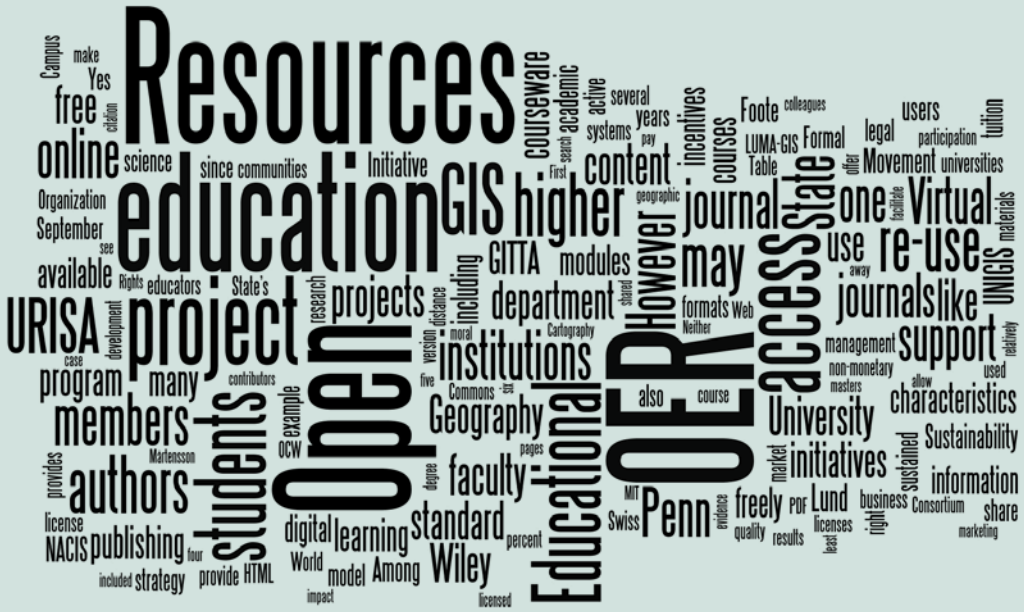
Freeing CP: GIS&T and NACIS in the Open Educational Resources Movement

David DiBiase | dibiase@ems.psu.edu

John A. Dutton e-Education Institute and Department of Geography
The Pennsylvania State University
2217 Earth-Engineering Sciences Building
University Park, PA 16802



ABSTRACT

This article positions higher education in geographic information science and technology (GIS&T), including cartography, in relation to the Open Educational Resources (OER) movement. After defining OER and the movement it denotes I compare several initiatives designed to promote free sharing of GIS&T-related educational resources and, in one special case, free provision of graduate education. Finally I consider a justification for conceiving *Cartographic Perspectives* as an open educational resource, and for freeing it from its current exclusive distribution to NACIS members, subscribers and their patrons.

INTRODUCTION

Of the various definitions of OER the Organization for Economic Cooperation and Development's (OECD 2007, p. 30) may be the most widely-cited:

> "open educational resources are digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research."

Under this definition OER includes:

> "Learning content: Full courses, courseware, content modules, learning objects, collections and journals" and

> "Tools: Software to supported the development and use, reuse and delivery of learning content, including searching and organization of content, content and learning management systems, content development tools, and online learning communities"

Readers who have shared their educational resources informally for years—via unrestricted Web sites, for instance—may wonder, "how is 'OER' different than what I already do?" Formal OER projects are distinctive in at least four respects (Table 1). First, truly open resources are not only freely available for use, they are also licensed for legal re-use by teachers, learners and anyone else, ideally using standard rather than idiosyncratic license agreements. Second, formal OER projects make it easier to re-use resources by providing them in a variety of standard formats that can be imported into learning management systems or content management systems (i.e., IMS Content Packages and SCORM archives). Third, like open source software projects, formal OER initiatives are associated with active developer and user communities. And fourth, successful OER projects provide incentives for resource providers to maintain and expand high-quality content. Granted, few OER projects embody all these characteristics. However, projects that incorporate even some offer clear advantages over isolated personal initiatives.

