

State-of-the-art in Open Courseware Initiatives Worldwide

Monica VL DOIU
Department of Informatics, PG University of Ploiesti
Bd. Bucure ti, Nr. 39
100680 Ploiesti, Romania
e-mail: monica@unde.ro

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Abstract. We survey here the state-of-the-art in open courseware initiatives worldwide. First, the MIT OpenCourseWare project is overviewed, as it has been the real starting point of the OCW movement. Usually, open courseware refers to a free and open digital publication of high quality university-level educational materials that are organized as courses, and include course planning materials, evaluation tools, and thematic content, under a Creative Commons license. OCW is free and open, accessible to anyone, anywhere, and anytime via the Internet. The OCW initiative started in 2002, and it has been followed by many more programs that offer open access to courseware: Carnegie Mellon Open Learning Initiative, Harvard Medical School's MyCourses, Webcast.Berkeley, Rice University's Connexions, OpenCourseWare Consortium, Open Education Resources Commons, and The Saylor Foundation's Free Education Initiative, along with other major open courseware projects worldwide. The prospects for future development of open courseware are taken into consideration, while its potential to provide for both social construction of knowledge and for development of open educational models, and therefore for E-Learning 2.0 and Web 2.0 is emphasized.

Keywords. open courseware, MIT OpenCourseWare, OCW Consortium, Open Educational Resources Commons, Free Education Initiative, Creative Commons license

Introduction

On 4th of April 2011, MIT celebrated the 10th anniversary of the statement with regard to the OpenCourseWare project, along with the completion of the first decade of open sharing of courseware. In the paper called *Auditing Classes at M.I.T., on the Web and Free*, published on 4th of April, 2001, Carey Goldberg noted that *Other universities may be striving to market their courses to the Internet masses in hopes of dot-com wealth. But the Massachusetts Institute of Technology has chosen the opposite path: to post virtually all its course materials on the Web, free to everybody* (Goldberg, 2001). Back then, MIT announced a ten year initiative on *open courseware*, called OpenCourseWare (OCW), which, at that time, was the largest such undertaking. Since the beginning, OCW has aimed to both create public Web sites for about 2000 courses, and to make available their related lecture notes, syllabuses, exams, simulations, video lectures, etc. in a nutshell, the main OCW's aspiration has been to disseminate as broadly as possible one of the major intellectual assets of the university, namely the content developed by its Professors, shadowing the commercial benefits of a distance learning venture. Though, OCW has not aimed to provide full-fledged, for-credit courses online – rather, the course materials have been thought as support instructional materials to be studied as such, or to be combined with student-teacher interaction wherever. The OpenCourseWare initiative has been envisaged in the larger context of open systems, based on the experience that opening of the software infrastructure has unleashed the creativity of software developers in unimagined ways, and thinking that something very similar can happen to education, as Charles Vest, the President of MIT, declared when OCW was launched (Goldberg, 2001). The OCW project started as a large-scale electronic publishing initiative based on the Internet, which was set up jointly by The William and Flora Hewlett Foundation, The Andrew W. Mellon Foundation, The Ab Initio Corporation, and MIT (MIT OCW Marks OCW Milestone, 2011), nowadays being supported by more foundations, corporations, in-kind contributors, and individuals (MIT OCW Supporters).

Moreover, there are other programs that offer open access to some of their courses, which have been evolving in parallel with MIT's OCW: Stanford Engineering Everywhere, Carnegie Mellon Open Learning Initiative, Harvard University Extension School Open Learning Initiative and Harvard Medical School's MyCourses – Open Courseware Initiative, Open Yale Courses, Webcast.Berkeley, Rice University's Connexions, Open University's OpenLearn, and so on. Furthermore, besides these initiatives hosted by major universities, large open courseware repositories are available as well: OpenCourseWare Consortium, Open Education Resources Commons, and The Saylor Foundation's Free Education Initiative (Vladoiu, 2011). All these efforts have a significant contribution to the development of new open educational models.

The license that covers most of the lectures and other course materials available within opencourseware initiatives around the world is *Creative Commons' Attribution-Noncommercial-Share Alike 3.0 license*. This license permits the free use or re-purposing of the open courseware materials by others. Under this license one is allowed to download, redistribute, remix, tweak, or build upon these materials to produce new materials, provided that they materials are used non-commercially, and the originators of the material are credited. Additionally, one must license any new use of the new materials under identical terms. In some cases, the materials under copyright held by a third party (i.e., an individual or organization) may be subject to more restrictive licensing terms (CC BY-NC-SA 3.0, 2011, Creative Commons FAQ, 2011).

A decade later, we have had a look to see how many of the initial objectives have been acquired, what is the current phase of the open courseware projects around the world, what are the challenges they are expected to overcome, and which are the expectations for future evolution of the open courseware movement.

The structure of the paper is as follows: the second section presents in detail the MIT's OpenCourseWare project, along with its offerings for undergraduate, graduate, and high school students. A brief outline of its history, accessing, usage, impact, and statistical data, followed by a discussion about the past and the future ten years of OCW are also included in this section. The next section is dedicated to The OpenCourseWare Consortium, while the fourth section presents in a few words some OCW Consortiums around the world. The following section presents other major open educational resource initiatives worldwide, while the last section includes some conclusions.

MIT OpenCourseWare

About OCW

MIT OpenCourseWare is a web-based free publication of virtually all MIT course content. OCW is open and available to the world and it is a permanent MIT activity (MIT OCW, 2011, MIT OCW About, 2011). Almost all the undergraduate and graduate subjects taught at MIT are illustrated with course materials. Nevertheless, OCW does not provide for a formal MIT education, and does not grant university degrees or certificates. What is more, the course materials may not mirror the entire content of a particular course. Courses may be browsed by department: Aeronautics and Astronautics, Anthropology, Architecture, ..., Biology, Brain and Cognitive Sciences, ..., Comparative Media Studies, ..., Experimental Study Group, Foreign Languages and Literatures, Health Sciences and Technology, History, ..., Media Arts and Sciences, Nuclear Science and Engineering, ..., Political Science, Science, Technology, and Society, and so on. Each course provides generally (selected) lecture notes, projects with or without examples, image galleries, multimedia content, assignments with or without solutions, exams with or without solutions, study group, and online textbooks, along with automatic notifications of course updates and news (MIT OCW About, 2011).

A selection of the *Most visited 20 courses*, based on the site traffic, is available from the OCW home page. Top three of this list included in July 2011 the courses: Introduction to Computer Science and Programming, Linear Algebra, and Physics I: Classical Mechanics (MIT OCW Most Visited Courses, 2011). Another useful selection includes the *New courses* published by OCW within the last 6 months, i.e. 112 courses in September 2011 (MIT OCW New Courses, 2011). *OCW Scholar courses* can be also reached by following a link from the main page. These particular courses are aimed for independent learners who have access to very few additional resources, and therefore they are considerably more complete than typical OCW courses, including new custom-created content and materials repurposed from MIT classrooms. These materials are ordered in logical sequences and include multimedia content such as video and simulations (MIT OCW Scholar, 2011).

