

GREEN EDGE

THE GREENING OF EDUCATION

by Jason F. McLennan, lead architect and Peter Rumsey, engineer



Copyright 2004 Jake Johnson

A renewed awareness of the environmental impact of our actions has spurred a proliferation of new academic programs, including environmental planning and design, sustainable urban design and even green MBAs. Many architecture and engineering schools have added sustainable design to their curriculum. But for the most part, the progress in the private sector, led by the U.S. Green Building Council, innovative building materials suppliers, and passionate individuals, has moved ahead of academia. With today's overstressed environment and health problems caused by buildings, sustainable design deserves to be the guiding principle behind every architecture and engineering program. How can we reduce this gap and ensure that tomorrow's graduates are armed with the skills necessary to meet the growing environmental challenges we face in the built environment?

The environmental impact of the work done by engineers and architects cannot be overstated. For example, a typical mechanical engineer will design the equivalent of 43 MW of cooling systems capacity in her career. This load will require the utility to spend over \$25 million on added power plant capacity. By investing in training the engineer to employ whole systems design, it is possible to reduce cooling systems' energy use by 50 percent, with significant lifecycle economic and environmental impact.

Green design is a collaborative and interdisciplinary process, and a whole systems design approach is the key to increased resource productivity and cost savings. However, the fundamental structure of most architecture and engineering schools emphasizes specialization and discourages integration between various disciplines. Currently there is very little collaboration between architects, interior designers, landscape architects and engineers of any kind. Engineering education is often compartmentalized, with little instruction in the holistic blending of systems design, sustainability and economics. The traditional design process focuses on optimizing components for single benefits rather than whole systems for multiple benefits.

reforming the education system

The first step toward reforming the education system is to reject this bias and consider ways to expose students to a wide variety of disciplines. Students should be encouraged to focus on design that responds to local climate, not just whatever is in fashion. The core curriculum should incorporate broader aspects of environment and sustainability. The Board of Direction of the American Society for Engineering Education has taken up the cause, recently stating: "Engineering faculty should use systems approaches, including interdisciplinary teams, to each pollution prevention, lifecycle analysis, industrial ecology and other sustainable engineering concepts."

A few U.S. architecture and engineering schools have done an exemplary job of weaving sustainable design throughout the entire

with today's overstressed environment and health problems caused by building, sustainable design deserves to be the guiding principle behind every architecture and engineering program

curriculum rather than just offering elective courses as a disparate subject from conventional study. Examples include programs at Carnegie Mellon and the Universities of Oregon and Arizona. Canada's leading sustainable design education includes Seneca College Center for the Built Environment's program on Urban Sustainability and the University of British Columbia.

At most institutions, however, sustainable design programs are taught by a single faculty member with very little institutional support. We must create a more effective dialogue of educators and students about sustainable design. The larger discussion of the ethics of sustainability could help infuse new meaning into the education of our future design and engineering leaders. The USGBC and AIA could develop training programs specifically for faculty who want to bring green design classes to their students.

teaching tools

The creation of a variety of sustainable design teaching tools is greatly needed. Some case studies are available, as well as Web-based resources and pioneering work such as The Sustainable Design Technical Manual. Yet educators still must cobble together information because there is no comprehensive

national standard curriculum. The dearth of teaching materials makes it much more difficult to offer new classes. More help is on the way. The Rocky Mountain Institute (www.rmi.org) recently launched Factor Ten Engineering, a four-year program to develop and introduce pedagogic tools on whole system design for both engineering students and practicing engineers. RMI also offers useful publications such as Green Developments. Jason's new venture Ecotone Publishing (www.ecotonedesign.com) is developing an architecture text based on his new book The Philosophy of Sustainable Design. Teachers from schools all over the country will participate in the development of this textbook, showcasing student work from many programs.

Students that leave design and engineering programs equipped with sustainable design knowledge will have valuable, marketable skills. A growing list of nationally leading firms now insist on green architecture knowledge as a prerequisite for hiring, an indicator that sustainability is finally entering the mainstream. Many students are finding that LEED accreditation on their resume is just as important as knowledge of AutoCAD. As mentors to students and interns, let's do our part to encourage

them to expand their knowledge base and get hands-on experience with the LEED rating system.

The buildings of the future should be designed by people who understand their impacts on, and responsibility to, the environment. Improving our educational system will go a long way toward achieving this goal. +



Jason F. McManis is a nationally recognized leader in the Sustainable Design Movement and is the founder and director of Elements, the sustainable consulting division of ENIM Architects based in Kansas City (<http://elementsbnim.com>). He can be reached at jmcmman@bnim.com.



Peter Rumsley, PE, CEM is an emerging leader in engineering design for sustainable buildings whose work has earned national recognition. He is founder and president of Rumsley Engineers, Inc., in Oakland, Calif. (www.rumsleyengineers.com). He can be reached at prumsley@rumsleyengineers.com.



Check us out online!
visit EDCmag.com

Environmental
Design+
Construction