

Tufts University

A Case Study
Production and Use of Open Education Resources

Prepared for the Organization for Economic Co-operation and Development

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October 19, 2006

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General Background

Tufts University is located on three campuses in Massachusetts (Boston, Medford/Somerville, and Grafton) and in Talloires France. It is comprised of nine academic units. These are the School of Arts and Sciences, School of Engineering, The Fletcher School (International Relations), School of Dental Medicine, School of Medicine, Sackler School of Graduate Biomedical Sciences, Friedman School of Nutrition Science and Policy, Cummings School of Veterinary Medicine, and the Tisch College of Citizenship and Public Service. The University is also affiliated with the School of the Museum of Fine Arts in Boston and with the New England Conservatory of Music.

Tufts enrolls 8,500 students from across the United States and more than 100 countries and offers degrees at the bachelor's, master's and doctoral levels including the Doctor of Medicine, Doctor of Dental Medicine, and the Doctor of Veterinary Medicine degrees. The University employs 1200 faculty.

The impetus for the University's participation in the OpenCourseware (OCW) project came from MIT, which was seeking to build a consortium of participants with curricula complementary to its engineering curriculum. The fact that the President of Tufts University, as the former Chancellor of MIT, was knowledgeable about OCW no doubt contributed to the decision to participate. In addition, Tufts' OCW project aligned well with the themes for the University that the President articulated. These are promoting an international perspective, building on Tufts' strengths in the life sciences and environment, and fostering Tufts' tradition of service to its local, national and international communities. Beyond this, there was already considerable support present at the University for sharing University resources with developing countries.

A Steering Committee worked to develop plans for the OpenCourseware project between August 2004 and November of 2004. A pilot was launched in June 2005; the project, in September 2005. The project is a University-wide initiative with faculty from all Schools contributing courses. However, the project relies extensively on the technical resources available in the Tufts University Sciences Knowledgebase (TUSK) that was developed by the School of Medicine and is still housed there.

The project is supported by in-kind contributions of faculty and staff time and leverages TUSK's staff and technical infrastructure. TUSK itself is supported by the four Health Sciences schools. The project also has received support from the Hewlett Foundation. The Foundation grant has been used primarily to support the staff needed for content development and for tool creation.

Selection of the Institution for Case Study

Tufts University was selected for study because it is significantly involved in offering open educational content. The demonstrated interest of the Hewlett Foundation in the project was probably another reason why the University was selected.

State of the Art of Content Production

Currently six schools are participating in the OpenCourseware Project. Seven courses were generated in the School of Dental Medicine; seven in the School of Medicine; three in the Friedman School of Nutrition Science and Policy; one in the Fletcher School; three in the Cummings School of Veterinary Medicine; and six in the School of Arts and Sciences. The number of courses currently available totals 27.

The portal for each of the courses is uniform. The home page contains an attractive picture and a course description. The links available vary. All include the course syllabus, schedule, and lecture notes. The link to lecture notes provides access to the content of the course. The full text of lectures is available for some courses; in other cases, outlines of the content are provided. Some include PowerPoint slides as well. By far the majority of courses provide a complete set of lecture notes. A few provide lecture notes for some topics only. A full list of the courses available as OpenCourseware may be found at <http://www.ocw.tufts.edu>.

The Tufts University Sciences Knowledgebase

The Tufts University Sciences Knowledgebase (TUSK) supports faculty in teaching and students in learning. TUSK is a comprehensive content management system, containing over 400,000 pieces of content that allows content/metadata upload and provides the ability to reuse existing content in new contexts. It includes a course management system similar to that provided by commercial systems. However, the TUSK system has far greater capability in that it enables faculty and students to link to information related to a particular topic across all courses in the system. Typical course management systems provide courses in silos. The TUSK system allows integration of content across all courses.

Its features also include schedule display, with blocks linked to relevant content, on-line quizzes and evaluations. It facilitates indexing using the National Library of Medicine's Unified Medical Language System and provides XML marked up text displaying the semantic meaning of the content. There are tags to denote keywords, nuggets, topic sentences and the like. With the exception relating to copyright, discussed below, once a course is available in TUSK, preparing it for use as OCW is an easy task.