1. Standard licenses allow legal use and re-use
2. Standard digital formats that facilitate re-use
3. Active communities of authors and users
4. Incentives for sustained participation

Table 1: Characteristics of formal OER Projects

THE OER MOVEMENT

I use the word "movement" here in its sense of a group of people who share a common ideology and who try together to achieve certain general goals (WordNet 2009). It seems to me that the common ideology shared by OER proponents are the beliefs that education ennobles humankind, and that education is at its best when learners are encouraged to construct knowledge actively, often by "remixing" elements of knowledge and expression produced by predecessors (Jenkins 2006, Lessig 2008). More than ideology, these shared beliefs may constitute the "moral ideal" that is one of the defining characteristics of the education profession (Davis 2002).

"The founders of the OER movement were inspired by the success of certain open source software projects in synergizing the efforts of many volunteer developers."

The founders of the OER movement were inspired by the success of certain open source software projects in synergizing the efforts of many volunteer developers. (Raymond's 2001 book *The Cathedral and the Bazaar* presents the classic case of the Linux operating system.) You can find many of the thought leaders at an annual Open Education Conference, which in its sixth year (2009) attracted over 200 on-site participants and many more on-line followers (see **http://openedconference.org/**). Among the most influential founders is David Wiley of Brigham Young University. While still a PhD student at Utah State University in 1998, Wiley coined the term "open content" and created an early license agreement that promoted content sharing while preserving authors' copyright (Wiley 2006, Smith 2009).

Wiley provides evidence of the scope and momentum of the OER movement in a recent report to the Organization for Economic Cooperation and Development, in which he estimates that more than 2,500 open access courses are available from over 200 universities (Wiley 2007). Nearly all of these have appeared within the past ten years, and the proliferation of open courseware appears to continue unabated. Many of these institutions' OER offerings can be searched and accessed through the OpenCourseWare Consortium (**http://www.ocwconsortium.org**) and the Open Educational Resources Commons (**http://www.oercommons.org/**), among others.

The OER movement is making an impact in the publishing industry as well. For example, in September 2009 the Directory of Open Access Journals (**http://www.doaj.org**) listed 4,355 open access scholarly journals (perhaps five percent of all scholarly journals), including 1,651 that are searchable at the article level. Meanwhile the same price pressures that plague academic journal subscribers (especially research libraries) confront students and families who purchase assigned textbooks. While a commercial market for low-cost digital textbooks may have been "two years away for the last ten years" (Lyman, cited in Oda and Sansilo 2009), one firm reports a ten-fold increase in the number of colleges that have adopted the free and low-cost open-source textbooks in only the past year (Flat World Knowledge 2009). And as of July 1, 2010, the 2008 U.S Higher Education Authorization Act requires higher education institutions to include textbook price information in course catalogs used by college students to plan their semester schedules.

SUSTAINABILITY OF OER INITIATIVES

The OER movement captured the attention of educators everywhere in 2001 when the Massachusetts Institute of Technology with much fanfare announced its OpenCourseWare Initiative (Vest 2006). With substantial philanthropic support and industry partnerships, MIT set out to make educational resources used in all its classes freely available worldwide under the recently-developed Creative Commons license. By September 2009, MIT's OpenCourseWare initiative (**http://ocw.mit.edu**) listed 1,900 "courses." Links to courseware are organized by academic department. Among many other resources the Department of Urban Studies and Planning lists a "Workshop on Geographic Information Systems" conducted

in Fall 2005. Courseware associated with the workshop includes lecture notes, laboratory assignments, and a final exam. (The two-hour exam is somewhat remarkable in that students are provided with datasets and are expected to answer questions by interrogating the assigned data using GIS software.)

Visitors to the MIT Open CourseWare site may also find resources by keyword search. On September 11, 2009 my search on "gis" yielded 333 results, sorted by relevance. The first 10 results included six HTML pages of lecture notes and reading lists (some with links to further resources) and four PDF files consisting of exported presentation slides, assignments, or discussion notes. An "advanced search" option allows one to restrict results to particular resources types, such as course home pages, videos or video lectures, lab assignments, exams, animations and simulations. An advanced search on "cartography" yielded 31 results (including one reference to "genomic cartography").

Considering how plain many of them appear to be, it's easy to underestimate the impact of MIT's open educational resources.. Earlier this year I had the chance to ask Chuck Vest, who was MIT's president when the OCW initiative was conceived and announced, how he responds to the many skeptical observers who have dismissed the initiative as "hype." Rather than resort to Web site traffic counts or other statistics, Vest described how OCW resources had been used by the Bahá'í Institute for Higher Education to create an "underground university" that counteracts the Iranian government's denial of higher education opportunities to Iranian Bahá'ís. How many of us produce educational resources that have such an impact?