Learners who are not yet decided what OCW course to study may benefit from *Editor's picks*. The current list is very heterogeneous, from Visualizing Cultures, Advanced (management) Strategies, Experiencing Architecture Studio, NextLab I: Designing Mobile Technologies for the Next Billion Users, Chandra Astrophysics Institute to Principles of Computer System Design: An Introduction, or (learning) Chinese (MIT OCW Editor's Picks, 2011). By following the link on the *Audio/Video courses* a selection of courses that include substantial video and/or audio content may be obtained. This content refers to simulations, applets, visualizations, etc. (MIT OCW Audio/Video Courses, 2011). Further additional OCW resources include the translated courses that have been produced in collaboration with five partner organizations that translate OCW course materials into languages as Spanish, Portuguese, Simplified Chinese, Traditional Chinese, Thai, Turkish, and Persian. Of course, many other translations of the OCW materials are doable, under the Creative Commons license, that establish that *the user provides attribution of the materials they choose to adapt; that the use of the materials be a non-commercial activity; and that the user shares the derivative work openly as OCW is free and open, or "share alike."* (MIT OCW Translated

Courses, 2011). Since the beginning of the OCW pilot phase in September 2002, the OCW materials have been translated to other languages as well: French, German, Vietnamese, Ukrainian, and so on.

OCW extends also to high schools through the *Highlights for High School* initiative. The teachers and students may access both a selected list of introductory MIT courses, that are thought to be of interest for them, and high school courses that are developed by MIT Faculty. Former category include courses on a variety of subjects such as Biology, Chemistry, Computers and Electronics, Engineering, Foreign Languages, Mathematics, Media, Music and The Arts, Physical Education, Physics, Social Sciences, Writing and Literature, while the latter consists of courses in Mathematics (for example, Calculus, Probability or Combinatorics), Science (for instance, Audio and Speaker Electronics, Guitar Building, Excitatory Topics in Physics and so on), and Humanities (e.g. Europe in Crisis: The World Wars in Europe, Gödel, Escher, Bach, etc.).

The high school teachers and students may also (1) explore hands on learning materials in chemistry and physics, (2) check out MIT competitions in domains as aerial design, robot design, robocraft programming, manufacturing, etc., or (3) watch live scientific demonstrations of magnetic levitation techniques, ways to rig a sailboat, and so on. Moreover, they have the opportunity to put *knowledge into action* by getting support to build new things, to develop sustainable solutions to challenging problems, and to increase their ability to communicate their ideas and research, which is considered as important as the ideas and research themselves. In addition, MIT provides other important resources for high school education: (1) BLOSSOMS (Blended Learning Open Source Science or Math Studies) that is a free repository of video modules for high school mathematics and science classes, (2) Lemelson-MIT InvenTeams, which offers the opportunity for high school students to cultivate their creativity and experience invention, (3) MIT Outreach database, which provides a growing list of various programs related to K-12 education at MIT, (4) MIT Women's Technology Program that is a rigorous four-week summer academic and residential experience where female high school students may explore engineering through hands-on classes, labs, and team-based projects in the summer after 11th grade, (5) MIT Educational Studies Program (ESP) that provide for sharing of students' knowledge and creativity with local high school students, and so on (MIT OCW High School, 2011).

OCW's Short History, Access, Use, Impact and Statistics

The OCW project is rooted in the MIT Faculty's decision, stated in 1999, which regarded the use of the Internet to better carry out the MIT's mission *to advance knowledge and educate students*. This decision has come to live with the proposal of the OpenCourseWare initiative in 2000, followed by the publication of the first proof-of-concept site in 2002, which contained 50 courses. Spanish and Portuguese translations were added in the same year as well. The official launch in 2003 was accompanied by the publication of 450 more courses, along the Chinese translation. During 2004, 400 more courses were published (reaching the level of 900 courses), and the first mirror site was established in Africa. In 2005, besides reaching the level of 1250 published courses, OCW began to update the previously published courses. In addition, the OCW Consortium formed also that year. By November 2007, the initial publication of almost the entire curriculum has been completed (1800 courses in 33 academic disciplines). Since then, the OCW project has grown both in the direction of updating the existing courses and adding new content and services. By 2009, 1950 courses were already published, virtually all MIT courses, the program Highlights for High School was started, and the Thai translation became available. Starting with 2008, audio and video content has been uploaded regularly to YouTube and iTunesU, and image content to flickr. In 2009, 225 mirror sites around the world were reported, and in 2010, 2000 courses were already available on the OCW site. The Course Champions program that aims at getting financial support for continuing free publication of MIT courses was launched also in 2010, along with the Supplemental Resources section that offers 30 complete educational materials. In 2011, the OCW LectureHall iPhone app becomes available as well. The number of visitors increased dramatically, from reported 2 million in 2007, to 50 million in 2008 and 100 million in 2010 (MIT OCW Our History, 2011). Currently, more than 250 other universities and associated organizations around the world have joined MIT, and have been publishing their course materials freely and openly for more than 13,000 courses in 20 languages (Myiagawa, 2010, MIT OCW About OCW Consortium, 2011).

Currently the OCW site reports 110 million visits from 78 million learners from almost every country. Most of them come from North America (44%) and Eurasia (46%). On average, MIT OpenCourseWare gathers 1 million visits monthly, with the translations getting 500,000 more (MIT OCW Site Statistics, 2011). A very consistent part of these users, more than 85%, finds it easy or very easy to locate materials of appropriate academic level on OCW, and they say that these materials are in the appropriate format. The majority of these users are students (42%) or self learners (43%), and only 9% of them are educators. Students use OCW to enhance their

personal knowledge (44%), to complement a course (39%), or to plan the course of studying (12%), while self learners use it to explore interests outside of their professional field (41%), to plan future studying (20%), to review basic concepts in field (17%), or to keep up-to-date in their field (11%) (MIT OCW Program Evaluation Findings Summary, 2009).

Visitors are generally very satisfied with the site's breadth (95%), depth (89%), quality (92%) and currency of the materials (94%). The majority of MIT faculty contributes to the OCW project (78%), and most of them have published two or more courses. The OCW site is used a lot inside the MIT community as well, thus 86% of students, 73% of faculty, and 46% of alumni and staff use the site, while those that have already used it, 92% of students, 87% of alumni and 78% of faculty, consider it valuable. The impact of OCW is seen as extremely positive or positive by 80% of the visitors, while 96% of the visitors would recommend this site. The OCW project is increasingly visible in the media as an influential open sharing endeavor, being cited in journals like Wall Street Journal, New York Times, The Guardian, The Hindu, The Manila Times etc. Moreover, the OCW movement has seeded the stimuli for creating an ever growing body of available courseware. It is reported that 100 institutions worldwide openly published their courses, and that 150 more have similar projects underway. More than 13,000 courses have been published globally, and 85% of them come from other institutions than MIT (MIT OCW Program Evaluation Findings Summary, 2009).