Faculty use of the tools provided by TUSK in developing courses, the first step necessary in making a course available as OCW, is voluntary. It is not clear how many faculty members will be interested in converting their courses at least in the near future. A faculty member from the School of Medicine who heads a team of ten faculty members

that developed a course using the TUSK framework provided some insight into why use of TUSK may have limitations. While the Medical School is interested in expanding digital content, many faculty don't know how to use the system and don't understand its potential. Finding the time to learn how to use TUSK and convert a course is a significant problem. That said, each of the 16 first-year and 29 of the second-year medical school courses contain significant online course material, some uploaded by faculty, some by students and some by TUSK or School staff. The same is true for the three other health sciences Schools.

Those faculty members who use TUSK see the system as having great potential to enrich student learning, which bodes well for the OpenCourseware Project. Linking the content in a course to similar content in other courses, for example, provides a rich reference for students. Providing access to current research through links to sources such as the [New England Journal of Medicine](#) adds another dimension to student learning by making the most recent research available within the course. In addition to the course content itself, the availability of current research via OCW would be very valuable to individuals in developing countries. Future plans are to add case studies. This will add another aspect to the OpenCourseware project.

Copyright Issues

While there are few technical issues involved in converting the courses developed within TUSK for OpenCourseware, a major barrier is the work entailed in assuring there is no violation of copyright law. United States copyright law includes a fair use provision that allows limited use of copyrighted materials within the classroom without prior permission so it is very common for faculty members to include copyrighted material in their lectures. However, further use of these materials outside of the classroom would be considered copyright infringement. This presents a real potential liability to the University. As a result, each course made available as OCW must first be fully reviewed to ensure no materials are included that could lead to copyright infringement.

Reviews are painstaking and time-consuming. Faculty members work with a TUSK staff member in reviewing materials. Staff members are responsible for contacting copyright owners for permission to use material, helping to locate open materials, and assisting faculty in developing their own materials to replace those that are copyrighted. Despite this help, the faculty member responsible for the Medical School course mentioned above noted that her team felt overburdened as they took on the task of developing the course to be available as OCW primarily because of the need to review all lectures and materials used in the classroom for copyright.

Materials on the OCW website make clear that the courses are not available for credit and that the courses do not provide access to faculty members. The OCW courses are made available under a Creative Commons public license that allows individuals to make use of the materials as long as they are used openly and freely for non-commercial purposes and attribution is given to Tufts University. Certain restrictions dealing with the use of the University name in connection with materials and exemptions that would

require the user to seek permission to use certain materials are noted in the policy statement on the website.

Faculty members at Tufts own the copyright to their courses. Faculty who have contributed courses thus far have not expressed any reluctance to grant Tufts University use of the courses as OpenCourseware.

Examining the Initiative

The Tufts University Office of Institutional Research conducted two studies that provide additional understanding of the OpenCourseware Project. The first, which has two parts, deals with faculty impressions of OpenCourseware and was issued in December 2005 soon after the initiation of the project. The second is a June 2006 report that provides information on usage of the courses.

Faculty Impressions

The faculty who participated in the faculty impressions study were those involved with the pilot phase of the initiative. Ten of the eleven faculty members who provided the courses during the pilot phase participated in the first part of the study, conducted around the time the courses were published in summer 2005. The questionnaire used was designed to capture their thoughts about the project at that time. The following characterize some of the points faculty members made in responding to the summer 2005 questionnaire:

The faculty were generally satisfied with their participation in OCW project.

Their motives for participating included increasing the reputation of Tufts, the desire to spread knowledge to areas of the world with limited resources and to contribute to their disciplines.

Despite the above, some respondents expressed concern over the value of OCW to the University and its students.

They also questioned the value to OCW users because the content no longer included copyrighted materials that added value in important ways to the course. Some also felt that the design of the course platform made the course seem rudimentary, which might devalue their reputations.

Other concerns included the time commitment required, loss of control over materials, and violation of privacy by users attempting to contact them.

Six of those respondents to the first part of the study participated in follow-up interviews that were conducted during the fall of 2005. The purpose of the interviews was to get feed back on their impressions of the OCW project. The results identify the

concerns these faculty members had as they began work on the initiative and describe their views on these same concerns after participating in the project. The interviews corroborated some of the concerns expressed in the first study but not others.