As Wiley (2007) points out, however, the MIT example is unique, and because of its high cost and reliance on philanthropic support, probably unsustainable. In 2007 the OCW initiative employed 29 people and had an average annual budget of $4.3M. While acknowledging MIT's success in attracting foundation support and vendor partnerships, Wiley concludes that there is "very little chance that any other institution will be able to replicate the MIT model" (p. 8).

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Other higher education institutions have launched OER initiatives, but none so far has embodied a sustainability plan of the sort that Wiley characterizes as "OCW 2.0" (Wiley 2009). His own alma mater, Utah State University, offers open courseware associated with 80 different courses (**http://ocw.usu.edu/**). Utah State's relatively modest OCW project employed just a full-time director and some student assistants and cost only about $0.125M per year to operate through June 30, 2009. Then, however, the director was laid off due to budget constraints after support from the Hewlett Foundation and state legislature was exhausted. Wiley called the dismissal "heartbreaking" (Parry 2009).

Rice University has shown that it is possible to grow a substantial OER initiative with minimal centralized University support. In September 2009 Rice's Connexions project (http://cnx.org/) listed "14,838 reusable modules" in "796 collections." Like OER Commons, Connexions is a "referatory"

that provides links to resources served locally by contributing institutions. Authors contribute resources voluntarily from institutions around the world with little or no backing. Wiley (2007) points out Rice's success at sustaining its decentralized OER initiative reflects the presence of an influential champion. For the same reasons Wiley's own departure from Utah State may have undermined the sustainability of that project.

In the following section I review a cross-section of major OER initiatives related specifically to GIS&T with reference to the four characteristics outlined in Table 1 above.

GIS&T IN OER

THE GEOGRAPHER'S CRAFT AND VIRTUAL GEOGRAPHY DEPARTMENT PROJECTS

Ken Foote was among the first to organize a Web-based collection of open resources for GIS education beginning with the Geographer's Craft project in 1992 (Foote 2007; http://www.colorado.edu/geography/gcraft/contents.html). This was a year-long course that used an active-learning, problem-solving approach to introduce geographic research techniques, all built around hypermedia, web-based course materials. By 1996, with funding from two NSF grants, Foote and his students created one of the first comprehensive, on-line bodies of educational resources in geography, including fourteen units on key topics in GIScience. Foote found that within months of units going online, file downloads from outside the university far exceeded those made by his students at the University of Texas. The files were being used across all Internet domains (.edu, .com, .mil) and from Internet addresses worldwide. The resources continue to be widely used, and those written by Peter Dana on map projections, coordinate systems, GPS, and geodetic datums are cited widely in digital and paper reference materials and still top lists of Internet search results on those topics.

The widespread use of the Geographer's Craft resources suggested that a similar sharing of materials might be possible if other faculty were willing to contribute. From 1996 through 1999 his National Science Foundation-funded "Virtual Geography Department" attracted over 100 contributors whose interests and expertise spanned the discipline. Foote's stated objective— "to develop a Web-based clearinghouse for high quality curricular materials and laboratory modules that can be used by students and faculty all over the world" (1999, p. 113)—typified later OER projects. However, his broader goal was to exploit the Web to promote and sustain "intradisciplinary collaboration" (p. 108). To this end project emphasized workshops in which educators worked together to learn Web publishing skills and pedagogical strategies for using Web-based resources in higher education.

His 1999 article "Building Disciplinary Collaborations on the World Wide Web" compares several kindred projects—including the Virtual Geography Department—in regard to project goals and the strengths and weaknesses of strategies adopted to achieve them. Project sustainability was a key

concern, as was the oft-cited lack of incentives for sustained voluntary faculty contributions. As Foote seemed to expect, several of the high-profile initiatives he compared were soon abandoned (e.g., the Core Curriculum in GIScience, successor to the NCGIA's Core Curriculum in GIS project) or stopped short of fulfilling their potential as OER clearinghouses (e.g., the Alexandria Digital Library).

The Virtual Geography Department itself still exists (see **http://www.colorado.edu/geography/virtdept/contents.html**), but its contents are dated. For example, as of August 31, 2009, only five of the 34 courses linked from the Virtual Department's "Geographic Information Science" resource page offer open and up-to-date syllabi and laboratory exercises, and most of those provide required exercise data only to registered on-campus students. Rights to re-use resources vary. One syllabus even states that "use of these materials by other instructors in their courses is expressly forbidden without my written permission." Most resources are provided as HTML documents, word processing or Portable Document Format (PDF) documents.