The last 10 years and the next decade with OCW

Ten years later, Shigeru Miyagawa, a member of the original Lifelong Learning Committee that has started the initiative, is confident that OCW has exceeded every previous expectations, by any considered measure: number of courses, number of visitors, amount of public attention, benefit to MIT faculty (nearly 1,400 MIT professors and teaching staff) and students (around 1400 as well). He sees OCW as *a collective act of intellectual philanthropy that truly reflects the MIT community's commitment to the dissemination of knowledge for the public good*. Prof. Miyagawa considers that beyond the raw figures mentioned, which are impressive by themselves nevertheless, the real stories of how OCW is changing lives around the world make the OCW initiative worthwhile (Miyagawa, 2010, MIT OCW Marks OCW Milestone, 2011).

Since it has been first announced in 2001, OCW has grown from a 50-courses pilot project to a site with 2000 courses that provides access to virtually the entire MIT undergraduate and graduate curriculum, and that reaches nearly 80 million learners from around the world. From a local experiment, OCW has matured in a global phenomenon that includes more than 250 other universities and associated organizations worldwide that have adhered to the OCW movement, and have published educational resources freely and openly for more than 13,000 courses in 20 languages.

As for the instructional materials available for each course, the current state is as follows: 586 courses have lecture notes, whereas 737 are only accompanied by selected lecture notes; assignments and solutions are provided for 264 courses, while assignments without solutions are available for 640 of them; online textbooks are offered for 48 courses; 235 courses are accompanied by both projects and examples, whereas 175 courses provide only projects with no examples; exams with solutions are obtainable for 238 courses, and exams with no solutions for 268 courses; multimedia content is provided for 230 courses, and image galleries for 71 courses. Only 12 courses have study groups via Open Study (OpenStudy, 2011). Moreover, the list of the audio/video enhanced courses contains only 121 courses from 2000, which is less than 7%. The OCW's accomplishments are impressive; nevertheless there is a lot of room for growing. For example, OCW Scholar offers for the time being only 5 courses: Physics I: Classical Mechanics, Physics II: Electricity and Magnetism, Introduction to Solid State Chemistry, Single Variable Calculus, and Multivariable Calculus, and it is worth to mention that four of them are in the top 20 of the most visited courses.

OCW has started with the vision of matching the human potential with the opportunities rooted in having access openly to the teaching tools of the world's top learning institutions, having therefore an enormous impact on people and communities worldwide. The envisaged goal of the decade that just started is to reach a billion minds, aiming at helping motivated people around the world to improve both their lives and the world we live in. To accomplish this daring goal, the depth and the quality of the course materials is ought to be improved, along with the site itself. Four major directions of action have been identified: (1) *placing OCW everywhere*, i.e. making the OCW content easy to find and distribute via ubiquitous devices, including reaching underserved populations; (2) *reaching key audiences* by customizing OCW materials to better meet the needs of people across a broad spectrum of backgrounds and cultures; (3) *creating communities of open learning*, by providing for an open learning ecosystem that enables more than access to the content, namely that boost collaborative learning; (4) *empowering educators*

worldwide by providing them with the right tools they need to be able to share OCW content with their students (MIT OCW The Next Decade of Open Sharing, 2011).

OpenCourseWare Consortium

The OpenCourseWare Consortium (OCWC) is *a collaboration of higher education institutions and associated organizations from around the world creating a broad and deep body of open educational content using a shared model* (OCW Consortium, 2011). At present, The Consortium includes hundreds of universities and associated organizations that are committed to advance OpenCourseWare and its impact on global education, and it acts in three main directions: (1) as a supporting resource for starting and sustaining OCW projects, (2) as a coordinator for the OCW movement globally, and (3) as a forum for exchanging ideas and planning the OCW's future. The OCW Consortium's vision matches the natural aspiration for learning with the opportunity to do it, everywhere in the world, by everyone, by having open access to *affordable, educationally and culturally appropriate opportunities to gain whatever knowledge or training they desire* (OCW Consortium About, 2011). The Consortium acts to accomplish this vision by addressing the issue of accessing of high quality educational materials, while it partners with organizations that address the related matters, which must also be tackled to fulfill this vision.

The members of the OCW Consortium are from three categories: institutions of Higher Education, associate consortia, and affiliates (OCW Consortium All Members, 2011). There is a special group of sustaining members that contribute to support OCW: African Virtual University, China Open Resources for Education, Japan OCW Consortium, Johns Hopkins Bloomberg School of Public Health, Korea OCW Consortium, Massachusetts Institute of Technology, Netease Information Technology (Beijing) Co., Ltd., Open University Netherlands, Tecnológico de Monterrey, TU Delft, Tufts University, UNIVERSIA, Universidad Politécnica Madrid, University of California, Irvine, University of Michigan, and University of the Western Cape. In addition, The OCW Consortium is also supported by the William and Flora Hewlett Foundation and member dues (MIT OCW About OCW Consortium, 2011). Most of the OCWC's members come from USA (52 members), Spain (40 members), Japan (27), Taiwan (19) and South Korea (12). Each of the other 45 participating countries is represented by less than 10 members (OCW Consortium Members, 2011).

Membership to the OCWC is valuable for both individuals and institutions, as The Consortium *provides a gateway to OCW projects and courses for the entire OCW community, being an ideal meeting place for people wanting to make structured contributions to the development of open education worldwide* (OCW Consortium Members, 2011). The OCWC actively educates general audiences about the OCW movement, and direct potential users to the most suitable resources. Moreover, the members benefit from collective visibility and expertise with regard to the ongoing development of open education projects worldwide. The OCWC's network of experts provides support in various directions like consulting and collaboration. Currently, The Consortium strives to expand its spectrum of services by addressing emergent issues such as sustainability and support for research.

The OCWC site is very community oriented, and offers various possibilities for interested users to become aware of other people's experiences when using OCW. First, there is a blog, where one may keep up to date with the latest announcements and communications from the staff and board of the OCW Consortium (OCW Consortium Community, 2011). To host the activities and discussions around communities of interest, which fall outside of the specific focus of Consortium, a dedicated website has been created (OCW Consortium Communities of Interest, 2011). Communities of Interest are discussion forums organized according to particular topics of interest within the OCW movement. We may find here various groups: Pedagogy and OCW, OCW in Developing Countries, OCW/OER Accessibility, OCW for businesses, etc. The Project Showcase is a commonplace where one can learn about members' projects, both old and new. The main goal of this page is to be a medium for fostering member collaboration by sharing current projects and prospects, as reading about the new exciting projects can both motivate others and help avoiding duplication of effort within the community (OCW Consortium The Project Showcase, 2011). A very interesting part is the OCW Toolkit Initiative that aims to gather in one place a portable kit of resources that have proven to be useful in starting OCW projects at a range of institutions. The Toolkit includes from frequently cited concerns to aspects related to selecting OCW-related software and other technology issues, creating and managing an OCW team, evaluation and metrics, translation and localization, internal and external communications, creating and using metadata, production, annotation and editing, etc. (OCW Consortium Toolkit, 2011). Also, it is available information on how to get more involved with OCWC by joining or forming either a community of interest or a working group, or by joining a committee. (OCW Consortium Getting Involved, 2011).

