

Open Courseware and Developing Countries: Building a Community

This is the report of The Forum on the Impact of Open Courseware for Higher Education in Developing Countries, convened in Paris by UNESCO 1-3 July 2002, with the support of the William and Flora Hewlett Foundation and organizational assistance from the Western Cooperative for Educational Telecommunications, WCET.

Participants mapped a collaborative course, involving colleges and universities from around the world, for the productive and creative use of openly shared educational resources. In advance comments, summarized in an appendix to this report, they provided insights on the potentials and complex issues involved. This report was prepared by John Witherspoon.

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Introduction: Open Resources

In spring 2001 the Massachusetts Institute of Technology announced that over a half-dozen years the substance of virtually all its courses would be posted on the Web, available for use by faculty members and students around the world, at no charge.¹ Just over a year later – before material from its first course was online – MIT’s OpenCourseWare concept became the focus of a new international community. This emerging consortium was organized to evaluate, adapt, use, and develop open resources for its members’ many cultures and diverse languages.

The idea was launched at the Forum on the Impact of Open Courseware for Higher Education in Developing Countries, convened in Paris by UNESCO in July 2002. Representatives of universities from ten countries, in addition to those from MIT and other North American institutions, plus representatives from international and non-governmental organizations, met to examine the possibilities and issues of open courseware – a term they relabeled as Open Educational Resources.

The UNESCO forum was preceded by one held in San Diego during December 2001, at which the broad issues of open courseware for higher education were examined. These ranged from intellectual property to institutional missions to technology and access concerns to cultural adaptation and effective language translation.²

Variations on the open resource concept were also represented at the Paris forum. While MIT offers a major library of course elements, Carnegie Mellon University is producing a series of courses that incorporate advances in cognitive theory and include potentially important learning objects. These courses will not be offered free, but the fee structure will take into account the economic realities of developing countries. Ceará University, Brazil, makes substantial use of information/communication technologies in specialized areas and is interested in offering open courseware for other areas of Brazil. The World Lecture Hall, based at the University of Texas, offers courses and course elements from many sources. The principal focus of the UNESCO forum, however, was the prospect of worldwide applications for the MIT program.

Defining the Concept

Participants at the UNESCO forum defined Open Educational Resources as: *The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for noncommercial purposes.*

¹ A further brief description of MIT’s OpenCourseWare Initiative is at Appendix A.

² The report of that meeting is at www.wcet.info/. Further information and project updates on the MIT OpenCourseWare Initiative are at <http://web.mit.edu/ocw>

More specifically, these characteristics were identified:

- The resources are intended for college and university faculties to adapt in accordance with their curricular and pedagogical requirements;
- Included technologies support open, meaningful access and use of the material.
- Course-related resources include at a minimum the course description, syllabus, calendar, and at least one of the following:
 - lecture notes
 - demonstrations, simulations, illustrations, learning objects
 - reading materials
 - assessments
 - projects
- The resources are not intended as supported open learning for students.

Prospects and Issues

Forum participants gave an enthusiastic welcome to the MIT initiative and its counterparts, noting the need of many nations for more high-quality higher education resources. Up-to-date material in science and technology is in particularly short supply. Some also cite the value of such material in helping the process of educational change, as societies seek to bring their institutions into the Knowledge Age.

The use of external resources is of course not a new idea. Colleges and universities are accustomed to welcoming visiting lecturers, using publications from many sources, facilitating exchanges involving students and faculty, and seeking information via the Internet. The MIT OpenCourseWare Initiative, however, takes the principle to a new level, adding a vast online library of continually updated resources in key curricular areas.

The issues to be addressed by developing countries in order to make practical use of this resource are familiar. In many areas the opportunity to use Web-based resources is limited not only by minimal Internet access but by the scarcity of computers. Longstanding academic and cultural traditions make many reluctant to use such resources. The institutions' libraries and laboratories are often inadequate.

