

The Silent Information Revolution

By Steve Mowry



Audio Engineering Society

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A revolution is defined as a drastic and far-reaching change in ways of thinking and behaving. The following is a discussion of revolutionary developments in the concept of freedom of information and the way we learn and share knowledge resources and tools. I will break down what I see as the significant elements of this seldom-discussed present-day phenomenon into two categories: open university and open software.

OPEN UNIVERSITY

Traditionally, the great universities throughout the world were beyond the reach of most people. The prestigious academic institutions seemed to simply be facilities that supplied societies with highly skilled professionals, or the "elite." An education at Harvard, MIT, or Stanford almost guarantees success. Admission is difficult even for affluent candidates with average or even above average academic achievement. This then leads to the educational element of the information revolution, the OpenCourseWare (OCW) consortium (www.ocwconsortium.org).

OPENCOURSEWARE CONSORTIUM

The OCW consortium is a remarkable story of institutions rallying around an ideal of freedom of information and then delivering on the promise of that ideal. This concept, which is now reality, flows from the passionate belief in a mission, based on the conviction that the free dissemination of knowledge and information can open new doors to the powerful benefits of education for humanity around the world. The individual can take control of his/her destiny.

Already, OCW is a large-scale, web-based publication of the educational materials from university courses throughout the world. This unique initiative enables the open sharing of teaching materials with educators, enrolled students, and self-learners around the world. OCW provides users with open access to the syllabi, lecture notes, course calendars, problem sets and solutions, exams,

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reading lists, and a selection of video lectures. There are no fees and there is no enrollment requirement. The course materials can be downloaded from various university websites.

The driving force behind the OCW movement is the granddaddy of all technical universities: none other than the Massachusetts Institute of Technology (MIT). I have previously referred to MIT as "the chambers of horror" when I resided in Massachusetts and attended a couple of seminars there. A university with academic standards at the highest level is a demanding experience for students. Compared to the national average in the US for 17- to 22-year-olds, MIT's suicide rate is almost three times the average at 20.6 per 100,000 since 1990. The national suicide average during that period at all colleges was estimated at 7 per 100,000. The OCW movement could help reduce suicides at all universities—and especially at pressure cookers such as MIT—by giving students open access to course materials.

OCW helps advance knowledge by providing resources for educators to use for curriculum development and teaching purposes, and for students and self-learners, who may use the materials for their personal knowledge development. These resources may be particularly helpful for people in developing regions of the world. OCW stimulates innovation, generates alumni and community pride, enhances faculty and student recruitment, accelerates adoption of digital materials in teaching, and fosters collaboration among faculty. OCW provides a new vehicle for contributing to faculty members' discipline, affords greater visibility for themselves and their work, offers a valuable service to faculty for enhancing the presentation of course materials, and provides an information resource and values. OCW also helps students to plan their courses of study and provides supplementary study materials.

The underlying premise and purpose of OCW is to make course materials used in the host institution's courses freely and openly available to others for non-commercial educational purposes. Through OCW, the publisher grants the right to anyone to use the materials, either "as is," or in a modified form. There

are no restrictions on how a user can modify the materials for his/her purpose. Materials may be edited, translated, combined with someone else's materials, reformatted, or changed in any other way.

At first I considered this type of learning format a great idea but without the "university experience." Although this may be the case, now a self-motivated learner can pick and choose what skills and knowledge are required for his/her occupation and what is the "best" OCW course available. This seems to be a very powerful tool with the option to self-manage the learning and skill enhancement process. This appears to be best suited to someone who has attained a Bachelor's or an Associates Degree from an institution of reasonable standards, although the OCW courses have no prerequisites. This puts the student in complete control and is only limited by what wares are available.

Having said this, an argument can be made that the openness and freedom of OCW allows a new university experience that is not limited by rules and traditions. This is truly revolutionary both in thought and behavior with regard to how we educate ourselves.

OPEN SOFTWARE

The second element of the information revolution is Open Source Code (OSC) software development (www.opensource.org). Open source is a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in along with any planned obsolescence.

The open source software license does not restrict any party from selling or giving away the OSC software as a component of a distribution containing programs from several different sources. The license does not require a royalty or other fee for such a sale. The objective is obvious—free or low-cost software that is readily available with downloading as the typical method of distribution. You can download most of the Open Source Code applications from sourceforge.net.

The Open Source Initiative (OSI) is a non-profit corporation formed to ad-

vocate the benefits of open source and to build bridges among different constituencies in the open-source community. One of the most important activities is as a standards body, maintaining the Open Source Definition for the good of the community. The OSI Open Source Software certification mark and program produces trust around which developers, users, corporations, and governments can organize open source cooperation.

I will apply the analogy of chemistry as a replacement for alchemy to software development. The main difference between chemistry and alchemy was that alchemists kept their knowledge secret. Someone who wanted to make a titrate of mercury needed to find an alchemist who claimed to know how to make a titrate of mercury, and pay him for that knowledge. Knowledge was power; knowledge was wealth; so knowledge was held privately and sold dearly. Knowledge was proprietary.