Besides all the above appealing features, the most interesting for the individual user seems to be the possibility to search within a large variety of high quality university-level educational materials. Currently, the search index contains 6,384 courses from 64 sources and 12 languages (English, French, Spanish, Japanese, Chinese – both

simplified and traditional, Hebrew, Polish, Portuguese, Catalan, Indonesian, and Russian). These materials are organized as courses on specific subjects, and are published by OCWC's members in various formats and languages. Frequently, they include course planning materials and evaluation tools, aside from the thematic content (OCW Consortium Courses, 2011). The available OCW materials may be reached in different ways: by searching, by using a specialized search engine amongst all the OCWC members that are publishing currently a course feed, or by browsing by language, or by source. As not all the OCW sites publish courses in a format that is compatible with OCWC search index, users may access the OCW websites directly, via the list available on the OCWC site, where the courses are grouped by the language (OCW Consortium OpenCourseWare Websites, 2011).

While the Consortium provide numerous benefits for both members and non-members, its members may benefit from extra advantage of using dedicated tools, from consultation with and support from Consortium's network of experts, from collaboration with peers within working groups and communities of interest, but also by increasing their international visibility and recognition, and by participating in a joint international effort that provides for a sustainable future for open sharing of educational resources.

OCW Consortiums in Spain, Japan, Taiwan, South Korea, and China

Universia is a network with members from 23 countries from Latin America, Spain and Portugal that promotes and facilitates the integration and development of its members in the knowledge and information society, as well as in the telecommunications sector, aiming to create a common forum for higher education *through training, culture, research, and collaboration with the business world* (Universia, 2011). Universia includes 1,056 universities and institutions of higher education, which represents approximately 10 million students. Universia has been committed to the OCW project *from day one*, promoting the OCW Universia Consortium and starting a partnership with the Polytechnic University of Madrid for joint development of the initiative. The available OCW may be searched by areas, authors, keywords, or by universities (Universia OCW, 2011)..

Japan OpenCourseWare Consortium (JOCW) is the consortium of Japanese Universities which have been providing OCW in JAPAN since 2004. Responding to the MIT OCW initiative, six major universities, Keio University, Kyoto University, Osaka University, Tokyo Institute of Technology, University of Tokyo, and Waseda University, have decided to open their lectures in the OCW compliant format. In 2005, they made an alliance, which was the predecessor of the current JOCW. During the next following year more universities have joined JOCW. Currently, the Consortium has 23 regular members, 4 associate members, and 13 affiliates. The number of course materials available online has been growing from 96 courses in Japanese and 57 courses in English in 2005, to 1285 courses in Japanese and 212 courses in English in 2010. The number of visits to JOCW has been reported as more than 400,000 per month in December, 2009 (JOCW, 2011). A survey from 2008 shows that 94% of Japanese see OCW as a good or very good thing, the main advantages being that the universities will become more open (58.3%), the course details may be compared between universities (44%), the interest in universities in society will increase (43.5%), and that it will promote lifelong learning (39.6%). It is interesting to notice why Japanese are keen to use the OCW sites: 69.3% of them say that their interest is driven by the need for improving their cultural education or by their interest in the topics, while for 39.6% of them the possibility to get support in gaining qualifications, or boosting their careers, motivates them; some are interested in using the materials for personal study (38.5%), while others are driven by curiosity (36.4%). As for the most important features expected from OCW, the respondents pointed out easy-to-understand lectures (28.9%), rich selection of courses (20.3%), interesting lecture themes (19.0%), and availability of audio and video of the lectures (10.9%) (OCW in Japan, 2008).

Taiwan OpenCourseWare Consortium includes 24 universities and 24 schools, and it is committed to the goal of offering high quality educational resources for students worldwide, for self-learners and for teachers, within the global context of economical growth and sustainable development, aiming to enhance the international competitiveness for all the beneficiaries. From the TOCWC website are reachable instructional materials related with 394 courses in a large range, from mathematics and physics, to advanced painting, philosophy, and literature, some of them being available both in Chinese and English (TOCWC, 2011). TOCWC provides also discussion forums to facilitate interaction between self-learners, and online teaching assistants to foster a self-learning environment. What is different from the other courseware initiatives is the fact that this self-learning process can lead to an official certification from the university, even for external students, after passing a certification exam, which is also free of any charge (Håklev, 2010).

Korea OpenCourseWare Consortium was started in 2008 with five universities and it includes now 19 universities (Håklev, 2010, KOCWC, 2010). Educational materials in English related to 32 courses are reachable via the OCWC site, and the courses are supported with study groups as well. More courses seem to be available on the

KOCWC website, but unfortunately these are only in Korean. China Open Resources for Education (CORE) is a consortium that was founded in 2003, and it includes 26 universities and 44 China Radio and TV Universities (higher education through radio and television), with a total enrollment of 5 million students. For the time being only instructional materials related to 26 courses are available in various domains like Architecture, Art, Biology, Chemistry, Electronics, Geography, Law, and so on. Unlike TOCWC, CORE does not grant credits or degrees, and does not provide access to faculty (CORE, 2011, CORE on Wikipedia, 2011, CORE OCW, 2011).

Other Open Educational Resources Initiatives Worldwide

Besides the many OCW-based projects around the world, there are some other relevant initiatives that provide course materials along with other instructional resources freely and openly.

One such initiative is *Stanford Engineering Everywhere (SEE)*, which makes freely available to students and educators around the world few of its most popular engineering classes. SEE provide for viewing syllabi and lecture videos, for accessing reading lists, homework assignments, and other course handouts, for taking quizzes, tests or exams (for which both questions and solutions are generally available), as well as for communicating with other SEE students. SEE supports PCs, Macs, and mobile computing devices. A Creative Commons license allows for free and open use and reuse, and for adaptation and redistribution of SEE material. Similar with OCW, SEE courses *cannot be taken for credit and do not include access to Stanford-restricted computers, libraries, or services*. Moreover, their content may not include all the material that is used in the campus offering (SEE, 2011). The available educational resources are related to three introductory courses in Computer Science, seven more advanced courses in artificial intelligence and linear systems and optimizations, two additional engineering courses, and seminars and webinars. SEE has its roots in Stanford's believing that *technology transfer is an important part of its mission*, which includes both research and teaching.