Mitigating these factors doesn't address the whole problem. There remain the fundamental Big Two requirements: adapting the material to local cultural, curricular, and pedagogical conditions; and translating it into the language (or, frequently, languages) used by local students and faculties.

Addressing such questions and working toward solutions was the work of the Forum.

Open Educational Resources: Turning a Concept into Reality

With a sense of urgency, Forum participants left Paris committed to evaluate, use and develop open resources. Creation of an active and focussed user group, organized initially to provide feedback on MIT open courseware and other available material, was a principal result of the meeting. The working group that proposed such an organization made two important recommendations:

- Post open educational resources on the Web as soon as they are made available, and immediately start using and evaluating them. Solicit international assistance from UNESCO and others to make them widely available.
- Organize a project for evaluation and usability improvement, the objectives of which are to gather, analyze, and synthesize faculty feedback, information concerning support needed from institutions, and information about access and usability.

The group also proposed that “In initiating this project, the planners will identify a specific set of courses, together with a specific set of institutions committed to thoroughly test and evaluate them. These courses would preferably be in the domain of science and technology, both because they are of prime importance to developing countries and to avoid cultural problems.”

The development of a collaborative open educational resource project may also become part of the group’s agenda.

Organization of the new project was immediately undertaken by WCET, and Mohamed-Nabil Sabry, of Mansoura University, Egypt, took the lead in preparing the project plan.

Design of an Index/Database

A related working group concentrated on effective means of providing access to – and information about -- available resources, including material related to history, use, and indicators concerning quality assurance. The group proposed:

As a repository of resources, the system should be conceived as a library which provides both an efficient indexing system to the content and pedagogical approaches used as well as useful advice and indicators of the quality of the materials it contains in the form of user commentary.

Constant updating of the index, incorporating the uses made of material and comments about quality, adaptations, and available translations, will be crucial to success. No less important will be the choice, maintenance, and user access to the technologies chosen for the task.

In order to establish a practical system for information about quality assurance, the group began with criteria for institutions that wish to post resources, suggesting that:

. . . requirements for access to the system as a provider should be determined on the basis of institutional recognition within relevant national or international systems. However, discipline-based groups of peers (global intellectual interest groups) would be encouraged to provide feedback on their usefulness, relevance and currency.

Creating a Globally Viable Infrastructure

If open resources are to be made broadly available, some technology fundamentals must be in place:

- Connectivity, including access to the material in locations with limited bandwidth;
- Software that works on a variety of platforms, using agreed standards;
- Software that permits easy modification of content as the resource is adapted for local use;
- Systems that support multiple languages;
- An infrastructure made workable through the existence of technically capable people. Training – developing and maintaining local technical competence -- is a key requirement.

These requirements link with the movement toward open source standards. An important element of MIT's OpenCourseWare development is the Open Knowledge Initiative (OKI), described as a layered infrastructure design the purpose of which is to enhance the interoperability of many technological infrastructures.³ OKI is one of the principal developments, along with the IMS Global Learning Consortium and the Advanced Distributed Learning (ADL) Initiative, which are moving toward open, free or inexpensive learning management systems that are independent of specific platforms.

In summary: The worldwide success of open educational resources will depend upon a community that can, within minimal technical restraints, access, adapt, translate, use, produce, and offer the material. The process of infrastructure design has begun.

2003: From Concept to Operation

2003 is the formative year for the international community of colleges and universities using and developing open educational resources. The first MIT OpenCourseWare offerings debuted on the Web in fall 2002, with the pace of development accelerating in 2003. Meanwhile, the plan that germinated during the UNESCO Forum in July 2002

³ See <http://web.mit.edu/oki/>

takes shape around an initial set of universities prepared to help advance the infrastructure, design the evaluation protocols, undertake the processes of adaptation and translation, make active use of the results, and share the results of their work with their colleagues around the world.

It's a complex undertaking, and not all of the issues and variables can be identified in advance. It begins with a small, deliberately diverse group of institutions working closely together as they address a first sample of MIT course material. More institutions and a variety of materials from more courses are added to the mix as the program proceeds.