Despite initial skepticism about the value of the project to the University, the faculty participating in the interviews felt strongly that there was value in the project for Tufts in making course content available to the world. Although the interviews were conducted early in the launch of the OCW, faculty members already understood the connection of the project to the University's mission to extend its reach internationally.

The interview results uniformly showed appreciation for the technical support provided by TUSK staff. The assistance provided with resolving copyright issues was particularly noted as helpful. Faculty felt that the work the staff did minimized the amount of time they needed to spend in preparing their courses.

Whereas initially faculty members were concerned that OCW users might contact them, only one faculty member reported contact by an OCW user, thus mitigating this concern.

Faculty members seemed generally to have adjusted to their loss of control over the materials. Loss of control was not reported as an issue in the interviews.

Other concerns were borne out in practice, at least in part.

Whereas faculty who had already developed their courses in TUSK found transitioning them to OCW a rather simple process, faculty members who had not used TUSK previously found the process time-consuming.

A problem affecting those participants responsible for courses taught by teams of faculty was the time needed to convince team members to participate and to review materials. Again, this was more of a factor when the course in question had not been developed previously in TUSK.

All respondents, however, felt that the time required detracted from their fulfilling their primary responsibilities of teaching and research.

During the interviews several ideas were provided that suggested ways that the program might be improved in the future. One was to provide more communication about the project, its goals, and its relationship to OCW projects at other institutions. Participants suggested that orientation to the project and on-going communication about its progress would be helpful to the faculty involved and important in recruiting new faculty participants.

Other issues suggested for improvement included redesigning the website to enable more depth and breadth of content. Respondents also felt that additional full-time

staff were needed to do more of the “leg work” in preparing the course. Minimizing the time required was cited as critical to recruiting new faculty participants. It was also noted that if greater participation of Arts and Sciences faculty were to be achieved, some means of converting BlackBoard to TUSK would be required.

Usage of the OpenCourseware

Between June 21, 2005 and June 21, 2006, a total of 212,944 visits were made to the OCW website. The number of visits increased steadily during the first year the courses were available. There was a 500% increase in usage between the June 2005 and June 2006.

The study of usage during the first year of the project examined the characteristics of users, their reasons for visiting the website, and their evaluations of the initiative and the courseware. The majority of users (60%) were from the United States. Users from outside the United States were primarily from countries in Asia and the Pacific Islands and Western Europe. Interests reported were Human Medicine, 19.5%; Health Sciences and Technology, 18.6%; and Other, 16%. Smaller percentages of users reported interest in other fields.

Twenty-five percent of the users held doctoral degree or equivalent; over 30%, master degrees or equivalent; and 26%, bachelors degrees or equivalent. Approximately half of the users reported they were affiliated in some way with an institution of higher education. Just over 20% of the users reported they were enrolled in a formal degree program at an institution and accessed the website to complement a course in which they were currently enrolled or to enhance personal knowledge. Over 20% responded that they were faculty teaching in an educational institution. Some of the reasons faculty members cited for accessing the website were developing or planning a curriculum for a department, preparing to teach a specific class, or learning about a subject matter to enhance learning or research.

The remaining half of the users were “self-learners” who reported visiting the site to enhance personal knowledge or to maintain currency in their professional field. The materials accessed most frequently by all users were lectures (51%), readings (35%), and lecture handouts (35%).

In general users had a positive impression of the OCW project. Over 80% of the users felt the OCW website reflected positively on Tufts; over 85% said they would recommend the website to other users; 40% reported the website helped them supplement their knowledge about a topic. Others responded that the website increased their interest in learning and that they had discussed specific materials from the website with colleagues.

State of the Art of Use and Production of Open Source Software

The Director of TUSK believes in using open source software where it meets a need. TUSK was built using open source software including the Apache webserver, MySQL database and Perl programming language. The University uses the Thunderbird mail client and has adapted the Mozilla Firefox for the browser. There is concern by some about the long-term sustainability of open source software, but the trade off thus far has been positive. It is expensive to maintain the staff required to create and modify open source software, but it can be beneficial for the system in terms of allowing great flexibility in tool creation and customization. .