The funding for the SEE's pilot program comes from Sequoia Capital, the Silicon Valley venture capital firm that has helped launching of Cisco, Google, Yahoo, and many other successful technology startups. In the future, depending on the success of the pilot program, more courses could become available via the SEE portal, especially those in domains with broad appeal such as bioengineering, energy/environment and nanotechnology. Feedback from users on the SEE's effectiveness, on materials' usage, on desired features or subject areas, is possible either by direct comments or by completing a survey (SEE FAQ, 2011).

A similar project is *Harvard University Extension School Open Learning Initiatives* with 8 courses offered freely online (Harvard OLI, 2011). A more consistent endeavor is *MyCourses – Open Courseware Initiative*, at Harvard Medical School, which offers freely instructional materials related to 108 courses (as pdf file, ppt file, websites, images, handouts, exams etc.). The MyCourses platform is a web-enabled distance learning environment that provides for lifelong learning for those associated with the Harvard community from the medical school, pursuing graduate or continuing medical education (Harvard MyCourses, 2011).

Carnegie Mellon Open Learning Initiative began in 2002 with a grant from The William and Flora Hewlett Foundation, and it is concerned with using intelligent tutoring systems, virtual laboratories, simulations, and frequent opportunities for assessment and feedback. Thus, The Open Learning Initiative (OLI) builds courses that *are intended to enact instruction - or, more precisely, to enact the kind of dynamic, flexible, and responsive instruction that fosters learning* (OLI The Initiative, 2011). From the main page, one sees that OLI addresses to independent learners, academic students, and instructors (OLI, 2011). The academic students have access to the academic version of the materials, based on an access key. The instructors have to sign up, which is free of charge, in order to get instructor privileges, and to be able to use the Course Builder together with all the available course management tools. By using these tools, the instructors can develop customized courses that include the needed units and modules pertaining potentially to several course packages, the necessary assessments, the course's schedule, and so on. The courses that are no longer supported by grants may need a small maintenance per-student fee to support the ongoing development and improvement of the course, provided that the fee is not prohibitive, in which case the fee may be reduced or waived (OLI for Instructors, 2011). The independent learners may join classes (after signing up) or peek in a variety of 17 courses from fields like Statistics, Biology, Chemistry, Physics, Biochemistry, Economics, French, Visual Communication Design, etc. Each course unit contains information, problem solving procedures, and self evaluation tests. The student's work is saved by joining a class, while it is not saved by peeking in (OLI for Students, 2011). Furthermore, 5 new courses are announced to be available during year 2011. Besides the instructional materials mentioned briefly above, on the OLI website, the users may find also information of the OLI related research projects, and on the specific publications (OLI Research, 2011, OLI Publications, 2011).

One particular feature distinguishes OLI among other opencourseware initiatives, i.e. the delivering of instruction materials in parallel with using technology both for collecting real-time interaction level data of usage by students and for using this data to create four positive “feedback” loops (OLI The Initiative, 2011). Here, feedback stands for the information derived from student activities that is used to influence or modify further performance. First feedback goes to the students and it refers to the corrections, suggestions and hints that are tailored according to the individual’s current performance and context, and that encourage revision and refinement. This approach differs from traditional computer aided instruction, where the feedback is referring to the students’ final answers, whereas the OLI’s Cognitive Tutors and “mini-tutors” provide context specific support during the problem solving process. The second feedback loop keeps the instructors in tune with various aspects of students’ learning, such as background knowledge, relevant skills and future goals. The third loop includes the course designers. The data from student use and learning are continuously evaluated to learn how students utilize the instructional materials, to assess the impact of their usage patterns on learning outcomes, and, finally, to refine the materials accordingly. The last feedback loop involves the scholars on learning science, as OLI is being built based on what we currently know about the learning process, and, moreover, it serves as a platform that provides for both generating new knowledge about human learning and including that knowledge in new instructional materials.

Through its main goals of producing open access instruction materials that enable instruction and support instructors, and of building a community of use, research, and development that is engaged in ongoing improvement, evaluation, and growth of those materials, OLI has steered a new iterative process for developing, improving, and evaluating of effective learning environments. This process is based on the multi-disciplinary knowledge of teams that include learning scientists, faculty content experts, human-computer interaction experts, and software engineers.

Open Yale Courses provides free and open access to 33 selected introductory courses taught by teachers and scholars at Yale University in various fields: Astronomy, Chemistry, Economics, History, Sociology, Physics, and so on (Open Yale Courses, 2011), and aims to expand the access to educational materials *for all who wish to learn*, subscribing to the Yale’s philosophy of teaching and learning that begins with the aim of *training a broadly based, highly disciplined intellect without specifying in advance how that intellect will be used. This approach goes beyond the acquisition of facts and concepts to cultivate skills and habits of rigorous, independent thought: the ability to analyze, to ask the next question, and to begin the search for an answer. The courses span the full range of liberal arts disciplines, including humanities, social sciences, and physical and biological sciences* (Open Yale Courses About, 2011). Each course material includes a full set of class video lectures, along with syllabi, suggested readings, and problem sets (with solutions). The lectures are available both as downloadable videos and as audio-only versions. Moreover, searchable transcript of each lecture is also provided. The online courses are targeted to self-directed and life-long learners, to educators, and to high school and college students. They may download, redistribute, and remix the course materials. Furthermore, users’ feedback is collected via a survey. Ten more introductory undergraduate courses and associated instructional materials were expected to be added to the website in 2011, covering the full range of arts and humanities, social science, and natural science disciplines. Video and audio elements from Open Yale Courses are now available at YouTube and iTunes as well.

Open Yale Courses is supported by a grant from the William and Flora Hewlett Foundation, which through its Open Educational Resources (OER) initiative, launched in 2001, *seeks to use information technology to help equalize access to knowledge and educational opportunities across the world. The initiative supports the development and dissemination of high quality content, innovative approaches to remove barriers to the creation, use, re-use and sharing of high quality content, and projects that seek to improve understanding of the demand for openly available content* (Open Yale Courses About, 2011).

Through a pilot arrangement with Open Yale Courses, OpenStudy offers tools to participate in online study groups for selected Open Yale courses. OpenStudy is a social learning network where students may ask questions, give help, and connect with other students studying the same things, regardless of their school, location or background. It uses AI recommendation engines to match students, and real-time technologies to enable online interaction. OpenStudy is the result of the work of a group of enthusiasts coming mainly from Georgia Tech and Emory Universities, aiming to make students’ learning experience *less lonely and more productive* (Open Study, 2011).