Some of the pioneer users will become developers and suppliers. Other institutions from other continents will present variations on the Open Resources theme.

In announcing the OpenCourseWare Initiative in April 2001, MIT President Charles M. Vest acknowledged that it "looks counter-intuitive in a market-driven world," but he declared it to be "a natural marriage of American higher education and the capabilities of the World Wide Web."

An international group of colleges and universities has welcomed the MIT concept, and they are in the process of making it their own.

Appendix A

Overview of the MIT OpenCourseWare Initiative

The Project. Over the next few years, the Massachusetts Institute of Technology (MIT) will post on the Web the core documents for more than 2000 of its courses. Under the OpenCourseWare (OCW) program, these materials will be available free of charge to anyone with an Internet connection.

OCW will not provide “online courses,” as that term is usually understood. Rather, the typical offering will consist of key course documents: reading lists, lecture notes, assignments, and, where appropriate, experiments, demonstrations and samples of students’ work. The result will be a major online library of resources concerning a great many academic topics.

The essentially costless, instant availability of these materials will open up MIT’s pedagogical methods to inspection by all. Faculty members, enrolled students and individual learners will be free to use or adapt OCW material as they see fit. MIT copyrights will require only proper attribution of authorship for any non-commercial use. (Commercial uses will require a specific license.)

Initial funding support for OCW has been provided by the William and Flora Hewlett Foundation and the Andrew W. Mellon Foundation, with a long-term commitment by MIT to build a sustainable infrastructure.

The implications. It is expected that other universities will produce their own variations of open course archives, and one of the goals of the MIT project is to help ensure that OCW is easily replicable. To that end, the multi-university Open Knowledge Initiative (OKI) aims to develop structures that are compatible with diverse “learning management system” software.

OpenCourseWare is conceptually straightforward: put course material on the Web and give it away as a worldwide educational resource. There are, however, uncharted implications for higher education institutions, both in the US and internationally. Among the issues:

- Transparency of course materials and methods will allow easier comparison of educational approaches. Will such openness spur beneficial competition, both within and across institutions, to yield improved pedagogical effectiveness?
- With minimal control over copying and adapting material, OCW represents a new approach to exercising the protections of copyright. How will the resulting intellectual property issues be confronted and solved?

- Among the most important beneficiaries may be universities in the developing world. How can OCW materials be made maximally useful for countries with different languages, cultures, and economies?

Administrative structures. In April 2001, the OCW concept was announced by MIT president Charles M. Vest. While acknowledging that it “looks counterintuitive in a market-driven world,” Vest argued that the program would be “a natural marriage of American higher education and the capabilities of the World Wide Web.”⁴

Immediately following the president’s announcement, an OCW Implementation Task Force was formed and subsequently recommended the following:

- creation of a professional publishing and service organization to produce OCW materials;
- that organization to be run by an Executive Director with a small core staff;
- coordination of OCW production centrally, with strong ties directly into MIT departments;
- OCW web designers to reside within the departments they serve; and
- a faculty Advisory Board, appointed by the MIT Provost, to provide guidance and coordination to the OCW organization.

Implementation. A pilot phase for OCW was established for the period October 2001 - March 2002, to explore the varying course-related requirements and develop preliminary production processes. A test site was prepared for up to 30 pilot courses, limited to an internal audience for evaluation.⁵

With the transition to a permanent staff in spring 2002, the program moves toward its planned schedule of online milestones. The first publicly available course materials were to be online in fall 2002.

During the initial implementation period, one of the tasks will be to “[a]ssess utilization of OCW materials by users inside and outside of MIT, and establish best practices.”⁶

Steady state goals. The production phase, during which the substance of essentially all MIT courses will be posted, is projected to take six years, after which a steady state

⁴ As cited by Michael Schrage, “Brave New World for Higher Education,” *Technology Review*, October 2001. <http://www.technologyreview.com/articles/insight1001.asp>

⁵ From “OCW Milestones,” at <http://web.mit.edu/ocw/>

⁶ “MIT OpenCourseWare: A Proposal Submitted to the William and Flora Hewlett Foundation, April 27, 2001,” p. 14.

operation continues and the full cost of OCW is assumed by MIT.⁷ It is anticipated that the materials for nearly all of MIT's courses will be included in the OCW program.

