SUSTAINABILITY

Education for a Sustainable Future

Sustainability is being integrated into higher-education institutions' mission and planning, curricula, research, student life, and operations.

Debra Rowe

Sustainability is a lens through which increasing numbers of individual colleges and universities, as well as national organizations, are collectively examining and acting upon our shared world systems (*1*, *2*). In the United States, a national trend has begun, but much more needs to be done.

CREDIT: CALIFORNIA STATE UNIVERSITY AT CHICO

College and University Actions

Sustainability is being integrated into U.S. institutions' mission and planning, curricula, research, student life, operations and purchasing, and community partnerships. Students and staff at hundreds of campuses are engaged in sustainability committees and actions, including the following: learning to focus on acquiring sustainability knowledge and application skills; sustainability-oriented film festivals, speakers, and other campus events; socially and environmentally responsible criteria for purchasing and endowments; infusion of sustainability into the general education core requirements, courses, disciplines, whole colleges, and specialized degrees; and regional and global approaches to sustainability in collaboration with businesses, government, nongovernmental organizations (NGOs), and kindergarten through high school (K–12) education.

Core requirements at many universities and colleges (e.g., Portland State University, Miami Dade Community College, University of Minnesota) include the components of sustainability education, even if the word sustainability is not specifically used. Degrees in sustainability have sprouted up at dozens of institutions [see (*3*) for a listing]. In the Campus Climate Challenge, students on over 400 campuses are working with administrators and staff to measure and reduce greenhouse gas emissions (*4*) and are voluntarily raising student fees and changing energy policies to move to renewable sources.

U.S. business, architecture, and engineering schools are in the forefront of sustainability education. Architecture and engineering schools have criteria for accreditation that require students to be able to understand and implement sustainable design. Nonprofit organizations such as Engineers for a Sustainable World and Engineers without Borders have developed. The World Resources Institute and the Aspen Institute have worked with business schools to develop case studies and business curricula that include sustainability principles and practices (*5*). Increasingly, interdisciplinary learning experiences focus on our sustainability challenges.

The purchasing power alone of colleges and universities, as they demand more environmentally and socially responsible products and processes, can help move sustainability from its present niche markets to become the standard in product and process design. This can be expressed through commitments to sustainable behaviors and policies in institutional mission and planning; more energy-efficient and greener buildings and operations; substantial purchases and installations of renewable energies and commitments to carbon emissions reductions and neutrality; sustainability audits and reporting; and sustainable living campaigns in the residential halls. For example, over 300 presidents have signed commitments and taken action to move toward carbon neutrality and to eliminate greenhouse gas emissions. Michigan State University, NYU (New York University), University of California at Berkeley, the Pennsylvania State University, and others have conducted sustainability audits and reports. Sustainability-oriented residential living practices are in place at Bowdoin, Carnegie Mellon, Dartmouth, Harvard, Tufts, University of Vermont, and Yale. Rutgers and the National Association for Educational Procurement have focused on developing resources for the purchasing side of sustainability (*6*, *7*). Stanford University has developed both environmental and social screens for their endowments.

A statement drafted by the Business Sector Team of the U.S. Partnership calls upon higher education to make sustainability education a requirement for all undergraduates. Participating members came from both small and large corporations—from media conglomerates to energy companies such as Duke Energy and consumer products such as Burt's Bees. "All students need to learn, through an interdisciplinary approach, not only the specifics of our sustainability challenges and the possible solutions, but also the interpersonal skills, the systems thinking skills, and the change agent skills to effectively help to create a more sustainable future. We are looking for these sustainability educated students as future business people, as employees, as consumers, innovators, government leaders and investors" (*8*).

Activities of National Organizations

After the United Nations declared a Decade of Education for Sustainable Development (2005–14), a grassroots effort from higher education developed in the United States in the absence of a federal government response. The National Council for Science and the Environment hosted its annual conference in 2003 on Education for a Sustainable and Secure Future. Out of that meeting, the U.S. Partnership for Education for Sustainable Development (*9*) was created to catalyze a U.S. response for this decade and beyond. This national network of over 300 organizations has sector teams in Faith, Business, Communities,

President of the U.S. Partnership for Education for Sustainable Development, Washington, DC 20037, USA; E-mail: dgrowe@oaklandcc.edu

Downloaded from www.sciencemag.org on July 31, 2007

Published by AAAS

Higher Education, K–12 schooling, and Youth. The U.S. Partnership convenes mainstream leaders and catalyzes their commitment to educating for a sustainable future. With impetus from multiple sources interested in sustainability, three major efforts emerged in the higher-education sector: the Higher Education Associations Sustainability Consortium (HEASC), the Disciplinary Associations Network for Sustainability (DANS), and the Association for the Advancement of Sustainability in Higher Education (AASHE).

The HEASC (*10*) was formed to advance sustainability in the mainstream higher education associations and in the system of higher education itself. HEASC members currently represent about half of the U.S. college and university presidents; about half of all of the boards of trustees, and many, if not most, facilities directors, business officers, college and university planners; purchasers; and staffs of residential housing, student affairs, and campus activities. Projects include the Higher Education Climate Action Partnership (*11*) to measure and reduce greenhouse gas emissions, support for the American College and University Presidents' Climate Commitment for clean energy, carbon-neutral campuses (*12*), and professional development initiatives on sustainability.