Another remarkable endeavor of offering open educational resources is *Webcast.Berkeley – University of California at Berkeley Video and Podcasts for Courses and Events*, which makes available both webcasts and podcasts for a range of their courses. Starting with 2001, when one course material for Econometrics and one for Chemical Engineering were accessible, more and more courses and events have become available for on-demand viewing via the Internet, reaching today a number of 40-50 courses per semester and hundreds of events (Webcast.Berkeley, 2011). They are from various fields ranging from Biology, Chemistry, Computer Science,

Electronics, etc. to Human Nutrition, Foreign Policy, History and English. The *webcast.berkeley/courses* is an “opt-in” program available to lecturers who are scheduled to teach in classrooms with installed video and/or podcast capture technology. The lecturers are invited to participate in *webcast.berkeley* for the coming semester by signing up to have their course video and/or audio podcast in bSpace. Both the output from a computer or document camera and the related audio narration become automatically available, by screencasting them to *webcast.berkeley*, iTunesU and YouTube, with no extra cost to the department. Currently, the webcast archive is available for at least one year. If many captures of the same course are recorded, the oldest recordings may be removed. One direction of improving the webcast service that is envisaged regards the real-time support for interactivity, based on tools for streaming and course management (Webcast.Berkeley About, 2011).

A very consistent repository for open instructional resources is *Open Education Resources (OER) Commons* (OER Commons, 2011), which is a project created by The Institute for the Study of Knowledge Management in Education (ISKME), which is an independent, non-profit research institute, established in 2002, and focused on knowledge sharing and educational innovations. ISKME helps schools, colleges, universities, and their supporting organizations *to expand their capacity to collect and share information and knowledge, to apply it to well-defined problems, and to create human-centered, knowledge-driven environments focused on learning and success* (ISKME, 2011). OER are teaching and learning materials that are freely available online for everyone to use: instructors, students, or self-learners. Examples of OER include: full courses, course modules, syllabi, lectures, homework assignments, quizzes, lab and classroom activities, pedagogical materials, games, simulations, and many more resources contained in digital media collections from around the world (OER Commons Wiki, 2011, OER Commons Tutorial, 2011). Furthermore, OER is also a process of engaging with the materials, which involves sharing materials that one has created, either individually or in groups with other teachers and/or learners; using and adapting others’ materials for one’s use; and sharing back modifications or comments with respect to others’ materials in order that future users may benefit (OER Commons Wiki Why OER, 2011).

OER Commons has its roots in its creators’ belief that *sharing resources and practices will help facilitate change and innovation in education*, seeding this way the incentives for both Open Education and a sustainable culture of sharing among persons involved in education at all levels (OER Commons Wiki Why OER, 2011, OER Commons About, 2011). Equitable access to high-quality education is a global imperative for the worldwide OER movement, which is actively offering opportunities for new paradigms for teaching and learning based on open access to educational resources, collaborative and participatory processes, and effective technologies for engagement with learning (OER Commons About, 2011).

The OER Commons website provides access to a database of links to a large number high-quality resources (31,856 in September 2011) located on other websites, which can be searched, browsed, evaluated or discussed within OER communities (OER Commons About, 2011). The materials that are included in the database may either be selected by the OER team members during their daily searches or be recommended by the site’s visitors (some being created by themselves). The resources that are compliant with the OER Commons criteria regarding quality and authenticity are included in the database. The OER materials are diverse, going from full university courses (readings, lectures’ videos, lecture notes, homework assignments) or interactive mini-lessons and simulations on a specific topic, to electronic textbooks, adaptations of existing open works and K-12 lesson plans, worksheets, and activities. Moreover, the website provides for engaging with the educational resources by social bookmarking, tagging, rating, and reviewing.

OER Commons’s content, infrastructure, policies, etc. is being supported by the William and Flora Hewlett Foundation, as a part of the Foundation’s worldwide OER initiative, and it is sustained by various organizations and institutions that provide expertise, knowledge sharing, and advice. Thus, OER Commons has established partnerships with over 120 major content partners to provide a unique access point through which educators and learners can search across collections to access the available instructional resources, to both find and provide descriptive information about each resource, and to retrieve the needed ones. By being “open,” these resources are publicly available for everyone to use, and mostly through Creative Commons licensing, many thousands of them are legally available for repurposing, modifying or improving. Besides the content partners, OER Commons and ISKME are involved in strategic relationships that boost innovation and research in the field of open educational resources and open education, aiming at building models for its sustainability. Finally, OER Commons is actively working to increase awareness of OER through outreach and educational endeavors focused on use, reuse, and community (OER Commons About, 2011).

Among the content providers of OER Commons we find Carnegie Foundation for the Advancement of Teaching, Carnegie Mellon University Open Learning Initiative, Encyclopedia of Earth, Federation of American Scientists Learning Technology Project, George Lucas Education Foundation - Edutopia, Harvard University Library Open Collection Program, Johns Hopkins School of Public Health OpenCourseWare, Massachusetts Institute of

Technology (MIT) OpenCourseWare, NASA (NASA KSN, NASA CONNECT, NASA SCI Files), The National Science Digital Library, New York Times Learning Network, Notre Dame OpenCourseWare, Open.Michigan, Open University OpenLearn, Public Library of Science (PLoS), Science Education Resource Center (SERC) of Carleton College, Stanford University Encyclopedia of Philosophy, Tufts University OpenCourseWare, United Nations University, University of California at Berkeley, University of Capetown OpenContent, University of Southern Queensland Australia Opencourseware, Utah State University OpenCourseWare, WikiEducator - Commonwealth of Learning, and Wikiversity. For strategic development and outreaching OER Commons relies, amongst many others, on partners as European SchoolNet (EUN), Creative Commons, Teachers Without Borders, Open Knowledge Foundation, UNESCO, Google Grants, and, of course, The William and Flora Hewlett Foundation (OER Commons Partners, 2011).

OER Commons uses a variety of categories and labels to organize the educational resources. The categories may be assigned by both the resource's creators and the OER Commons administrators, and describe various aspects of the resource, including subject area, grade level, and material type. Each item may have multiple subject areas (OER Commons How Resources are Organized, 2011). The OER fall in six categories by subject: arts (art, art history, cinema, dance, fine arts, music, photography, theatre, and visual arts), business (accounting, e-commerce, economics, finance, international business, management, and marketing), humanities (history, language and literature, library and information studies, linguistics, philosophy, religion, rhetoric, world languages, writing), language arts, debate, grammar, journalism, phonics, reading, speaking, spelling, storytelling, and vocabulary), mathematics and statistics (mathematics, statistics and probability, algebra, arithmetic, calculus, geometry, measurement, number theory, and trigonometry), science and technology (agriculture, architecture, astronomy, biology, chemistry, computer sciences, digital media, engineering, environmental, geology, health policy, health sciences, information technology, nanotechnology, physics, psychiatry, physical education, sports and fitness, life sciences, earth science, ecology, meteorology, oceanography, paleontology, pharmacology, physical sciences, and space sciences), and social sciences (anthropology, archaeology, business law, communication studies, criminal justice, education, gender studies, geography, law, political science, psychology, sociology, social studies, civics, current events, human behavior, human relations, social work, state history, United States history, urban studies). As for the number of materials per subject, the current state is as follows (September 2011): 1,673 materials are related to Arts, 723 to Business, 6,560 to Humanities, 3,066 to Mathematics and Statistics, 16,539 to Science and Technology, and 4,846 to Social Sciences. From these materials, 26,230 are course-related, 3,670 being full courses, while 22,577 are learning modules only.