The University has made the TUSK system available to several universities in Kenya, Tanzania, and Uganda. Christian Medical College in India will soon have the software installed. TUSK has not been made available freely for several reasons, the most important of which is that the code was developed for use at Tufts and the words “Tufts” and “TUSK” were embedded throughout the code. The system has now been installed at seven external sites, including three in the United States, and after each installation, extensive work has been necessary to remove references to Tufts in the code. A new 2.0 version of the software will rectify this problem to some extent. While TUSK is available under license only, there are no limitations on its use by the external partner. The license agreement allows the partner to further develop the code as long as it does so under TUSK guidelines and shares the code with Tufts.

TUSK staff are also collaborating with Medbiquitous, based at the Johns Hopkins University School of Medicine, in building standards for Virtual Patients. TUSK already has a tool for the development of case studies of virtual patients, which is one of the models for standards development. A flash version of the Virtual Patient player is being created as part of Tufts grant from the Hewlett Foundation. This player will be available on the Tufts OpenCourseware site, along with ten virtual patients. Also through the Hewlett Foundation grant, Tufts will create two other open tools. One will enable display of the “hot content” on a site, similar to the one in TUSK. This will help to draw users into interesting content not visible from the top pages. In addition, Tufts, in conjunction with the staff at EduCommons at Utah State University, will build tools to export content from a variety of sources, including Blackboard, into an IMS format that can then be imported into TUSK or any other system that is IMS compliant.

The University is also an educational partner in Sakai, which is an open source collaboration and learning software used by colleges and universities around the world. It is also a member of a number of other open technology initiatives including OKI, Internet2, the New England ePortfolio Pilot Project.

The Future of Open Educational Resources

The significant growth in the use of the OCW website during the first year of operation clearly suggests there is considerable interest in OpenCourseware. Currently, the majority of individuals accessing the site are from the United States. This population

of users reported benefiting from the materials available both in supporting teaching and learning in formal educational settings. Self-learners report that OCW has helped them to maintain currency in their fields and to add to their general knowledge. The large percentage of users from the United States may be an unexpected outcome since the primary goal for OCW initiatives across all institutions participating is to spread knowledge around the world.

English is the international language for education and research in the human medical sciences, but in other fields language could be a barrier to use of the materials. However, this seems likely to change. Groups in China, for example, have begun the process of translating some courses from participating institutions into Chinese. There is some concern that translations may not be accurate, though where possible they will post the original English version next to the translated version side-by-side in split windows. However, the network of institutions and individuals broadening the accessibility of OCW will grow, and ultimately the University and its faculty will have to rely on quality mechanisms beyond their control if the project is to achieve its goals.

Lack of knowledge about OCW could be another barrier, but knowledge will spread over time. Tufts has in place relationships with three African institutions that involve sharing of curriculum. The pilot phase of the program, begun this past fall, will involve Tufts faculty teaching three pilot courses in public health concurrently with faculty from the African universities. Students from the African universities will be participating in discussions with Tufts students in the United States. The project also involves some joint research initiatives. To make this collaboration possible, Tufts provided each school with web servers loaded with TUSK software that the African universities have formatted with their own logos and course names. While this project does not use OCW, it will contribute to the spread of information about OCW both within these institutions and in Africa generally.

Use of the system will also increase as additional courses are made available. To reach this goal, Tufts is taking steps to reduce the barriers to faculty participation that were identified in the Faculty Impression Study. Lack of knowledge about OCW was cited in the study as one of the barriers to faculty participation. Since the study was conducted, TUSK staff have assembled a packet of materials that provides information about the background, status and significance of the OCW initiative. The materials a faculty member needs to begin participating in the initiative are also included in the packet.

A more significant barrier cited in the study was the time required to prepare a course for OCW. Faculty particularly valued the support provided by TUSK staff but felt more help was needed. Beyond the help that will continue to be provided by staff, plans are in place to add functionality to the system that will reduce the amount of time required for faculty members to develop their courses as OpenCourseware. Workflows may make it possible for faculty to “build in OCW” as they develop and update courses. Soon, it will be possible for faculty members to create courses in Word that can be converted to XML and then to HTML with no human intervention. A beta version of this was put into production in September 2006. There is some thought that a tool can be

developed that can help with the work required to check courses for copyright issues, although copyright will continue to be the major barrier to the expansion of the project.

The upgrades to the system should be completed in two years. Despite the upgrades some current faculty may still continue to be reluctant to use the technology but, as the faculty member interviewed noted, this will change in time as current students, fellows and residents bring expertise and interest in using technology as they move into the faculty ranks.