1. Standard licenses allow legal use and re-use?	No - mixed
2. Standard digital formats that facilitate re-use?	Mostly HTML, word processing and PDF documents with some standardized metadata descriptions
3. Active communities of authors and users?	Not sustained
4. Incentives for sustained participation?	No

Table 2: OER Characteristics of the Virtual Geography Department

Project reviewer Michael Solem (2000) concluded that the Virtual Geography Department succeeded in "diffusing innovative practice in geography by training faculty members in Web pedagogy and online curriculum development" (p. 353), despite the fact that " some participants failed to follow through with new online materials after the conclusion of the workshops…" (p. 363).

Anderson (2009) describes several types of business models that include provision of "free" goods. Of these, the Virtual Geography Department typifies a "non-monetary market." The primary incentive for voluntary contributions in a non-monetary market is the enhanced reputation that accrues to authors and/or institutions from the widespread distribution and use of their works. As Foote himself observed, however, that incentive is inadequate for most academic geographers since such contributions are rarely included among the criteria by which university faculty members are awarded promotion and tenure. Foote (2009) also notes that:

> …for most faculty, sharing teaching materials—putting them out in public—is a foreign and uncomfortable experience. Though they do this with their research writings, they are far more hesitant to do the same with their teaching materials.

For these and other reasons, sustainability has proven as elusive for the Virtual Geography Department as for most of the other projects that Foote compared in 1999. One exception is the UNIGIS project.

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UNIGIS INTERNATIONAL NETWORK

The UNIGIS network was the project about which Foote was most optimistic in 1999. Founded in 1990 and expanded by educators in the U.K., Austria and the Netherlands, UNIGIS began as a print-based correspondence course, then migrated to Web-based distance learning in the late 1990s. Ten years later, despite many organizational and technological changes, UNIGIS International continues to thrive (http://www.unigis.org). Ten universities in Europe, Africa, South and North America operate nodes. UNIGIS students register in and earn postbaccalaureate certificates, diplomas, and masters degrees from one of the participating universities, but may earn credits for modules offered by several different institutions. Partners share curricula and educational resources, including revisions and translations. They also share marketing and administrative costs (Molendijk and Sholten, 2005). Foote observed that "formal collaborations that have permanent staff and means of funding, such as the UNIGIS project, may offer a more viable, long-term model for developing collaborations" (Foote 1999, p. 114).

However, UNIGIS is not an OER project. Educational resources created and shared by Consortium members are not open to others except fee-paying students. Indeed, the essence of the relationship between members is an exclusive license agreement that governs access to educational resources copyrighted by the Consortium. Therefore the original question Foote posed in 1999 remains unanswered: Is it possible to create a sustainable OER project for GIS?

PENN STATE 'WORLD CAMPUS'

In North America, UNIGIS nodes compete for students with several universities that offer distance education in GIS&T, including Penn State University. Penn State's online GIS Certificate and Masters degree programs attract about 1500 enrollments annually from about 400 students who register through the University's online "World Campus" (**http://worldcampus.psu.edu**). Key to Penn State's success is a University policy that rewards entrepreneurialism by returning a large share of tuition revenue to academic units who create and sustain online programs. In fiscal year 2008-09, for instance, the share of tuition revenue returned to the Penn State program was $2.2M USD, much of which supported salaries of the fifteen full-time-equivalent instructors and support staff.

As of September 2009, fourteen of the program's 26 online courses are at least partly available as open educational resources. The open "courseware modules" consist mainly of HTML pages and associated graphics that are served through a content management system (Drupal). This is paired with a password-protected learning management system (ANGEL) in which select materials and communications are shared only with registered students who pay tuition and earn academic credit. The courseware is contributed voluntarily by faculty members and is licensed for non-commercial re-use through a standard Creative Commons share-alike version 3.0 license. Users are invited to submit comments and requests to faculty authors through Penn State's College of Earth and Mineral Sciences' Open Educational Resources initiative (**http://open.ems.psu.edu**).