The grade level can be primary (kindergarten to grade 6), secondary (grades 7 to 12) or post-secondary (higher education, college, university, graduate school, professional development, and training). For primary level, 7,796 materials are available, for secondary level are offered 12,992 materials, while for post-secondary 18,451 resources are accessible. Material types include (within the brackets the number of each available particular kind of material is indicated) textbooks (286), video lectures (2,192), lesson plans (3,525), games (386), simulations (788), readings (9,001), assessments (1,780), homework and assignments (2969), syllabi (5,762), teaching and learning strategies (2050), etc. The media format of each item could be audio, downloadable document, graphics/photos, text/html, video, and so on. Course-related materials include full courses and learning modules, while libraries contain collections of primary sources, teaching and learning strategies, or other types of instructional materials (OER Commons How Resources are Organized, 2011).

When registering with OER Commons, a user can create a portfolio, can review, tag, and rate for value and relevance the items, or contribute his or her own content to the site. Tags are words used to classify a resource in a way that is helpful to the user. Portfolios help users to save individual resources or search queries, in order to easily access them at a later time. Users may make private notes on the resources. They may also submit open educational resources if they control the copyright or licensing, provided that the materials are freely hosted online, since OER Commons does not provide hosting of the actual items.

Other major open educational resource provider is *Connexions* (Connexions, 2011). The Connexions project is a non-profit start-up hosted by Rice University since 1999, which provides both an open source platform and an open access repository for open education resources, which enables creating, sharing, modifying, and vetting of open educational material that are accessible online to anyone, anywhere, and anytime (Connexions Consortium, 2011). Connexions provides a growing gathering of open scholarly materials, along with a set of free software tools to help authors develop small knowledge chunks, called *modules*, which correspond to a single idea or topic, and that can later be organized as courses, books, reports, etc. A *collection* refers to a group of modules arranged in a specific order and labeled by the author, editor or instructor building the collection, which can be a course, a textbook, a report, a survey, a journal, etc. In each module, the collection developer can add links to supplemental, prerequisite, or example material to help learners understand the material.

The architecture and the software tools provided in Connexions have been designed to support easy remixing of the content. The associated knowledge can be shared and built upon straightforwardly because it is highly reusable technologically, legally, educationally, and collectively. Thus, the modules are saved in a simple standardized XML format with included accessibility features. The content in the repository is licensed under the *Creative Commons Attribution Licence CC-BY 3.0*, which is one of the most open licenses, and allows free sharing and remixing, provided that the attribution is maintained to the original author (this being done automatically by the Connexions software). As Connexions has been envisaged as collaborative since the beginning, the authors are encouraged both to develop each module to stand on its own, facilitating this way the re-use in various collections and contexts, and to collaborate with peers through author's feedback and shared work areas (Connexions About, 2011). Reviewing of the content is supported by some post-publication review methods that are powered by the content viewers, the most powerful being *the lenses*, which enable users to give their stamps of approval to the content in the repository, providing for user-driven quality control of both modules and collections. Via the lenses, users can add their own comments and tags for the items in the repository, and, furthermore, they may use some sort of bookmarking within the repository to keep track of related or otherwise interesting content. Users may rate individual modules for quality on a five-star rating system (Connexions FAQ, 2011).

Currently, 19139 reusable modules woven into 1154 collections are available. Arts, Business, Humanities, Mathematics and Statistics, Science and Technology, and Social sciences are the subjects of the materials available in Connexions. Materials can be viewed over the Internet, or be easily downloaded to almost any mobile device (as ebooks), being used by over 2 million people per month. Moreover, schools can also order low cost hard copy sets of the materials (textbooks). Connexions resources are available in many languages including English, Chinese, Spanish, Japanese, Vietnamese, Italian, French, Portuguese, and Thai. Connexions is supported by Rice University, The William and Flora Hewlett Foundation, The Maxfield Foundation, Twenty Million Minds Foundation, and The Connexions Consortium. Long term sustainability of the Connexions project is ensured by The Connexions Consortium, which was formed in 2009, and contains over 20 members – universities, community colleges, foundations, and NGOs – from several countries such as China, India, South Africa, the Netherlands, Vietnam, and USA (Connexions Consortium, 2011, Connexions About, 2011).

The *Open University* (OU) is a major distance teaching and learning university that opened in 1971 for 25,000 students with a choice of four multi-disciplinary foundation courses in the arts, social sciences, science or mathematics (The Open University, 2011). Nowadays it has more than 250,000 students worldwide, who study arts, business, education, languages, health, law, mathematics, computing and technology, science, social science, knowledge media etc. OU is mainly financed from government grants, student fees and research funding. In 2006, OU launched OpenLearn thanks to a grant from The William and Flora Hewlett Foundation. OpenLearn allows free online education, open to anyone, anywhere in the world, and it is reported to have since reached 8 million people (OU About OpenLearn, 2011). OpenLearn includes thousands of study hours of learning materials from the OU courses (600 courses, 8000 hours reported in 2008). Moreover, those learning materials may be accessed, studied, discussed with others, etc. by using free learning tools for collaboration within OU's Learning Space, by tuning on the Open University channels on YouTube and iTunesU, or by following it on Twitter. (OU OpenLearn, 2011). Extracts from OU's broadcasts and teaching materials can be viewed on iTunes University and YouTube. More than 15,000 research publications are now freely available to access and consult via Open Research Online, which is The Open University's repository of research publications and other research outputs (OU Open Research Online, 2011).

One particular initiative is unique, as it is one person's vision come true, and as it aims to become a free online university. Michael J. Saylor, an American entrepreneur, inventor, benefactor, and visionary, has launched Saylor.org in 2009, through The Saylor Foundation, as a free online university (The Saylor Foundation, 2011). Its slogan *harnessing technology to make education free* reveals its commitment to *The Free Education Initiative*, which envisages free college education for everyone and everywhere. The *saylor.org* is seen as a *zero-cost alternative to those who lack the resources to attend traditional brick-and-mortar institutions, and as a complement to mainstream education providers* that will both motivate people around the world to pursue personal growth and career ambitions and lead to institutional change amongst education providers (The Saylor Foundation Status, 2011). The Foundation's goal is based on the belief that *harnessing technology makes education free*, while offering to many individuals the opportunity to overcome the barriers of attending mainstream college education: fixed class schedule, physical distance to a campus, rising costs related to tuition, fee, and textbooks etc.