While the program's foundation-based funding is for the external applications, those at MIT expect OCW to bring significant internal improvement, department by department. The program is also expected to increase communication across the disciplines and improve transparency across the departments. For example, when instructors of upper division classes can easily access the content of lower division required courses, they can better understand what students can be expected to know.

While the OCW offering is worldwide, the course materials will be provided in English only. MIT will encourage other educational institutions to undertake translations. Outside groups have expressed interest, with initial prospects for Chinese, Portuguese, Arabic, and Spanish.

⁷ Ibid.

Appendix B

Summary of Forum Participants' Preliminary Papers

Introduction

This paper summarizes the written contributions submitted by the participants of the UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries. It is organized according to the questions posed in the guidelines for contributions.

As Prof. V.S. Prasad observes in the paper he contributed to the Forum, “The Open Courseware concept is based on the philosophical view of knowledge as a collective social product and so it is also desirable to make it a social property.”

The contribution guidelines were designed to provide a basis for discussions on the implications of that idea for developing countries. What national or institutional needs might open courseware address? What are the limitations – technical or otherwise – that must be overcome? How might the institutions of developing countries be producers and participants as well as users of open courseware material?

An important example of the concept is the OpenCourseWare Initiative of the Massachusetts Institute of Technology (MIT), the result of which will be that the substance of nearly all MIT courses will be posted on the Web, available for use at no charge by any educational institution or individual learner, anywhere in the world. Only commercial applications will require licenses for use.

Variations on the open courseware principle are also outlined in the contributed papers, including the World Lecture Hall organized at the University of Texas, open courses offered by Brazil's Federal University of Ceará, and the program of online courses being developed by Carnegie Mellon University. The papers are presented in full at <http://www.wcet.info/UNESCO>.

Using External Resources

Forum participants uniformly report that the use of external resources is hardly a new idea. Most institutions around the world have been doing it routinely for many years. Among the most common external resources cited are:

- Visiting lecturers and experts
- Twinning arrangements, providing for international exchanges of students and academic staff
- Imported courseware in a variety of media
- Externally developed sponsored programs
- Interinstitutional programs developed collaboratively

- Publications
- Information resources of the Internet

Forum participants also report the need for other external resources, and prominent among these is the perennial problem of library resources. Subscriptions to academic journals and databases are a particular problem, compounded by the lack of computers, Internet access at key locations, and training for students and staff.

The Need for Open Courseware

Participants from developing countries report a wide range of areas in which open courseware can be valuable. A view of a widely developed theme is offered by Prof. Senteni, of the University of Mauritius:

Presently, acute training and retraining needs in ICT are being felt The shift towards a knowledge society, with the service sector as its main pillar, creates training gaps in areas such as Management, eBusiness, eCommerce, eLearning, Human Resource Development, Information Systems, Finance, Banking, Marketing. . . . A coordinated Open Courseware initiative would therefore enable the University of Mauritius to build up networks, both local and international, and would be an opportunity for catching up and leapfrogging.

Requirements in education include instructional design and course design, development and delivery. Also cited were learning objects for use in teacher training and for classroom use by teachers. Advanced areas in science and technology are also prominent, including biotechnologies, microelectronics, and the information technologies.

In Morocco there is underway “a sweeping education reform whose implementation should start in institutions of higher education as soon as Fall 2002.” Therefore, “The most important benefit of open courseware for Moroccan institutions of higher education seems to be the generalized contact with alternative systems of education.” Course structure and the pedagogy implied in such programs as that of MIT provide needed perspective as faculty members recast their courses.