The costs of maintaining these open resources (which are also used in classes by fee-paying students) are charged to the programs' operating budget, along with faculty salaries and related expenses. Since 2008 the Penn State program's marketing strategy has included open access to select courseware. The rationale for is based on the expectation that in an increasingly competitive higher education marketplace, adult learners will choose to register with an institution whose educational resources are open access and of superior quality. Feedback from one student suggests how the strategy works:

> The ability to access course information … was critical in my decision to choose Penn State over other distance education providers. Distance education was new to me and I had some concerns regarding quality and value. When I discovered the wealth of well-presented information provided for GEOG 482 and other courses in Penn State's GIS program, I immediately felt an increased level of comfort with the quality of education I would be receiving (Foster, personal communication, 27 July 2009).

The Penn State program exemplifies the type of business model Anderson (2009) calls "Freemium." In this "most common" strategy, online businesses give away a free good to many users but earn revenue from a relative few who are willing to pay for additional features. As Anderson (2009, p. 185) observes,

> … a college education is more than lectures and readings. Tuition buys direct proximity to ask questions, share ideas, and solicit feedback from academics … for universities, free content is marketing.

Time will tell if Penn State's OER strategy is sustainable. From Foote's (1999) perspective a weakness may be that the approach is motivated by primarily by competitiveness, not cooperation.

1. Standard licenses allow legal use and re-use?	Yes
2. Standard digital formats that facilitate re-use?	No - Mostly HTML word processing and PDF documents
3. Active communities of authors and users?	Yes
4. Incentives for sustained participation?	Yes

Table 3: OER Characteristics of the Penn State World Campus program

In regard to the distinguishing characteristics of formal OER initiatives outlined above, the Penn State approach to open education embodies three of the four characteristics: (1) it's resources are licensed for legal re-use; it provides access to a community of authors as well as a collection of resources; and it provides incentives for contributors (whose salaries depend wholly or partly on the quality of their workproducts and the success of the marketing strategy). The Penn State initiative falls short in regard to technical interoperability, however, since it fails to provide resources in standardized exchange formats like IMS and SCORM (see below). From technical perspective the most ambitious collection of open educational resources in GIS&T may be the GITTA project (**http://www.gitta.info**).

GITTA PROJECT

GITTA (Geographic Information Technology Training Alliance) is a joint project of ten groups at seven Swiss universities and federal institutes of technology that created six multi-lingual online modules to supplement classroom-based GIS&T education. Established in 2001 with support from the Swiss federal government, the GITTA project was one of 50 contributors to the Swiss Virtual Campus (**http://virtualcampus.ch**) which promotes online and blended learning in Swiss higher education institutions. By September 2009 the Swiss Virtual Campus listed 82 courseware projects and promised 30 more to come.

The six GITTA modules today consist of over 40 lessons (23 English, twelve German and five French) plus eight case studies (six German and two French). Lessons included six to thirteen HTML pages of text and graphics (including some Flash and SVG) plus quizzes and questions, bibliographies, glossaries and metadata. The modules are freely available to anyone who subscribes to the project newsletter, and are licensed for use and re-use through a Creative Commons Attribution-Noncommercial-Share Alike 2.5 Generic license. In addition to HTML pages and printer-friendly PDF files, the modules are provided as standards-compliant IMS Content Packages and SCORM (Shareable Content Object Reference Model) archives that can be imported to commercial and open-source learning management systems such as Blackboard and Moodle.

1. Standard licenses allow legal use and re-use?	Yes
2. Standard digital formats that facilitate re-use?	Yes
3. Active communities of authors and users?	Yes
4. Incentives for sustained participation?	Maybe

Table 4: OER Characteristics of the GITTA project

In sum, the GITTA project embodies at least three of the four distinguishing characteristics of formal OER initiatives: its resources are freely available and licensed for legal re-use; it provides access to a community of authors; and it facilitates re-use by providing resources in standard interoperable formats. Strengths include the sophisticated technical and pedagogical frameworks within which its modules were designed. A formal sustainability plan is in place (Weibel et al 2009), though it's unclear that the non-monetary incentives to courseware authors will succeed in sustaining their participation. To support continuing development of lessons and modules after its five-year grant, the GITTA project formed an association of dues-paying members in 2006 (Grossman, Weibel and Fisler 2008). Since dues are modest, and since benefits to dues-paying members appear to be not much greater those enjoyed by users who access the its resources for free, GITTA's business model more resembles a "non-monetary market" like the Virtual Geography Department than a "freemium" strategy like Penn State's. Ken Foote would approve of the fact that one of the Swiss Virtual Campus' stated objectives is to "strengthen collaboration among

universities" (Swiss Virtual Campus 2009). It remains to be seen if the project will prove to be more sustainable over the long term than the Virtual Geography Department, which was founded with similar goals. In the short term, a €25,000 MedidaPrix prize awarded to the project in 2008 is sure to help.