The main directions of action are as follows: identification, development, solicitation, organization and dissemination of free online academic materials, in a structured and intuitive format. For the time being, the effort is focused to the appropriate content delivery that is necessary for a student to know in order to earn the equivalent of a degree in any of the top majors in the United States. The goal is to produce high quality course materials, along with

high program completion rates (The Saylor Foundation Status, 2011). In the future, the initiative is envisaged to include primary, secondary, and post-graduate levels.

For the time being, there are available course materials for 188 courses from the slated 241 courses, which are needed for majoring in the following fields: Art History, Biology, Business Administration, Chemistry, Computer Science, Economics, English, History, Mathematics, Mechanical Engineering, Political Science, and Psychology, along with those for the General Education Program. Despite that the materials may be used in numerous ways, The Saylor Foundation invites its learners to proceed through the materials aiming to simulate the traditional four-year higher education experience, i. e., to select a major, to fulfill its requirements, and to complete the General Education Program. The courses taken in order to satisfy the requirements of the chosen major build on and reinforce what one learns in this particular program, which seeks to support learners in skill development and knowledge enhancement.

The General Education Program is thoughtful and visionary, as the program's purpose is to educate the learners about what human beings know about themselves (namely history, culture, religion, physical make-ups and environments, communication, and personal economical support). The curriculum has been designed to boost learners' abilities to *think analytically using quantitative and qualitative information and to consider ethical questions*, and to help them be reflective, confident, and productive citizens of their local, national, and global communities, while they perceive the importance of continuous and reflective learning in the knowledge-based society. The structure of the program's webpage includes the requirements with respect to the necessary courses for a given amount of credits, some stipulations to guide the student among their course choices, the learning outcomes for each module, and the list of the needed courses, both mandatory and optional (The Saylor Foundation General Education Program, 2011).

Each major on a given subject is articulated from a short but meaningful description, followed by the list of the mandatory (included in the Core Program), optional and electives courses. Then, the requirements that are necessary to be fulfilled in order to major in that subject are enlisted, namely how many courses, and what is each course's type. A course completeness legend follows, and it describes that a course may fall in one of three classes: not yet developed, partially developed, or completed. Afterward, the list of links to each course's page is provided, the courses being grouped according to their type (core, optional, or elective). For each course, a visual image of the degree of completeness is available. A 100% complete course includes the units of learning, and for each unit, its objectives, content, time advisory (number of hours per each sub-unit) and learning outcomes. Some courses include also the final exam. A sub-unit may include video lectures, some related readings, specific assignments, etc. The recommended materials have very different sources, from wikipedia materials to MIT Professor's lectures.

The current status of the completeness per major is as follows: Art History – 90%, Biology – 93%, Business Administration – 67%, Chemistry – 82%, Computer Science – 71%, Economics – 87%, English – 91%, History – 75%, Mathematics – 57%, Mechanical Engineering – 74%, Political Science – 63%, and Psychology – 85% (77% completeness). It is worth to mention that since submitting this paper, 5 months ago, the availability of the materials related to most of these majors have increased significantly, for example Biology from 65% to 90%, Business Administration from 31% to 67%, Chemistry from 38% to 82%, Computer Science from 27% to 71%, Mathematics from 24% to 57%, and so on. Furthermore, a new major has been included, namely Art History, and it has been completed to 90%.

The team behind this visionary effort includes a small operational group, and a large crowd of academic consultants, content reviewers and contributors, and partners (both worldwide persons and institutions), some of them remaining anonymous on request. Among the partners we find The Carnegie Council for Ethics in International Affairs, Ohio State University Press (that provide full text of more than 80 of its publications), Heritage Foundation, New Academia Publishing, University College Dublin, Victoria and Albert Museum, and many others, including numerous individuals with major American universities.

Conclusions

Nowadays, following the demographic trends corroborated with the emerging universal aspiration for participating within higher education programs, there is a huge demand for high quality educational resources that are available online both freely and openly. Moreover, the lifelong personal evolution in the knowledge and information society is thoroughly supported by the opportunity that anyone have access to such resources from anywhere at any time via the Internet. Seeing the world's knowledge as a public asset that can be accessed, shared, used and reused, etc. mediated by technology, especially ICT, is a powerful idea that may have an influential impact on teaching and learning within our society. A decade of development of initiatives that offer open courseware and open educational

resources has passed, and all the related projects have contributed to the provision of free and open high quality university-level digital educational materials. Moreover, some of these initiatives are also impressive by their scale, such as MIT OpenCourseWare with the available instructional resources related to 2000 courses, and with the associated 250 universities and organizations that provide their course materials freely and openly for more than 13,000 courses in 20 languages. In addition, the OCW projects around the world that develop under the umbrella of the OCW Consortium benefit supplementary from various facilities like using dedicated tools, consulting with and receiving support from the OCWC's specialists, collaborating with colleagues involved in particular communities of interest and working groups, and so on.

Another comprehensive repository is OER Commons with more than 31,000 instructional materials, which are very diverse from textbooks, audio or video lectures, and readings, to lesson plans, assessments, syllabi, etc. or even games. The Connexions project makes also an impact by its size (19139 reusable modules combined into 1154 collections), and even more important by its approach to support high reusability and easy remixing of the content. Other open educational resources initiatives like Carnegie Mellon University's Open Learning Initiative are interesting because they intend, beside providing open courseware, to serve as platforms that increase our understanding about human learning, aspiring to contribute to the development of better learning environments by using that understanding. But, the most promising of all seems to be The Free Education Initiative of The Saylor Foundation, as it is driven by the idea of "building" a free online university without walls or any other boundaries of conventional higher education systems, and as it grows as we speak.

Most of the open courseware initiatives presented in this paper have strongly committed to participation in joint international efforts that work energetically and persistently to guarantee the future sustainability of the paradigm of open sharing of educational resources. Moreover, these programs contribute significantly to the development and evolution of open educational models that may finally lead to the construction of a *global reflective educational infrastructure*, which will be able to fulfill the learning needs of people, both individually and collaboratively, supporting them and their communities on their quest for and social construction of knowledge throughout their life.

Note. This paper is an extended updated version of the paper: Vladoiu, M., (2011). Open Courseware Initiatives – After 10 Years, 10th Int'l Conference Romanian Educational Network - RoEduNet, pp. 183-188, Iasi, Romania, 2011

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M. Vl doiu got her MSc (1991) and PhD (2002) in the Department of Computer Science of The Polytechnica University of Bucharest, Romania. Since then, she has been with the Department of Informatics of PG University of Ploiesti (UPG), Romania. Her main research interests include digital libraries, learning objects, multimedia databases, desktop grid computing, multiagent systems, context-aware services and systems, knowledge society, reflective, blended, e- and u-learning, and e-society. She has published over 50 research papers concerning these topics and she has (co-) authored 4 books.