Most of the growth of the project will likely be in the Health Sciences because faculty members in those schools are more likely to use TUSK in the development of their courses than other faculty. However, plans are also in place for greater participation of faculty from other Schools. A goal for the program in 2006/07 is to add courses from the School of Engineering, particularly courses in "Water, Systems, Science and Society", an area of strength in the School and the University. The Dean of the School of Arts and Sciences is interested in providing an open source course in Introduction to Psychology in the near future. Additional Arts and Sciences courses will be offered as OCW over time and will be aided by a new "Blackboard to TUSK" conversion tool being developed under the current Hewlett-funded Tufts OCW project. Still, it is unlikely that the number of courses from the School of Arts and Sciences will increase to any considerable extent. This is because many of the courses offered in the school are seminars, which use discussion as the primary means of instruction. Another barrier is that Arts and Sciences courses rely considerably more on copyrighted material than courses in other areas.

Another factor contributing to the sustainability of the Project is the commitment to public service at the University. Faculty generally see the OCW project as important in the diffusion of knowledge, and experience thus far shows that they are willing to allow courses for which they own the copyright to be offered as OpenCourseware. This commitment is also exemplified within the University by projects that serve third world countries, such as the Africa project discussed above.

The availability of adequate resources is, of course, critical to the sustainability. TUSK, the foundation of the OCW, is supported by funds contributed by the four Health Sciences Schools. Much of the other work needed to sustain the project outside of TUSK is provided in-kind by various administrative units in the form of staff time. The Hewlett Foundation grant was important in supporting the development of a database that manages OCW content more efficiently and effectively than flat HTML files. Currently the grant supports the TUSK staff needed to work with faculty in "scrubbing" their courses for copyright ownership and the development of adaptive tools. The grant has been important, but there is little doubt that the resources needed to sustain the OpenCourseware initiative will continue to be available after the expiration of the grant.

The factors that suggest a long-term commitment to OpenCourseware apply also to software. The conditions surrounding the availability of open software are somewhat

different, but the University's interest in sharing the work they have done and are doing in developing software is clearly evident.

Concluding Remarks

Based on the information gained in the course of this case study, there are three factors critical to initiating and maintaining an OpenCourseware project that provides no direct monetary return. The first is the degree to which the project is perceived as central to the mission of a university. The second is the availability of the technical resources to launch and maintain the project. The third is the ability to integrate the project with work already being done. All of these factors are clearly present within the Health Sciences Schools at Tufts University, and if the means are available for faculty members from other Schools to migrate their courses to TUSK, it is likely there will be growing participation in the OCW project in all the Schools of the University. .

While there are some obstacles to extending the project beyond the Health Sciences, the strong support the President and the Provost have provided to the project probably will lead to greater participation of faculty in the other Schools. Clearly, the position of Dr. Mary Y. Lee as both the Associate Provost and the Dean for Educational Affairs in the School of Medicine can also contribute to spread of the project University wide.

Annexes

List of Persons Interviewed

Susan S. Albright
Director, TUSK

David A. Damassa, PhD
Dean for Information Technology
Professor of Anatomy and Cellular Biology

Susan Hadley, MD
Associate Professor of Medicine
Division of Infectious Disease

Mary Y. Lee, MD
Project Director
Associate Provost
Tufts University
Dean for Educational Affairs
School of Medicine

Charlie McCormick
Second Year Student
School of Medicine

Links to Further Information

Tufts University

<http://www.tufts.edu>

TUSK

<http://tusk.tufts.edu/>

Tufts OpenCourseware

<http://ocw.tufts.edu>

The information contained in this report came primarily from interviews with the individuals listed above conducted on August 10, 2006. The interviews were supplemented by material on the Tufts University, the TUSK, and the OCW websites. Two research reports prepared by the Office of Institutional Research were very helpful

in confirming information gathered during the interviews and in describing usage of OCW. “Tufts OpenCourseware: Faculty Impressions”, issued in December 2005 and attributed to Lisa S. O’ Leary, Research Analyst, reported information obtained in a survey of and interviews with faculty members who participated in the project during the pilot-phase. The data concerning use of the OpenCourseware between June 2005 and June 2006 were taken from “Tufts OpenCourseware: Annual Web Statistics Report” issued in June 2006.