To a computer, code is knowledge. Code is the essence of "How do I do this?" Someone who wants a specific operation must buy code from somebody who already knows how to do it, or else reinvent it. Or, if working in open source, they can simply find the code and copy it. Shared code, like shared knowledge, has a group power that proprietary organizations can never appreciate.

In the long run chemistry outran alchemy because information, which is shared, compounds itself. For the same reason, in the long run open source code will swamp proprietary code. Code, which is shared, compounds itself. Proprietary software companies are trying to block each other with patents and copyrights; open source software companies are trying to help each other.

Open software finally addresses the issue of software piracy head-on. Free distribution of OSC is fundamentally encouraged. Although some companies do offer low-cost (~\$100) or even free limited "student versions" of their FE/BE software applications, and a few companies may offer one-to-twelve-month free trial licenses of their applications, and there are even a few freeware technical software applications available, the vast majority are priced far above what the typical self-learner could afford. FEM and BEM multi-physics, math-

ematics, and other engineering and scientific software applications retail for as much as \$100,000 for a perpetual license and are rarely less than several thousand US dollars. Open software could someday significantly change this.

The currently available PC hardware has advanced to the point where most PCs are as powerful as engineering workstations were just a few years ago. In other words, the Finite Element/ Boundary Element software applications can now be run effectively on most new low-to-moderate-cost PCs that are on most desktops. The desktop computers also tend to be easily upgraded by simply purchasing memory chips and/or new video and/or audio cards.

IMPACT ON THE AUDIO/VIDEO INDUSTRY

If the self-learner uses both of these sources of information together—OpenCourseWare and Open Software—the results will be fascinating, to say the least. In a futuristic setting, I see a person sitting at his computer, studying and acquiring powerful knowledge, skills that at least in theory can result in super technical people operating with little or no funding. However, the value of these degreeless but self-motivated professionals could still be very high with regard to what society needs and thus result in potential high demand for these highly skilled human resources. This then implies higher salaries and improved standards of living for future generations, especially in developing countries. Forget educational standards for a moment and focus on the reality of "knowledge is power" from the perspective of the powerless.

Individuals can now target specific A/V technical jobs based on the required skills. Utilizing OCW resources, companies can structure very low-cost training programs for employees, who can take advantage of the flexibility of such programs and the companies' risk is mostly limited to someone changing jobs. There is an increased incentive to train employees and technical staff. Merit salary increases could be contingent on outside self-study learning and training. Practicing independent engineers and technical staff can keep their skills up to date.

continues on p. 49

continued from p. 9

The open approach seems to offer users reasonable hope of acquiring the fundamental and advanced theories and technical information required for loud-speaker or audio electronics engineering. Specialized A/V software tools and systems can be developed quickly and in-house by utilizing free open source code.

The idea of being able to audit university-level courses and to obtain powerful software applications in parallel all from a PC workstation anywhere in the world with no fees is a powerful concept that appears only to be limited by the diligence of the self-learner. The only requirements are a reasonably new PC and Internet connection.

The shocking realization is that this revolution, although silent, gives mankind the best hope of a solution to world peace—is this the answer we have all been looking for? If everyone is busy learning and/or solving the physical problems and challenges that the world faces, while developing new products

and processes, then war and atrocity are presumably less likely. Well, at least peace in the office, I hope.

Whatever the outlook and impact, it is highly unlikely that these drastic changes will subside. Rather there is evidence to the contrary. These trends in freedom of information should continue to intensify with the advance of IT. Education of the elite seems to actually be counter to world peace in the context of this argument.

There are critical unanswered questions. Who will pay for the universities? Who will pay for the software development? I leave these “open” for you to consider. However, each element of the Silent Revolution has economic market forces associated with it. If the traditional barriers from institutions, governments, and regulatory agencies are taken down, a free information market will result. Something tells me that this could then open up opportunities for innovation that have not yet been considered based on the convincing arguments for OCW and OSC. *aX*

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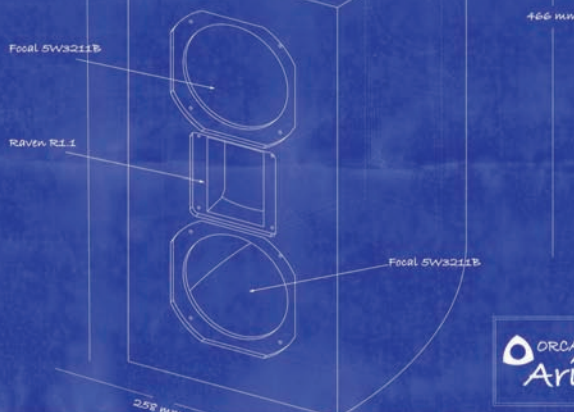
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