Lessons from Open Source: Intellectual Property and Courseware
by Jan Newmarch

Abstract

In this competitive age, universities are seeking ways to protect their intellectual property, for fear that it might be stolen or used by others without financial benefit coming back to the university. Increasingly, universities are using mechanisms of secrecy to secure their property. This paper argues that this approach is wrong on both moral and business grounds, and that a better model can be found in the Open Source movement of the software industry.

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Intellectual Property Ownership by Secrecy

Universities are increasingly regarded as ordinary industries that trade in particular goods, and have to make a profit in order to survive. While this rationalist approach may be abhored by many, the public funders of education in many countries have cut funding to universities [1] so that they have to adopt this attitude in order to continue existence.

The proper trade of universities is knowledge. A major role of a university - many would argue *the* major role of a university - is to pass on knowledge to students. Many faculty, particularly in research-oriented universities, would instead propose that the major role is to *generate* new knowledge through research activities. Whichever view is adopted, it remains that the "stock in trade" of universities is knowledge, and that they gain reputations, students and funding based on how they deal with the knowledge they "own."

In a competitive world, it is important to keep control of the goods in which you trade. Companies do not divulge their business secrets to competitors, but attempt to protect their business advantage. Universities are now regarding their intellectual property (IP) as their stock in trade, which must be protected against competitors.

Courseware

One of the annoying (to those adopting a "for-profit and corporate" model of higher education) things about knowledge is that it can be learned by others. Indeed, that is what universities do: teach students about the IP they possess. Courses are there to pass knowledge from faculty who possess it, to students who don't. This makes it hard to protect, because once people have access to it, then they just might learn it!

Since the birth of the World Wide Web, some twenty years after the beginning of the Internet, individuals and organisations have been placing all sorts of materials on the Web. In particular, there is now a vast amount of courseware available on the Web. In recent years, university administrators have begun to see the possible advantages in placing all, or at least large amounts, of their courseware on the Web. It allows students to access materials at any time, leading to flexible delivery models. If well thought out and executed (and with money spent), Web-based courses can also be used for remote delivery.

Several authors have pointed out that getting faculty to place courseware on the Web also results in shifts in power structures within the university [2]. Faculty staff can lose control of their own work, which has both positive and negative consequences.

Universities typically couch arguments in terms of "flexible delivery", "best coursesware on the Web", and so on. Whatever the reasons, it has become the expected norm for each course to have at least some components on the Web.

Courseware and Secrecy

But here comes the catch: the Web is open, so putting courseware on the Web is "giving it away." Whoops! Apparently, there goes the university's IP, just a download away from anyone!

So how do you guard against this? Well, you hide it, of course! That is, you take an open system and use the various mechanisms available (such as password access) to turn it into a closed system [3]. This approach is being adopted either implicitly or explicitly by an increasing number of universities. The explicit approach is when hiding courseware becomes university policy, enforced by access protection through the university Web servers. The implicit approach is often by the university encouraging use of particular Web authorware systems that impose a protection system by default [4].

This paper argues that the approach of protection by hiding is wrong, in many ways. Our major arguments against secrecy *per se* are given in the next section. The following

section "Courses aren't just Courseware" argues that universities are applying too narrow a focus to courses. The next section gives a brief survey of the Open Source movement, which is followed by one of the keystone tenets of Open Source, that ownership is protected by copyright which can be used to grant as well as to deny rights. The final section summarises the advantages of appying Open Source principles to courseware.

Arguments against Secrecy

Common Knowledge

There are several hundred textbooks on freshman calculus. Every university teaches one - and typically several - courses in freshman calculus. The repetition of ideas amongst all these thousands of courses is enormous, and that is exactly how it should be. There is nothing new in introductory calculus, and the intent in teaching this material to students is to form a common base of knowledge that can be relied upon, no matter where the student comes from.

Calculus is just one example of a course where a common base of knowledge is sought. The same occurs in hundreds of other disciplines. To hide the courseware is a silly thing to do, since the material is available in abundance from many different sources, and is often taught using the same set of source texts.

Attempts to hide material which are common knowledge should probably be regarded with suspicion: either some new twist is being used (rare), or more likely, some incompetence is being hidden or copyright material is being used illegally.

Even at the more advanced level there is still a large degree of commonality. For example, graduate courses in artificial intelligence are expected to cover a core of material, although much more optional variation is expected. But when we take into account the optional components, or the stresses and stances taken towards common materials, it often comes down to the attitudes of a particular lecturer, and the courseware itself often does not reflect these variations.

Common Good

Universities are often held as some sort of moral pinnacle of knowledge discovery and learning. Universities hold a privileged position as collectors and dispensers of knowledge. They are expected to maintain an unbiased and open view on current knowledge.

