting one strategy.

Prescott College is a good example of this multi-tiered combination of approaches. The college has included sustainability in its mission and strategic plan, in its operations, as a core degree requirement, and as an infusion of sustainability concepts throughout the curricula. In addition, the college has a four hour long orientation where the students engage in a mini-liberal arts activity discussing environmental issues through multiple perspectives as well as a service learning component so students can apply and practice their new knowledge and skills about sustainability.

Implications for sustainability curricula – The process for political acceptance

This author collected anecdotal evidence about the processes used to successfully add a degree requirement and/or a curricula infusion about sustainability across the disciplines. At some colleges, input during strategic planning moved the whole direction of the institution toward sustainability and environmental literacy. At some institutions, the general education

review process has been the point where sustainability and environmental literacy is discussed and then included in curricula requirements. At a number of these colleges, faculty collected and shared information about what other colleges were doing, which lowered the barriers to change. In addition, the facilitating faculty often asked the rest of the faculty to brainstorm what key skills and knowledge, or competencies, students should have when they graduate with a degree to be successful in their adult roles of citizen, worker and family member. These faculty brainstorms tended to include environmental literacy and social responsibility. These lists were then used to help transcend territoriality when the General Education requirements were revised.

To complete the task, faculty supporting the addition of sustainability requirements had to attend the meetings in enough numbers to assure passage of the changes. In those institutions where the value of sustainability principles were not an inherent part of the organization's value system, facilitating faculty did not shy away from the omnipresent organizational politics. They counted votes ahead of time, educated and influenced committee members in between meetings, and/or tied the acceptance of sustainability requirements to other items that had support. This intriguing yet not statistically significant, anecdotal evidence needs to be tested through research, to help other people in higher education who are attempting to add sustainability into their own college's curricula understand how to make effective and positive change.

At other institutions, neither the strategic planning process or the general education revision process was used to create change. Faculty announced a series of meetings open to all educators who were interested in talking about how to include sustainability and environmental literacy in their courses, and interest built from there was used to gain resources for professional development. At some institutions, faculty worked with other college staff to involve students in sustainability projects in other sectors of the academy: research, operations and student activities.

Once the commitment is made to include sustainability (environmental literacy and social responsibility/civic engagement), institutions can enhance the success of the commitment by supporting professional development and faculty sharing initiatives. Administrators should also consider positively counting in the tenure decision faculty members' course revisions to include sustainability and providing support and resources for this task. Without this tenure incentive, untenured faculty cannot take the time to produce course revisions because of the pressure to publish to meet tenure requirements.

Implications for sustainability curricula – Research needed

More longitudinal studies are needed to see what approaches and combinations of approaches best encourage graduates to be proactive change agents for sustainability concepts. Research is also needed on what types of teaching are most effective. Research assessing what professional development is most effective would also be very helpful to higher education institutions. "Assessing environmental teaching methods and learning outcomes across all higher education disciplines is an area in which much more work is needed" (National Wildlife Federation, 2001). Additional surveys over time are needed to assess changes in how many schools require or systematically include sustainability concepts in the curricula. Collection of information on sustainability requirements and models in other countries would be very useful. Research on how to effectively handle organizational politics and make the

shift from the old conquering nature paradigm the new sustainability paradigm would also be constructive.

Resources to assist the addition of sustainability - Other curricular resources

As mentioned above, an outstanding resource for higher education educators is Second Nature, a Boston-based national organization helping institutions of higher education prepare future professionals for the increasingly complex environmental challenges the nation faces. The organization offers colleges and universities a range of programs, training sessions, one-on-one consulting and online resources to make the integration of environmental sustainability thinking "second nature" to higher education. Second Nature works with colleges and universities to incorporate sustainability concepts into campus life via teaching, learning, research, and interaction with the community and campus operations. Second Nature also supports networking among stakeholder groups by designing interactive workshops, facilitating intra- and inter-institutional collaborations, gathering and disseminating 'best practices' resources, providing institutional consulting, and promoting the vision of Education for Sustainability. Second Nature's Resource Center and web site(<http://www.secondnature.org>) is a substantial and well-used repository of materials submitted by individuals from across higher education and includes Education For Sustainability profiles, courses and methods, sustainability contacts, calendar, Education For Sustainability writings and a bibliography.

The Teaching and Learning for a Sustainable Future report by UNESCO is another resource for helping educators integrate sustainability into the curricula:

Teaching and Learning for a Sustainable Future is a multimedia professional development programme prepared by UNESCO for teachers, teacher educators and student teachers - as well as curriculum developers, education policy makers and authors of educational materials. The programme contains 25 modules. Each one involves 4 hours of interactive activities - a total of 100 hours of professional development for use in pre-service and in-service teacher education (United Nations Educational, Scientific and Cultural Organisation, 2001).