Courseware and Institutional Missions

Institutions of participants in the Forum are considering the prospect of open courseware from the perspectives of a variety of missions. Some examples follow:

- The Moscow Institute of Open Education is charged with training and support for Moscow’s 100,000 teachers, including research and development in ICT, pupil health, curriculum development, quality monitoring, and programs for gifted children.
- The African Virtual University and its partner universities in Sub-Saharan Africa, with 31 sites in 17 countries, has among its objectives: Increase access to tertiary and continuing education; improve the quality of education by

tapping the best resources, in Africa and worldwide; improve connectivity in learning centers and host universities, providing training in engineering, computer science and IT and business; and serve as a catalyst for new investments in economic development by offering skills training and upgrading of professionals.

- The University of Mauritius is a participant in the national project to transform Mauritius into a cyber island.

Institutional missions also suggest some cautions in the use of open courseware. It is important not to inhibit the creation and dissemination of knowledge by scholars in developing countries, and the unique roles and stature of local higher education institutions must not be diminished when open courseware is applied. Open courseware is intended to be shared, not imposed.

Web Access Limitations

Not surprisingly, the access limitations most commonly reported are lack of adequate bandwidth, a shortage of computers, and the need for training in ICT. Inadequate local telecommunication infrastructure, sometimes including regulatory policy that has the effect of keeping costs high and access limited, is also a recurring issue.

In some institutions computer access is limited to faculty and graduate students, and often it is inadequate even for this relatively small group of users.

Language can also be a constraint. Sometimes the language of instruction is not the language of the Web. And Professor M. Dahbi reports that in Morocco, “Multilingualism . . . functions as a limiting factor [since] institutions feel that it is inappropriate and improper to be present on the web only in French, so they spend a lot of energy and resources trying to have Arabic as well as French and sometimes English, which makes the whole effort much more costly or simply aborts the project.”

For some, there is a reported “non-readiness” to use resources. Professor A. Semenov observes that “For example, a school can have a computer lab but it is locked when the computer science teacher is not in school. To place [computer facilities in] the library and to provide access to it for 12 hours a day you need to change mentality and regulations as well as to find additional funds for hardware, service, and personnel.”

The good news, however, is that many countries, provincial authorities, and institutions are recognizing the vital role to be performed by ICT, and appropriate access is often increasingly available or imminent.

Concerns in Applying Open Courseware

The language issues noted above are particularly important when considering the adoption of open courseware. Closely related is the matter of cultural differences between originating and using institutions, not to mention differences between their

respective societies. In planning its OpenCourseWare Initiative MIT has identified institutions interested in translating its work into other languages. With regard to cultural and political issues, the MIT response has been to maintain the traditional academic freedom of its faculty, relying on the users of open courseware to make necessary local adaptations.

For many, adapting open courseware to suit local requirements will require skills and technology that are in short supply. Clearly, however, many consider that a challenge worth addressing.

Institutions as Open Courseware Partners

Institutions represented at the Forum are prepared to collaborate in regional or international open courseware programs. Among the suggestions:

- Materials for professional programs such as Bachelor's and Master's degree programs in library and information sciences.
- Production of a portal for the African educational community to share information, course content, and make accessible quality distance education learning products and services.
- Using existing resources, develop reusable learning objects as "cognitive Lego Bricks."
- Develop collections of science experiments and industrial processes, and the resources of art galleries and historical archives.
- Develop the international intellectual resource that is constituted by scientists and professors who are currently under-used in their present national infrastructure.
- Develop courses in the field of continuing education.
- Collaborate with other countries in the development of case studies in international business, for example in the transition from traditional to modern business structures.
- Provide a test/evaluation environment for open courseware programs.
- Publish links to pages created by faculty worldwide who are using the Web to deliver course materials in different languages.

In Summary

The international discussion about open courseware – its potential and the issues to be addressed – is clearly both timely and pertinent. Thanks to a confluence of technology and imagination, it is now feasible to recognize that knowledge as a social product can indeed become an international social property, a concept that the Forum was invited to explore and advance.

Appendix C
Forum on the Impact of Open Courseware for
Higher education in Developing Countries

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