With increasing commercial forces acting upon universities, it is widely seen as regrettable that these forces may be acting to dilute the open nature of universities. That

is, hiding information for commercial reasons is seen to be against the common good, an argument which particularly applies to government funded institutions.

Hiding courseware is thus against the public interest. It is akin to public libraries charging an entrance fee or borrowing fee. While it may be acceptable for private institutions to adopt such policies, it is not acceptable for publically funded institutions. It is notable that MIT, a private university, has recently announced that it will make all of its courseware publically available, apparently on the argument of public good [5].

Research Analogy

A scientist does not advance the cause of human knowledge by suppressing their results, and they do not gain peer recognition by remaining secret. A researcher in the sciences, humanities and arts is expected to publish in the public domain. Indeed the whole research process relies on peer-assessed research, released into the public domain.

Universities gain reputations and funding based on the openness of the research of their academic staff. Whenever a researcher enters into a secretive situation such as commercial-in-confidence research or military research, they effectively disappear from view. Their work also disappears from view, and while it remains unpublished the researcher's reputation declines.

Teaching has not been subject to the same level of peer assessment because it has been localised. Later we will argue that peer assessment methods can be applied to courseware in the same way that it is applied to research.

Advertising

In the more competitive world in which universities now live, advertising is beginning to play the same important role that it does in the commercial world. Advertisers typically play a game of extravagant promises, downplaying their opponents and promoting their own product.

Universities are increasingly playing this game. Adverts appear in the press, on the radio and on TV. Generally, they fall into this same category of extravagant promises, trying to lure students into studying at *their* institution rather than another. The substantive content of these adverts is usually fairly minimal.

Organisations selling goods cannot just give them away. However, they will often give away samples. Universities can open up selected subjects as "sample" courseware. In the next section it is argued that courseware by itself it not the sum total of a course, and so you could give away the entire courseware of a university and still only be giving away "samples."

The whole point about advertising is that something has to be made public about what you are selling, and has to be made public in a highly visible way. If a university can

make *its* courseware hold the public perception in an area, then its advertising is more effective than that of other universities.

I have often heard the argument that if you make knowledge visible then others might use it as their own. Typical arguments on this line run as follows:

We run a course by distance delivery. We sent the materials to a new student in country X. Within a day, photocopied versions of our course were being sold in local bookshops without any return to us.

Firstly, these types of practise are illegal. More and more countries are becoming signatories to copyright agreements, so this is becoming less common. But to be pragmatic: if someone is out to copy courseware, would you prefer it to be your courseware or that of someone-else that is copied? If nothing else, a vanity argument should prevail: "my courseware is the most highly copied in the world."

I have heard it said about a country where copyright enforcement may be suspect that "Linux is the most widely spread legal Operating System." Linux may be freely copied, unlike other proprietary operating systems where the amount of copying does not lend itself to positive advertising in this way.

Cost recovery

University courses are expensive to produce. They involve costs over a variety of periods. A lecturer who delivers a course over several years will generally have a high investment of costs in initial preparation of courseware, but a much smaller one in successive years. Student enrollment is on a per semester basis and has a per semester cost. Marking is a cost that occurs at least several times per course delivery. Lecture delivery is a cost that occurs several times per week. Simplifying, one could almost regard courseware preparation as a once-off cost, with course delivery as an ongoing cost.

A university has a target audience, that is, its own students. It must meet costs from this target, and preferably make a profit from this audience. However, once it has met this cost for the course content component, what should it do with it: hide it, attempt to sell it, or give it away? Selling is turning out to be fairly hard on the internet, with many .coms disappearing. Hiding it, we have been arguing, is wrong. So once costs are met, why not just give it away?

Courses aren't just Courseware

Personal contact

Many universities have fallen for a simple error: confusing *courseware* with *courses*. Courseware is something you might put in a set of notes to be sold at a bookshop, or placed on the Web. A course is a totality that includes courseware among many other factors. When a university worries about non-students getting access to courseware, it should instead be concentrating on what it means to offer a course.

The first of the differences between courseware and the course it belongs to is that a course typically has a measure of personal contact. A student in a course will interact with other students, tutors and lecturers for the course. This interaction with other people is sufficiently important that nearly all distance or remote delivery mechanisms will try to simulate this interaction. This is done by chat rooms, email forums, online video, summer camps, and so on.

Timetables

A syllabus will name a topic. Courseware will expand on the topic, frequently giving references to other material. What often governs how a student deals with too much material is the *timetable* for the course. If a topic is one of many in a week's schedule, then the perception is that it is probably not too important. If it lasts for several weeks, then it will be important. The professor's timetable structure gives lots of clues about how to deal with courseware, which may not be present in the courseware itself.