The first five modules present a sequenced introduction to global realities, imperatives for sustainable development, and educational issues that form the rationale of Education for a Sustainable Future. Additional modules include exploring global realities, understanding sustainable development, a futures perspective in the curriculum, reorienting education for a sustainable future, and accepting the challenge. A third set of modules illustrates ways in which education for a sustainable future can be integrated across the curriculum. The last set of modules explain teaching skills and methodologies helpful for the successful teaching of the knowledge, skills and values necessary to understand and implement sustainability, including experiential learning, story-telling, values education, enquiry learning, appropriate assessment, future problem solving, learning outside the classroom and community problem solving.

Both secondary and higher education educators can get information on how to teach change agent skills and actions to help keep the planet healthy via "The Sustainability and Energy Education Project", funded by the state of Michigan. Resource guides, free learning activities and curricula, and open ended questions that can be used to introduce sustainability to a variety of disciplines are available by selecting the Sustainability Education Handbook at www.urbanoptions.org.

For community and technical colleges, The Partnership for Environmental Technology Education (PETE) provides leadership in environmental education and training through

community and technical college partnerships with business, industry, government and other educational providers. The National Science Foundation funded Advanced Technology Environmental Education Center (ATEEC) advances environmental technology education through curriculum development, professional development, and program improvement in the nation's community colleges and high schools. These two organizations have environmental curricula databases and assistance and are just completing a model curriculum in Energy Technology, focusing on energy conservation, energy efficiency and renewable energies, with modules available for integration into a variety of programs.

Some institutions depend on outside programs to infuse environmental literacy into the curricula. At Living Routes, over 50 cooperating colleges benefit from the opportunity to send their students to college-level learning experiences within ecovillages around the world. (Living Routes, 2001). The Center for a Sustainable Future (csf.concord.org) is working with colleges around the world, providing teacher training, downloadable learning activities and on-line courses in sustainability.

While this chapter has focused on developing environmental literacy and social responsibility/civic engagement for all undergraduates, it is important to mention that some graduate program are good models for incorporating sustainability concepts, and undergraduate curricula developers may learn from these examples. The following two examples are representative of these opportunities. The Field Study Trip Program at Antioch New England Graduate School offers an unparalleled opportunity for on-site, first-hand learning about sustainability. Through a mix of field seminars, guest speakers from the area, work projects, field research exercises, and intentional group dynamics, the field study class allows students to learn through immersion in a specific place. Such place-based education involves direct interaction with the environment, gaining perspectives on the ways people live in that environment and use its natural resources (Second Nature, 2001).

At the University of North Carolina at Chapel Hill, the Kenan-Flagler Business School's Sustainable Enterprise Initiative includes teaching, research, programs and activities, service and outreach. Content relevant to sustainable enterprise has been woven into current executive education programs and several new initiatives are planned. Second-year students can now specialize in sustainable enterprise by taking a mix of required and recommended courses that cover issues including urban reinvestment and minority economic development, environmental management systems, social marketing, life cycle management, finance and sustainability, and sustainable development (Ibid, 2001). Other business schools that have tried to incorporate sustainability into their curricula are profiled by the World Resources Institute in their Grey Pinstripes report. According to Rick Bunch, the

World Resources Institute's business education projects have been working since 1990 to ensure that environment and sustainability are fundamental components of business school curricula around the world. WRI's BELL (Business-Environment Learning and Leadership) projects, in North and Latin America and China, develop and publish business school curricula, provide curriculum resources, facilitate faculty networking and offer training events and conferences for business school faculty and staff. The Environmental Enterprise Corps (EEC) offers business school students experiential learning opportunities helping green startup firms with their business development needs. The biennial report, *Beyond Grey Pinstripes: Preparing MBAs for Social and Environmental Stewardship* (produced jointly with the Initiative for Social Innovation through Business of The Aspen Institute) reports how leading business schools around the world infuse these issues to their curricula. The report highlights innovations, helps students find MBA programs that support their interests, and inspires competition among schools to do better (Bunch, 2001).

Curricula developed for and lessons learned from the above graduate programs could be applied to undergraduate programs, and should be considered a resource for institutions contemplating a move toward sustainability.

Highlighting an interesting model of infusing sustainability into multiple disciplines

Encouraging professors to include sustainability concepts in their courses is often met with resistance. Professors are often uncomfortable teaching outside of their normal course content. What curricular projects promote environmental literacy and positive change agent skills, are easily integrated into existing curricula in multiple disciplines, and can be enjoyably utilized by professors who have not previously taught environmental literacy or change agent skills?

