Open Source and Freeware – Strategic Resources for IS Pedagogical Endeavors

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Abstract

Freeware and open source resources can provide significant value to the pedagogy of IS educators, but are often overlooked in curricula decisions. Freeware and open source titles broaden the repertoire of learning objects available to the IS educator and may significantly enrich the learning environment, and provide new vistas of opportunity, at nil to minimal cost to the institution. Open source Learning Management Systems, such as Moodle, provide comparable functionality to their commercial counterparts, including WebCT, Blackboard and Webboard, but without the investment, upgrade and replacement costs normally associated with the commercial entities. Open Source and freeware titles, though not advertised and often spread by word of mouth, are available to supplement off-the-shelf software titles used to teach various courses in Information Systems, and are gaining in popularity amongst numerous budget-conscious academic institutions. In this paper, we shall explore the invaluable world of freeware and open source, provide key definitions of the relevant terminology, identify several places where freeware and open source software titles may be discovered and are available for distribution, examine some of the motivations of freeware authors, relate some of our experiences with Moodle, a particular open source Learning Management System, and provide examples of how we have integrated the concepts of freeware and open source into our instruction in some specific Information Systems courses.

Keywords: freeware, open source, Learning Management System, donationware, adware, public domain, shareware, Moodle, MySQL

DEFINITIONS/TERMINOLOGY

Freeware is defined as computer software which has been made available by the authors of the freeware titles to the general public, without any charge, registration fees or license fees. The distribution channel which has fostered the growth of the freeware market is the World Wide Web, where freeware titles may be readily downloaded. If the freeware is accompanied by source code which may be modified, then the freeware is known as open source, and individuals and groups thus have the capability to build on the "base" source code to tailor the application to their particular needs.

The term "freeware" is due to Andrew Fluegelman who introduced the term in the 1980's to describe a communications package called PC-Talk which he had designed and made available to the general public. He characterized "freeware" as "an experiment in economics more than altruism" and encouraged users to make voluntary contributions if they found valuable the freeware title. It should be noted that what Fluegelman characterized and trademarked as "freeware" is commonly known today as "shareware," and the confusion still persists. Shareware, in particular, specifically obligated the user to pay the shareware author a registration fee after a defined trial period (typically 30 days), whereas freeware has no

explicit obligatory payment. In many cases, the full features of the shareware title cannot be "unlocked" unless the user pays the requisite registration fee, and until then, that which is available to the user is often referred to as "crippleware."

As an example of one of the earliest pieces of freeware, introduced in in 1995 by Yasumasa Kanada and D.Takahashi, professors in the Dept, of Information Science at U. of Tokyo, is the SuperPi Calculator, a freeware title that will calculate the value of pi up to a maximum of 32 million decimal digits (http://en.wikipedia.org/wiki/Super_PI). This piece of freeware has been widely used to benchmark CPU performance, and has been a favorite of those who wish to "overclock" their processors. Yasumasa Kanada has held numerous world records for calculating the digits of pi (over a trillion digits, which took over 600 hours on a supercomputer), and released this program in 1995 to the world community, while developing more advanced algorithmic approaches. The aforementioned program is based on the Gauss-Legendre algorithm.

Open source is often confused with freeware, but the terms do have a subtle difference. Prior to the introduction of the term "open source," such software was known as "free software," where the "free" referred to the right of the user to freely modify the source code. The "open source" terminology replaced the "free software" descriptor in 1998 with the release of Mozilla and Netscape Navigator. Open source code is freely available under a license, and, again, users are free to study, change, copy, improve, redistribute, share and use the open source software for any purpose. To reiterate, freeware will not permit modification of its source code, and the "free" in "freeware" refers only to its gratuitous price.

Over the years, numerous variations of the freeware and open source themes have appeared, each with a slight difference in terms of the obligations of the user. "Public domain" software differs slightly from freeware in that it claims no copyright, and can be freely distributed. Donationware is freeware which will be accompanied by a suggestion to compensate the author(s) for the cost of building the software, or to target such donations to a socially aware organiza-

tion specified by the author(s). It should be explicitly noted that such donations do not "purchase" the software title for the user, or provide a license.

