



The Internet can expand an educator's reach

With emerging disciplines in engineering and advances in technology, engineering education is becoming increasingly complex. The Internet is a viable tool to share knowledge and practice tips—a tool of which Canadian engineering educators have yet to take full advantage, say the authors.

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Engineering is a discipline that is becoming increasingly complex to teach and practice. Today, engineering educators must be current on the state-of-the-art and teach what they practise and research. On both these counts, the Internet is an indispensable tool. No one instructor, however, can be current on all the subject matter that he or she teaches. Consequently, there exists an urgent need to publish course materials, preferably via the Internet, for wide and real-time dissemination, as has always been the case with research publications. In order to achieve excellence in engineering education, we should thus make a concerted effort to use the Internet to build on each other's works.

On April 4, 2001, MIT President Charles M. Vest announced that the Massachusetts Institute of Technology would make the materials for its courses freely available on the Internet. This US\$100M program is known today as MIT OpenCourseWare (OCW) and already contains materials for about 100 courses (<http://ocw.mit.edu/>). It is envisioned that by September 2007, almost all of MIT's courses will be published on their website. President Vest expressed that "education can be advanced by constantly widening access to information and by inspiring others to participate."

He added that "OpenCourseWare will make it possible for faculty here (MIT) and elsewhere to concentrate even more on the actual process of teaching, on the interactions between faculty and students that are the real core of learning."

While OCW is not the first initiative to gather and make available educational materials (e.g. the National Engineering Education Delivery System, the South East Advanced Technological Education Consortium, and the Canadian-based Engineering.com), it is perhaps the most ambitious and noteworthy initiative of its kind. This is partly because of the international reputation that MIT has garnered, but also because of the breadth and scope of the project itself.

Although the OCW initiative has numerous novel objectives, the two most beneficial ones to Canadian engineering educators and practitioners are as a source for curriculum development and for self-study or supplementary use. The OCW program should be considered as a model for Canadian engineering schools to make similar content open and available to all for real-time dissemination of knowledge via the Internet. These ini-

tiatives would then be linked through the World Wide Web (WWW) to create a vast repository for the collection of educational resources.

One can rightfully argue that many individual instructors and engineering departments in Canadian universities do place large amounts of course materials on their websites. However, most of these sites, and their counterparts in the U.S. and elsewhere, are not open to outsiders, primarily due to lack of funds to maintain them professionally and to protect intellectual property rights. Other sites are behind various dynamic systems, such as WebCT, which make them difficult to access from outside the specific user community. Still other collections of information are just difficult to find even with such tools as the Google search engine (<http://www.google.com>).

A contrary example to this restrictive practice is the initiative of the Canadian Design Engineering Network (CDEN, <http://www.cden.ucalgary.ca>). CDEN, as does OCW, advocates that Canadian engineering schools should "work collaboratively to share knowledge, expertise, and experience to promote the best possible

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teaching and learning of design engineering” and allow Canadian engineering industries to have ready access to academic expertise in design engineering. Today, CDEN maintains a repository of courseware (targeted to design engineering) for its members. At its inception, CDEN’s membership included 33 of the 34 Canadian universities that offer engineering programs. CDEN, currently funded by the Natural Sciences and Engineering Research Council, differs from MIT’s OCW in that the course materials will be offered in a “standardized” format to facilitate their use.

We also recognize that there are many excellent sources of educational material outside North America. To make all those materials more accessible to Canadian engineering educators/practitioners, two online systems are currently maintained at Ryerson University’s website: <http://deed.ryerson.ca/corc/> and <http://deed.ryerson.ca/cgi-bin/serf/search>. The latter site, specifically, is Prof. Salustri’s searchable collection of more than 1000 links relating to engineering, software, and artificial intelligence. Another individual effort is the website of Prof. Benhabib at the University of Toronto: <http://www.mie.utoronto.ca/labs/ciml/bb-book/>. This website includes 16 free downloadable presentations (more than 500 slides in Windows PowerPoint and Adobe PDF formats) that encompass such topics as competitive manufacturing, concurrent design, modern manufacturing techniques, instrumentation for manufacturing control, control of manufacturing systems and quality assurance. They are based on Prof. Benhabib’s book *Manufacturing: Design, Production, Automation, and Integration* (Marcel Dekker, 2003).

Finally, we are certain that the above will encourage Canadian engineering educators and others to share freely course materials and best practices of curriculum development in their institutions over the Internet. Such a grass-roots movement would eventually lead to improved education of Canadian engineering students by offering a better selection of materials to educators and practitioners than is currently available. For example, several individual initia-

tives on updating the engineering curriculum at different universities were reported recently in *Engineering Dimensions* (July/August 2003 issue). In each case, the reports belie a tremendous effort to bring those changes to fruition. The expertise garnered by these educators should be disseminated widely, perhaps through a network like CDEN, so that others involved with curriculum reform can learn from their experiences. In the long run, everyone would benefit. ✦

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