For a more thorough exploration of this subject, the reader is directed to Second Nature's web site at www.secondnature.org, which houses a database of syllabi and learning activities about sustainability. The following example has been selected as a model for higher education in Education for Sustainability: A Paradigm of Hope for the 21st Century (MacGregor, 2000). It is presented here because it is a good example of a curricular project that is easy to implement in a variety of disciplines and embodies the components necessary to help develop positive change agents for sustainability.

At Oakland Community College, the faculty has developed a flexible instructional and curricular project model that is simple, inexpensive AND FUN to implement in a variety of disciplines or as part of an interdisciplinary learning community. For both teachers and students, the model reduces apathy, and instills attitudes and skills required to become positive change agents for the environment. Small groups of students envision a positive scenario for the future of society using two themes, creating a more humane society and environmentally sustainable society. Students then use discipline concepts from the course to create a story describing how society changed from today to their positive future scenario.

Logistics

The small groups mentioned before are made up of nine to twelve students per group, with three to four students from each of the participating classes (in this case, Introduction to Psychology, American Government, and Microeconomics). The professors add thirty minutes to one section of each course, offer the courses simultaneously, and put a footnote in the schedule explaining that the extra thirty minutes will be used for an interdisciplinary project, but this project could also be accomplished by using existing class time. Dual/blocked enrollment is not necessary because students only sign up for one course. There is no need to change course descriptions because students get the regular content of the course. Even though professors have used combinations of Economics, Political Science, English and Psychology courses, any combination of disciplines can be used and other institutions have replicated this project using a wide array of disciplines. Students experience interdisciplinary thinking if multiple separate classes of students participate in the project, but the curricular component can also be used within a single discipline's course.

Grading and Workload for Students

This project is worth approximately 30% of the course grade, although that is easily adjusted by the instructor using the project. About half of the project grade is a group grade and the other half is a grade of the individual's reflective papers. Students individually compare the

scenarios presented by the groups and write about their personally preferred scenario and their willingness to help create this positive society in real life. Students' assessments of their group members are weighted into the project grade in order to prevent loafing by individuals. The workload for the students is similar to other sections of these courses without the interdisciplinary project, because the project replaces other homework assignments that emphasize the application of discipline concepts.

Change Agent Skills and Materials

Students are taught the following skills: the four Ps of futuring (brainstorming and positive scenario building skills), the four Ds of doing (implementation skills), the ABCs of preventing burnout, and Critical Thinking to Critical Action Skills (Rowe and Bartleman, 1999). (These materials are available upon request to the author.)

Economic Viability of a Positive Future

The students gain a sense of the scope of problems and the relative expenditures required for solutions. For example, students read analyses from the World Game Institute describing how global population can be stabilized, starvation and malnutrition can be virtually eliminated, drinking water can be cleaned, deforestation, greenhouse gas excesses and ozone depletion can be stopped, renewable energies and energy efficiency technologies can be implemented, developing nations' debt can be retired, and illiteracy can be eliminated, all for less than 25% of the world's annual military budget. The instructors do not advocate this shift away from military expenditures. They use this analysis to show the relative size and cost of solutions to global problems. Many students erroneously think these problems are too expensive to ever be addressed adequately within the resources of global budgets (World Game Institute, 1997).

Building Political Efficacy

Students read and hear success stories about people proactively helping their communities and societies. A cart of materials on reserve in the library gives students exposure to some of the best futurists of our time; people who can envision and articulate environmentally sustainable, humane and practical possibilities for the future. (The librarians reported that the materials are heavily used.) Some students use the database available through the Giraffe Heroes program (www.giraffe.org), which is presently in the schools of 47 states, helping students identify the hero within. The Giraffe storybank holds profiles of over 800 real heroes, people who touch the heart, inspire action and demonstrate that one person can make a difference.

Students Create A "Positive Futures Fair"

After the students create scenarios, they learn how to create a Positive Futures Fair. They acquire valuable skills and the fair is an inspiring campus event. Students conduct research to find which local organizations are creating a more humane and environmentally sustainable future for society and invite these organizations to participate.

Students help write a press release and distribute fliers on campus and at local schools and places of business. Each organization has a display table and gives a short speech in the auditorium about their organization, describing career and volunteer opportunities. Student enthusiasm for the fair is very high, and many students become interested in careers they

never knew existed. Most students have little previous exposure to how organizations are creating a more humane and environmentally sound society. Many students volunteer after the Fair. Some institutions have replicated just the Positive Futures fair and have found that it stands on its own as a successful project to teach some of the knowledge, skills, values and attitudes required for a shift to a sustainability paradigm.