LUMA-GIS

Perhaps the most formidable sustainability challenge in GIS&T higher education is the online masters degree program offered by the University of Lund in Sweden. The Lund University Master's in Geographical Information Systems (LUMA-GIS) is free—students admitted to the program pay zero tuition. Not surprisingly, the Lund program is popular—as of September 2009, 766 students had been admitted, with 1,789 more enrolling in individual courses. The 2,555 total active students participate online from 91 countries (Mårtensson 2009).

Lund began developing online courses in 1999. Development accelerated in 2001 when it and nine partner institutions gained support from the European Commission's Leonardo da Vinci programme for vocational education and training. (Onstein and Mårtensson 2004). In 2004 Lund established a complete eleven-course online master's degree, which includes a final thesis project defended in person. Students are welcome study at their own pace, part-time or full-time. Although student demographics vary widely, the typical Lund online student is single, male, over 30 years of age, works full-time, and studies from home. (Mårtensson, Pilesjö and Galland 2007). Five years after the masters program was established, only five students defended theses and earned degrees. Mårtensson (2009) speculates that this low completion rate is due to the program's "relatively low priority" in adult students' busy lives.

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Given the willingness of students to pay substantial tuition and fees for online masters degrees at other institutions, why does Lund give away its degree and its faculty members' time and expertise? One explanation is that higher education is tuition-free (or nearly so) in many European countries—including Sweden—where taxpayer support for public higher education is significantly greater than in the U.S. However, this explanation fails to account for the number of students that the Lund program serves. Mårtensson (2009) reports that the financial support the Lund program receives from the Swedish national government is really only sufficient to support the staff and facilities needed to supervise about 50 graduate students. He and his colleagues accept many more because they're committed to "capacity building of GIS in developing countries." Besides meeting this need, the primary incentive for faculty is to "place Lund University on the map." For these reasons the LUMA-GIS program exemplifies the "non-monetary market" business model.

The LUMA-GIS program is not an OER project. Its courseware is available only to registered students through a password-protected course management system. The program is pertinent to this discussion, however, insofar as it is motivated by the same "moral ideal" that guides OER advocates and projects. Also relevant is the sustainability that LUMA-GIS has demonstrated to date.

DISCUSSION

Like LUMA-GIS and the Virtual Geography Department, the GITTA project embodies a "non-monetary market" business model. Unlike LUMA-GIS, GITTA is an OER project. To succeed where the Virtual Geography Department and most of its contemporaries could not in sustaining an active developer community, the GITTA project needs to deliver added value to its dues-paying member organizations and to deploy dues income in ways that incentivize participation by authors. In the U.S., where public support is inadequate to offer free university education, entrepreneurial institutions may create mechanisms for deploying tuition revenue in ways that provide incentives to authors. Where this happens, as at Penn State, the "Freemium" business model may be a viable means for sustaining OER initiatives. Ironically, OER may prove to be more sustainable where taxpayer support for higher education is least (i.e., the U.S.), since competition for tuition-paying students in such places provides a justification for OER as a marketing strategy. The justification follows from the expectation that in an increasingly competitive higher education market, rational adult students will choose providers whose courseware is open for inspection and is of the highest quality. But regardless of an institution's level of taxpayer support or competitive position, how can it hurt to share educational resources with others who can't afford to pay or who don't need a degree?

GIS&T JOURNALS IN OER

OPEN ACCESS PUBLISHING

"Journal publishers have been able to continuously increase prices because they control peer review and this control or peer review has not been challenged by academics themselves"

The need for open educational resources in GIS&T education may be most acute in the arena of scholarly publishing. Obviously teachers and learners in higher education—particularly in graduate education—need ready access to original source materials like academic journals. As subscription costs increase, however, research libraries are forced to be more and more selective about the titles they provide their patrons. Following the concentration of ownership of journal titles by a relatively few for-profit publishers (including Elsevier, Candover and Cinvenn, Thompson and Wiley)(Munroe 2007), the cost of journal subscriptions has increased far beyond the rate of inflation in recent years. For example, Edlin and Rubinfeld (2004, p. 120) observe that "prices of library subscriptions periodicals in law, medicine, and physical science rose by 205 percent, 479 percent, and 615 percent between 1984 and 2001, a period when the overall price increases as reflected by the Consumer Price Index was 70 percent." Overall, prices of for-profit journals are now as much as 500 percent higher than non-profit journals.