Recently, a community of software developers dedicated to donationware created a new organized "twist" for those seeking to obtain posted donationware titles at their website, http://www.donationcoder.com . To obtain any software title from their website, one needs to obtain a license key, but they have decided to be a little more "forceful" with the general public in soliciting donations, and we quote from their website:

> *"In order to encourage people to really consider making a donation, we have adopted a somewhat unusual policy for people who do not donate:*
>
> o *The free license key generated here will remove the reminder nag from the program for 6 months.*
> o *After 6 months the reminder will come back and you must return to this page to generate a new license key which will last for another 6 months.*
> o *After 1 year from your initial signup you can return to this page for a permanent non-expiring license key"*

We present below a table from the donationcoder website which provides the suggested donations for lifetime membership:

Suggested Donation Amount (in US Dollars) as a Function of Annual Income versus Degree of Appreciation for DonationCoder.com						
	hate it	it's ok	like the idea	really like the idea	love the idea	in love with site
<= $0	$0	$0	$0	$0	$0	$0
$1 - $20,000	$0	$1	$2	$5	$5	$10
$20,000 - $40,000	$0	$4	$10	$20	$30	$40
$40,000 - $60,000	$0	$8	$20	$30	$40	$50
$60,000 - $100,000	$0	$10	$30	$40	$50	$80
$100,000 - $200,000	$10	$20	$50	$80	$100	$150
$200,000 - $500,000	$25	$40	$80	$100	$150	$250
$500,000 - $4,000,000	$50	$100	$200	$300	$400	$500
$4,000,000 - $25,000,000	$100	$200	$500	$1000	$2,000	$10,000
$25,000,000 - $100,000,000	$500	$2,000	$10,000	$20,000	$200,000	$500,000
> $100,000,000	$1,000	$25,000	$100,000	$200,000	$1,000,000	$2,000,000

Another variant of freeware is known as "postcardware" and is merely an attempt by

the freeware author to learn the extent of adoption of his/her freeware title. Postcard-ware authors request that users of their freeware titles optionally mail them a post-card indicating their names and locations, which presumably provides the author with some satisfaction in seeing the wide distri-bution of his/her freeware titles. Another variant of freeware is "adware" which implies that users will be exposed to "advertise-ments" in exchange for their "free" usage of the software titles.

MOTIVATIONS OF FREEWARE/OPEN SOURCE AUTHORS, THEIR COMMUNI-TIES, AND SPECIFIC WEBSITES TO OB-TAIN TITLES

Why do programmers seek to design, de-velop and promote freeware and open source titles? Ideally, we would like to think that they possess altruistic goals, and that they truly believe in the free sharing of knowledge, and welcome the opportunity to "return" something to the community from which they personally have derived signifi-cant knowledge, excitement, pleasure, and often careers. More realistically, it is often recognition which is the driving force, recog-nition that the fruits of their labors are being used worldwide by many other individuals.

While the above is true in most cases, we do recognize that often there are subtle eco-nomic incentives which foster the creative spirit of freeware authors, and sometimes the freeware title serve as an incentive to whet the appetite of the user to upgrade to a full featured version of the software, or to purchase a related commercial software title of the author. Thus, in this sense, the free-ware title often serves as a "loss leader."

Summarizing, then, amongst the various motivators for freeware/open source au-thors, we can include recognition, returning something to the community, desire to build a resume, inability to market a software ti-tle, a spin-off of some academic project, de-signing a "loss leader," or possibly an in-stance of corporate good-will.

The freeware and open source communities differ markedly in their cohesiveness and structure, although some changes are taking place. The freeware community is highly fragmented, there is no cohesiveness or or-ganized structure, and nil to minimal formal communication between freeware authors. The aforementioned donationcoder.com represents an attempt to organize a special-ized segment of the freeware community. (In stark contrast, shareware authors have a distinct organization, ASP, The Association of Shareware Professionals (ASP), which was founded in 1987 to strengthen the future of try-before-you-buy software as an alterna-tive to conventional retail software. Its members, all of whom subscribe to a code of ethics, are committed to the concept of shareware as a method of marketing.) The open source community is much less frag-mented than the freeware community, as open source authors are freely sharing with each other the fruits of their labor (e.g., source code) and communicating and net-working with each other, often through the dedicated web sites which exist for the open source community.

There are various websites which serve as repositories for freeware and open source, and also act to disseminate amongst users some of the latest titled to be distributed. We present below some representative web sites, and this list is by no mean totally in-clusive of the many dedicated web sites for freeware and open source:

- o Chris Pirillo's Lockergnome (http://www.lockergnome.com)
- o Gizmo's Support Alert Newslet-ter (http://techsupportalert.com)
- o Freeware Genius (http://freewaregenius.com)
- o ZDNET Downloads Digest (sub-scribe at http://www.zdnet.com)
- o Microsoft Research (http://research.microsoft.com/re-search/downloads/default.aspx)
- o Sourceforge.net (Open Source Hosting Site) (http://sourceforge.net/)

A recent presentation at a prior ISECON con-ferences has outlined the design of a peda-gogical freeware webcenter dedicated to be-ing both a repository and recommender sys-

tem for pedagogical freeware (Kim, Scher, Turoff, 2005).