Research results support that students using this model developed:

- increased caring about the future of society,
- increased belief that they can make a difference,
- increased willingness to participate in solving societal environmental problems (Rowe and Bartleman, 1999).

Providing educators with sample projects like the above can lower the barriers to involvement in sustainability curricula.

Resources to assist the addition of sustainability - Networks

A number of associations have developed to share information between institutions that are striving for inclusion of sustainability in their curricula and operations. These networks have mission statements, programs, materials and precedents to use and replicate, as well as providing a way for institutions to communicate with each other.

The University Leaders for a Sustainable Future (ULSF) is unique in the U.S. because it maintains an international focus. ULSF recently formed a partnership with the COPERNICUS Programme of the Association of European Universities, the International Association of Universities (IAU), and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to build a global transformation toward sustainability in higher education. ULSF works in partnership with more than 275 international signatories of the Talloires Declaration and other colleges and universities pursuing sustainability (University Leaders for a Sustainable Future, 2001).

The Higher Education Network for Sustainability and the Environment (HENSE) is a broad-based North American network of individuals, institutions and organizations whose vision is to make education for sustainability and the environment a foundation of all aspects of higher education: teaching, research, operations, and community outreach. This emerging network is involved with a number of sustainability projects and is positioned as a mainstream organization for all people affiliated with or interacting with higher education who want to benefit from being part of a sustainability network with a North American focus. HENSE has a listserv available to all (Higher Education Network for Sustainability and the Environment, 2001).

The North American Alliance for Green Education is a non-profit consortium of varied higher educational institutions and organizations from diverse bioregions and includes many of the example institutions described above. Their joint vision is of “education dedicated to nurturing pro-active community members capable of creating a sustainable balance between natural and social ecologies” (North American Alliance for Green Education, 2001).

Networks have also developed with bioregions and geography in mind. In the United States, The Associated Colleges of the South have received funded to further develop their ongoing initiative regarding environmental literacy. The Pennsylvania Consortium for Interdisciplinary Environmental Policy (www.paconsortium.state.pa.us/) is comprised of environmental policy makers as well as 41 universities and colleges devoted to improving environmental policy and understanding through government and academic cooperation that

encourages interdisciplinary analysis and discourse. The New Jersey Higher Education Partnership for Sustainability (www.njheps.org) is committed to building sustainability on campuses via supporting teams who are making changes in curriculum, research, campus facilities management and public policy outreach. This organization also documents these changes through a best practices project so other campuses might replicate them. There is also a listserv one can join. The United Negro College Fund has a Building Environmental Stewardship Program (www.uncfsp.org/bes), with a chat room for its ten participating institutions about sustainability, including both environmental issues and social justice. Other nascent networks are on the west coast and in the Midwest (Minnesota, Wisconsin, Indiana, Michigan).

For curricula assistance in the area of social responsibility and civic engagement through service learning, contact National Campus Compact (www.compact.org), and the National Center for Community Colleges (<http://mcweb.mc.maricopa.edu/academic/compact>).

Conclusion

The National Wildlife Survey looked at academic content, operations, management and institutional commitment to environmental performance and sustainability. In the overview of key findings, the area where the most improvement is needed is “Ensuring graduates, regardless of major, are environmentally aware and literate” (McIntosh, Cacciola, Clermont, Keniry, 2001). The planet has environmental problems, such as climate change, that threaten every type of ecosystem. Humans are making changes to the environment without pretests or complete understandings of the consequences and these changes threaten the habitability of the earth for humans and many other species. Most courses still come from the obsolete paradigm that resources are endless and pollution is not a serious issue instead of the more realistic paradigm of sustainability. Educated decisions will have to be made in the personal, business and government arenas to address the environmental challenges of the future, yet we still graduate most students with an undergraduate degree that has no requirement to become environmentally literate.

In terms of social responsibility, the majority of institutions do not require courses that describe either the global distribution of wealth and natural resource use, or the analysis skills and attitudes required to have a high level of social responsibility and a deeper understanding of the term “quality of life”. In addition to the environment and social responsibility, most students are still taught to be “armchair pontificators” or critical thinkers, looking for careers within existing job offerings instead of learning how to become positive agents of change who can change institutions and create new jobs necessary to a sustainable future. Change agent skills are not included in most academic programs.

The good news is that a growing number of institutions are recognizing this flaw in the norms of higher education and are making new commitments to teach sustainability. New models for both degree requirements in sustainability and infusions of the sustainability paradigm across the curricula are now available as precedents for other institutions. Networks have formed to facilitate communication and organizations exist to help higher education institutions move forward to help create a more equitable and environmentally sound future.

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