A 2008 survey of 45 academic libraries (an international sample of two-year and four-year colleges, research universities and small hospitals) concludes that "journal publishers have been able to continuously increase prices because they control peer review and this control or peer review has not been challenged by academics themselves" (Primary Research Group 2008, p. 28). About a quarter of survey respondents believe that open access publishing is slowing increases in journal prices, while nearly half of others believe it will eventually have some effect.

OPEN ACCESS PUBLISHING IN GIS&T

The Directory of Open Access Journals lists three journals whose keywords include "gis," twelve journals concerned with "cartography," and 44 with "geography." However, only two open access journals are included among the 46 leading geographic information science (GIScience) journals identified by Caron *et al* (2008)—the *URISA Journal* and *Mappemonde*. (The open *Journal of Spatial Information Science* wasn't announced until 2009.) Caron and colleagues' study addressed the absence of a comparative analysis of research publications in the relatively young and ill-defined GIScience field. They combined a Delphi study of "40 international experts" and a quantitative comparison of journal citation rates (specifically, JCR impact factors) to identify and rank leading periodicals. The *URISA Journal* provides an instructive example.

In 1998-99 Harlan Onsrud offered to serve as editor on the condition that the URISA Board of Directors agreed to publish open-access version the journal. Onsrud was concerned about escalating costs of academic journal subscriptions, and about scholars' responsibility to "maximize dissemination of our works and our readership" (Onsrud 2009). At the time, URISA President Joseph Ferreira stated that "while commercial publishers best make progress through exclusivity and control, the URISA Journal editors believe that science and new knowledge is best advanced through an intellectual environment of openness and freedom" (URISA 1999) Ferreira's position thus presages his MIT faculty colleagues' recommendation 2001. As of September 2009 there are 192 articles in 39 issues of the *URISA Journal* freely available for use and re-use at **http://www.urisa.org/journal_archives**, making this one of the richest open educational resources collections in the GIS&T field. A shortcoming is that URISA's license limits re-use of digital articles to URISA members.

1. Standard licenses allow legal use and re-use?	Non-standard; re-use rights limited to URISA members
2. Standard digital formats that facilitate re-use?	N/A - PDF files
3. Active communities of authors and users?	Yes
4. Incentives for sustained participation?	Yes

Table 5: OER Characteristics of the URISA Journal

Besides the obvious benefits to educators and students, what benefits accrue to URISA as an organization, and to authors who contribute research articles? Certainly the journal's reputation has not suffered. The URISA Journal is ranked 14th in relative importance among 46 GIScience periodicals in Caron and colleagues' 2008 analysis. (*MappeMonde* is 42nd; *Cartographic Perspectives* is 37th.) Neither has open access hurt the organization financially. According to URISA Executive Director Wendy Nelson, both membership in the organization and library subscriptions have been stable since 2000 (Nelson 2009). And current editor Jochen Albrecht (2009) confirms that submission rates haven't been affected either. Authors who contribute manuscripts to the *URISA Journal* apparently

see neither advantage nor disadvantage in open access publishing (Albrecht 2009). This impression is consistent, in a sense, with the equivocal findings of bibliometricians who have attempted to document such advantages.

"[A] 'selection bias' suggests that authors who tend to be more frequently cited also tend to make their articles freely available."

DO AUTHORS BENEFIT FROM OPEN ACCESS PUBLISHING?

It's reasonable to assume that authors would prefer to publish in open access journals if they knew that their work would be more widely read and cited. Craig *et al* (2007, p. 4) observe that several "early studies have shown correlation between free online availability … and higher citation counts." Antleman (2004), Subler (2004) and Eysenbach (2006) are among those who provide evidence that open access publishing "provably increases the visibility and impact" of authors' work (Subler 2004, p. 8).

However, while acknowledging the association between citation rates and open access, critics like Craig and colleagues warn against inferring causality since confounding factors are usually not taken into account in such studies. For example, a "selection bias" suggests that authors who tend to be more frequently cited also tend to make their articles freely available (Moed 2006). Furthermore, it's well known that the generality of apparent citation effects is limited due to the culturally specific nature of scholarly publishing and citation behaviors across disciplines.

It's hard to say, therefore, if publishing in open access journals is beneficial for individual authors. At the same time, however, there is no evidence that open access publishing has been detrimental to one of the first GIS&T professional associations that attempted it (URISA). So, NACIS members should ask, why (or why not) "open" *Cartographic Perspectives*?