AN EXAMPLE OF INTEGRATING FREE-WARE/OPEN SOURCE TITLES INTO A DATABASE DESIGN COURSE

A course in database design is generally a requirement for students in Information Systems, and it presents a learning environment which could readily be augmented by various freeware and open-source titles. Perhaps the most well-known freeware/open source title for Database Design is the MySQL (Pratt, Last, 2006) open source database management system, having more than 10 million installations worldwide (http://en.wikipedia.org/wiki/MySQL). Many instructors of database design believe that freeware/open source ends with MySQL, when, in fact, there are numerous other freeware and open source titles which could be effectively utilized in a database design course. We enumerate some of these:

- o The GreenEclipse Crossword Puzzle Generator (http://www.greeneclipse.com/) may be utilized to measure student comprehension of database design concepts, and allows the instructor to prudently leverage Bloom's taxonomy for developing critical thinking skills (Gomez, Scher, 2005)

- o The Lahman Baseball Database (http://www.baseball1.com/) is a freely available relational database consisting of over 20 tables, is updated annually, and contains the most complete set of baseball data available anywhere, with full statistics on professional baseball players and teams from 1871 through the current year. It is an excellent vehicle for having students design SQL queries into a meaningful database.

- o Screen capture programs, such as Snippy (http://www.bhelpuri.net/Snippy/), ScreenHunter5Free (http://wisdom-soft.com/products/screenhunter_free.htm) or Gadwin PrintScreen (http://www.gadwin.com/printscreen/) allow the user to take a snap-
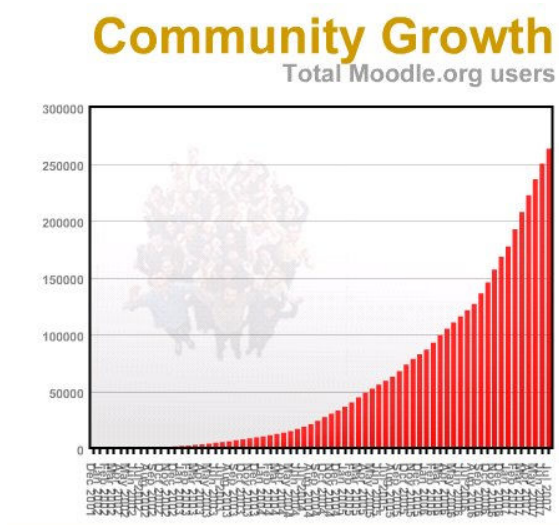
shot of any portion of the computer screen, and is often invaluable in capturing the dynaset from the screen in a Microsoft Access student project.
- o MDBtoMySQL is a freeware title (http://www.mdbtomysql.de/) from Zebra Computer Systems which will convert a database in mdb format to mysql

AN EXAMPLE OF AN OPEN SOURCE LEARNING MANAGE-MENT SYSTEM: MOODLE

Moodle is an open source Learning Management System, providing support for the IS instructor to create an effective online learning community (http://moodle.org/). Moodle may be used in traditional face-to-face classes, in E-Learning environments where all "meetings" take place on-line and course content and management is done on-line, and in hybrid learning environments, which "blend" traditional face-to-face learning with the online E-Learning mode of instruction. Moodle was created initially by Martin Dougiamas, a former WebCT administrator.

As of this writing, Moodle has well over 12 million users, and used in over one million 'courses' ranging from the largest user (University of Nantes (France) with over 13,000 courses), to one of the newest users, a small private prep high school in Montclair, New Jersey (Montclair Kimberly Academy). Open University (UK), with over 200,000 students, is now a major user of Moodle. The web site http://moodle.org/stats/ will contain the most current data on Moodle usage. In the graph below (from http://moodle.org/stats/) we present the growth in registered users of Moodle:

The first design decision for the Moodle instructor is to decide upon the course structure (called course format in Moodle nomenclature) and there are two formats

o   Weekly Format (the course is organized in a week-by-week structure)

o   Topics Format (the course is organized by specific topics, where each topic may span several weeks)

Given the cognitive differences between undergraduate students and graduate students, it would probably behoove the instructor to best consider the highly structured Weekly format for undergraduate classes, and the more open-ended Topics format for graduate classes.