DANS (*13*) was formed after the U.S. Partnership asked the Association of American Colleges and Universities (*14*), the AASHE (*15*), and the Association of University Leaders for a Sustainable Future (*16*) to cohost meetings of more than 20 disciplinary associations to discuss each discipline's potential contributions to a more sustainable future. These meetings included national associations for psychology, sociology, philosophy, religion, biology, chemistry, engineering, anthropology, political science, math, broadcasting, architecture, women's studies, and others. Working groups are focusing on infusing sustainability into curricula, professional development, standards (including tenure, promotion, and accreditation criteria that value sustainability research and action), cross-disciplinary projects, legislative briefings, and ways to educate the public about how to help create a sustainable future (*17*).

AASHE (*15*) serves colleges and universities in the United States and Canada. It offers an extensive resource center of sustainability initiatives and policies, discussion lists, sample syllabi showing how sustainability can be infused into various courses, a biennial conference, and professional development opportunities. AASHE also publishes an electronic-mail bulletin and an annual digest with campus sustainability news stories, resources, events, and job opportunities.

Moving Forward

For real progress, the implementation has to be broad (across all higher education institutions) and thorough. We need to make sure that none of the courses currently being taught in the United States reflect the old, inaccurate paradigms such as "endless resources" and "man conquers nature." Textbooks need to describe our sustainability challenges and the contributions each discipline can make to the solutions. Funders have to support such work. The National Science Foundation should encourage a sustainability focus in its grants to STEM (projects to increase students' interest in science, technology, engineering, and mathematics) and other areas and should fund interdisciplinary coursework and research. Other governmental funding sources, foundations, and corporations need to understand and support this trend.

Through sharing stories of how people have made a difference in society and by providing assignments that focus on solving real sustainability issues, educators can engage students and help institutions and the larger society turn toward more sustainable behavioral and policy norms. Students can learn and practice via such assignments how to be more environmentally, economically, and socially responsible and how to support policies and legislation that support a sustainable future. Imagine what might happen if students were regularly assigned actual sustainability problems that were brought to higher education by cities, businesses, nonprofit organizations, and other institutions. If classroom exercises produced workable contributions to solutions, students would understand they can have a positive impact on the world through their academic learning. Most of our higher education institutions include somewhere in their mission statements goals for preparing students to help create a better society, yet this ideal is often not fully implemented. Given the challenges of sustainability and the need for policy and behavioral modifications, we need to change our emphasis from critical thinking alone to the inclusion of effective change-agent skills and opportunities to take action on campus and off. A matchmaking Web site listing real-world sustainability projects from business, government, and nonprofit organizations available to students, faculty, and volunteers has just been launched (*18*).

To have a sustainable future, sustainability education has to be implemented at the K–12 levels as well. There are examples of innovation, including the Sustainable Schools Project sponsored by Shelburne Farms in Vermont (*19*); the Educating for Sustainability master's of education program at Antioch University training teachers for the K–12 level (*20*); and the global sustainability resources produced by Facing the Future (*21*), including K–12 curricula, community service activities, and teacher preparation programs.

However, state standards and assessments primarily emphasize writing, reading, and math, often do not relate to societal problems and solutions, and create barriers to learning about sustainability. The K–12 sector team of the U.S. Partnership has created draft sustainability education standards, has compiled resources for K–12 teachers, and has just begun a process similar to what was done in higher education to convene the national leaders in K–12 education and to share information to catalyze their commitment to sustainability.

Right now, sustainability is treated by many as an add-on, as another item on an already full plate. Sustainability needs to be a main focus of our efforts in education. Given the educational and research capacity, the external partnerships, and the position of higher education as an influential voice in society, there is ample opportunity for higher education to help shift societal norms toward a healthier environmental, social, and economic sustainability.

References and Notes

1. A. Cortese, Higher Education Associations Sustainability Consortium (HEASC) presentation, 12 January 2007.
2. For additional information regarding available resources, see the supporting online material.
3. For a listing, see Association of University Leaders for a Sustainable Future (ULSF), www.ulsf.org/resources_sust_degrees.htm.
4. Campus Climate Challenge, www.climatechallenge.org.
5. Beyond Grey Pinstripes, www.beyondgreypinstripes.org.
6. Rutgers, http://purchasing.rutgers.edu/ green/index.html.
7. National Association of Educational Procurement (NAEP) www.naepnet.org/Microsites/sustainability/sustainability.html.
8. Minutes of 30 April 2007 meeting, Business Sector Team, U.S. Partnership for Education for Sustainable Development, Washington, DC, Appendix A.
9. The U.S. Partnership, www.uspartnership.org.
10. HEASC, www.aashe.org/heasc.
11. Higher Education Climate Action Partnership, www.hecap.org.
12. University President's Climate Commitment, www.presidentsclimatecommitment.org.
13. Disciplinary Associations Network for Sustainability, www.aashe.net/dans.
14. Association of American Colleges and Universities, www.aacu.org.
15. Association for the Advancement of Sustainability in Higher Education, www.aashe.org.
16. ULSF, www.ulsf.org/.
17. AAAS is part of this network. Contact Sarah Banas at sbanas@aaas.org to participate.
18. Play a Greater Part, www.playagreaterpart.org.
19. Sustainable Schools Project, www.sustainableschools project.org/index.html.
20. Antioch University, www.antiochne.edu/ed/exed/ss_edforsustainability.cfm.
21. Facing the Future, www.facingthefuture.org/.

Supporting Online Material

www.sciencemag.org/cgi/content/full/317/5836/323/DC1

10.1126/science.1143552

Downloaded from www.sciencemag.org on July 31, 2007

Published by AAAS