JUSTIFYING OER INITIATIVES IN GIS&T

Financial considerations aside, why should professional associations like URISA and NACIS make their publications freely available? Why should higher education institutions and their faculty members give away their educational resources? One reason is the conviction that sharing such resources freely is the "right" thing to do. One participant in the 2009 Open Education conference reported that participants discussed OER as a "moral imperative" (Camplese 2009). Can OER be justified on ethical grounds? For a moral imperative to exist, one or both of two conditions must exist: either (a) people have a right to free educational resources, or (b) educators are duty-bound to provide them. In fact, neither is the case.

In regard to rights, Article 26 of the United Nations' Universal Declaration on Human Rights (**http://www.un.org/en/documents/udhr/**) does state that "Everyone has the right to education" and that "education shall be free, at least in the elementary and fundamental stages." However, the Declaration goes on to state that "higher education shall be equally accessible to all on the basis of merit." In other words, the Declaration recognizes the right of higher education institutions to be selective. If institutions have a right to choose which students gain access to its human resources (faculty), then it follows that institutions also have the right to restrict access to educational resources. OER is therefore not a right that higher education institutions are bound to honor.

What about our duties as educators and editors? At a minimum, these are codified in institutional statements of professional ethics like Penn State's (1996). This policy states that faculty members' primary responsibilities are to "seek and to state the truth as they see it" and to preserve, protect and defend academic freedom. In regards to professors' obligations to society, the policy does state that they are obliged to "promote conditions of free inquiry…" This could be taken to mean that faculty members are duty-bound to publish only in open access journals and to share all educational resources freely under Creative Commons licenses. Unfortunately, that interpretation is contradicted by common practice. No faculty member at Penn State or elsewhere would pass up an opportunity to be published in *Science*, for example, on the grounds that it is a breach of professional ethics to publish in a proprietary, limited-access journal.

Therefore, in fact or in practice, educators in higher education institutions are bound neither by rights nor by duties to participate in OER initiatives.

SUSTAINING OER INITIATIVES IN GIS&T

The foregoing is not to suggest that "opening" educational resources is a bad idea. Like other proponents I believe that sharing resources freely comes close to what philosopher of professions Michael Davis (2002) calls the "moral ideal" of the education profession. My point is that if OER is not justifiable solely on ethical grounds, the case must be made that it can be a sound business strategy. Unfortunately there is as yet no evidence available to support that claim. Although OER has a relatively long history in GIS&T, the *URISA Journal* may be the field's only sustained formal OER project. And those closest to that project have no evidence of advantages or disadvantages accruing to contributors, users or the organization. Recent developments are encouraging, however. In Europe and other places where taxpayer support for higher education keeps tuition low, non-monetary markets like the GITTA project may prove sustainable if contributors perceive sufficient value in enhanced reputation, increased collaboration and the satisfaction of participating in a "gift culture." Where tuitions are high, as in the U.S., entrepreneurial institutions may succeed creating what Wiley (2009) calls "OCW 2.0"—a "new generation of OpenCourseWare projects … built around sustainability plans."

> [Such] second generation projects [could be] integrated with distance education offerings, where the public can use and reuse course materials for free (just like first generation OCWs) with the added option of paying to take the courses online for credit (Wiley 2009).

It's also possible that the international UNIGIS distance learning network could recognize the potential of an OER "freemium" to expand markets and goodwill. Foote's optimism about UNIGIS may still be justified.

"if OER is not justifiable solely on ethical grounds, the case must be made that it can be a sound business strategy."

CONCLUSION: WHY GIVE AWAY *CP*?

The more appropriate question may be, why not? Like URISA, NACIS could offer a freely-available digital version of Cartographic Perspectives in addition to its regular print version. Like URISA, NACIS should expect neither to lose nor gain subscribers, members or contributing authors as a result of adding an open digital version. And if it were to publicize its open version more assertively and measure results systematically, NACIS might even realize benefits that URISA has not.

Access to *CP* is currently an exclusive benefit for NACIS members and subscribers. This is akin to restricting access to National Public Radio to dues-paying members and underwriters. Denying access to NPR to those who don't contribute during pledge drives does not make it a stronger or more valuable service. Similarly, "freeing" *CP* from its current exclusive distribution to NACIS members, subscribers and their patrons just makes sense.

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