Moodle's threaded discussion spaces are known as Forums, and a typical course will maintain several Forums, each with a specific goal, and each subject to the design specifications of the instructor. Below we present an example of a weekly course structure utilizing several Moodle Forums:

The Moodle course instructor has the capability to add various activities and resources to a Moodle classroom – below we illustrate this with the various categories of resources and activities:
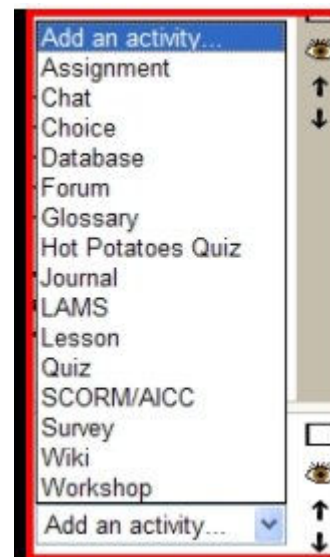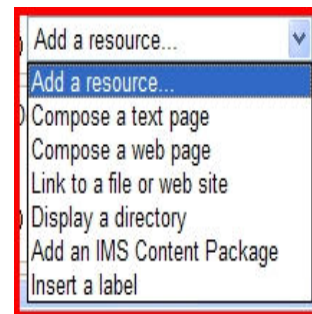
Of the numerous supported "activities" of Moodle (as enumerated above in the "Add an activity" selection box, we will choose in this paper just one significant activity to focus upon, and this is the Glossary activity. Moodle provides the instructor with the capability to build a glossary for a course, and the instructor must decide if the glossary is to be simply a single person effort (the instructor), or a collaborative effort involving participation from all students in the class. Moodle supports two different types of glossaries:

- o Main Glossary: only one main glossary can exist for a course, and it can be edited only by the designated teacher

- o Secondary Glossary: can have student entries, and can be exported to the main glossary

Configuration options, at the discretion of the instructor, could include the requirement of approval by the instructor of any student entries to the glossary, and allow comments and peer evaluation ratings of entries (with several rating schemes) by other students in the class.

Moodle, and in particular, the development of a class glossary, was utilized by the author in a Spring, 2007 course in Systems Simulation, and we present the results of an end-of-semester survey – we briefly summarize each survey result, and provide both the survey question as well as a table indicating the class response to the question.

a) There was a strong recognition by the class that the collaborative class activity to create a glossary of terms used was a beneficial learning experience for the stu-

dents.

I found the Moodle Glossary activity, which we completed before the midterm examination, to be a worthwhile educational experience in learning some of the terminology and definitions of Systems Simulation

CHOICE	PER CENT
Strongly Agree	0
Moderately Agree	64.28
Indifferent	14.29
Moderately Disagree	14.29
Strongly Disagree	7.14

b) Students did utilize the class generated glossary of simulation terms and definitions in preparing for the midterm examination. (And, the completed student glossaries provided helpful feedback to the instructor in measuring student mastery of the course material.)

For the Moodle Glossary of Simulation Terms Project, which we completed before the midterm exam, I did spend _____ reviewing the Glossary terms contributed by other students.

CHOICE	PER CENT
a great deal of time	7.69
a moderate amount of time	61.55
a minimal amount of time	23.07
Zero Time	7.69

c) Students recommended that the collaborative class development of a glossary of terms was an excellent teaching and learning tool which could be applied to other classes.

The concept of a class-generated Moodle Glossary is an excellent teaching and learning tool, and I would recommend that it replicated in other courses.

CHOICE	PER CENT
Strongly Agree	0
Moderately Agree	76.92
Neutral	0
Moderately Disagree	15.38
Strongly Disagree	7.60

d) Students generally found Moodle to be an easy-to-learn Learning Management System:

I have found Moodle to be _____ to learn.

CHOICE	PER CENT
Very easy	46.15
Moderately easy	30.76
Somewhat easy	15.39
Moderately Difficult	7.70
Very Difficult	0

e) Students (several of whom have been exposed to commercial Learning Management Systems) generally found the functionality and power of Moodle to be good or excellent, and only a small percentage found it to be "fair."

I have found the functionality and power of Moodle to be _____.

CHOICE	PER CENT
Excellent	30.77
Good	53.85
Fair	15.38
Poor	0
Very Weak	0

CONCLUSIONS AND SUMMARY

Open source and freeware titles can be a valuable addition to the repertoire of learning objects and tools available to the instructor in Information Systems courses. Open Source Learning Management Systems are rapidly growing in popularity, and open the door to several new creative collaborative tools to be embedded in the Information Systems instructor's pedagogy, including activities like the class collaborative development of a glossary of terms and definitions used in the class. A formal class end of semester survey and evaluation in a class taught by the author confirmed the effectiveness and benefits of integrating a particular Open Source Learning Management System, Moodle, into the pedagogical environment of the class.

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