Guidance and feedback

Personal contact and lecture schedules are two mechanisms whereby a student gains feedback about progress in a course. These are missing from all but the most sophisticated courseware systems, and even in those the feedback it is minimal (e.g. giving the correct answer in multiple choice questions).

Assessment

The progress issue is important here: students don't just "take" a course, they begin, progress and complete a course. Assessment is given for a variety of reasons, ranging from positive reinforcement to pruning underachievers. Whatever reason is used (and most educators use positive motivation), assessment is used by both students and professors as a measure of progress throughout a course.

Assignments, projects and exams are typical measures of assessment. At the end of this process, all parties hopefully will agree that this measures achievement in the course, culminating in success or failure to various degrees.

Certification

I think the major difference between courseware and a course lies in the certification that follows successful completion of a course. Many people will study subjects out of pure interest. But if you offered people a choice: study this subject for one semester and (a) get

a certificate of passing the subject; or, (b) get no certificate. What is the most likely choice?

Universities do not just offer subjects or courses, they offer degree programs. Extend the argument of the last paragraph: study at *this* university for three years and get a degree; or study at *that* one, and not get any certification at all. What is the choice? Universities are degree granting organisations, and this is really what they offer: a certification that a student has reached the degree standards of that university.

In terms of "value adding", this is where a university really adds to courseware. Many students and employers rate a university on the value placed on the degree, which is hopefully related to the quality and content of the subjects. Academics may often complain that their degree program is only rated on its value in being a "passport to a job", but I do not know of any professional academic who would willingly downgrade the quality of their degree, or of employers or students who would like to see this happen.

The certification programs offered by various computer companies also follow this line: pass the certification exam and get a better job. Education companies separate from these computer companies will often offer courses, but the reason students take them is to get the qualification (and also the knowledge to pass).

Open Source

Open Source is a loose philosophy within the computing fraternity that has been present for well over thirty years, but has only recently been given a name and a reputation [6]. Software may be distributed in a variety of formats, and under a variety of conditions. The standard "commercial model" is that software is distributed in binary format, with very limited rights to use or distribute the software. More permissive is the "shareware model", where the software is again distributed in binary format, but you have the option of trying before buying, or even having a reduced capability version that you do not have to pay for. The Open Source mechanism is the freest of all, and it distributes copies of the original source that anyone can compile to binary format and then run.

The Open Source movement is not a homogenous movement, and covers a range of philosophical viewpoints. Nevertheless, adherents have a common position, albeit arrived at in different ways:

Software should be distributed in source code form, not hidden in binary-only formats, and that others are free to use. modify and adapt this source code.

Some of the practical consequences of this are

- Software can be examined for bugs much more easily;
- With many eyes watching, more bugs can be found;
- Given the source, it can be adapted for uses beyond the original authors conception; and,
- Authors achieve recognition by making their code available.

The Open Source movement has a deeper and richer history than that of the Web courseware adherents, and has spent more time examining motives as consequences of their beliefs. In particular, it has developed arguments against the secrecy and proprietary mechanisms used by many commercial vendors, that form the basis of the arguments used here against the secrecy and proprietary mechanisms sought by some university administrators.

Copyright

Copyright as Assertion of Ownership

The basis for universities to use courseware developed by staff is through copyright. Some universities claim outright copyright on any materials produced by academic staff. Others will allow copyright to reside in the producers, but claim usage rights for this material.

Copyright is a contentious issue. David Noble [7] argues strenuously that universities are attempting to use and abuse copyright:

"University control over copyright is the *sine qua non* of the Digital Diploma Mills. Without it the universities and their corporate partners cannot succeed."

Noble's extreme stance on Web courseware has been modified by others, and in my own paper [8] I argue that while power relations have changed, this is not necessarily an evil. Nevertheless, Noble's argument that copyright is the key is correct. This allows universities to grant or to deny access. In some extreme cases it allows access rights to be sold to third party organisations: Noble is concerned about these, but I am concerned with more commonplace situations.

Copyright as Restriction of Rights

Copyright as usually practised serves to take away rights. The typical copyright notice inside a book lists the many things you are not allowed to do. You aren't allowed to photocopy it, scan it in or reproduce it in any away.

There are provisions in the copyright laws of many countries for "fair copying" of a small amount, such as 10% of an article. These provisions required strenuous efforts to gain. Without them, it would be difficult for many educational courses to function. Even with them, it is still often difficult.

Copyright as Guarantee of Freedom

The various Open Source licenses use copyright as protection mechanism for the Intellectual Property they contain [9]. The restrictions are usually simple, and mean that once someone has placed a copyright notice in a piece of software, then that copyright cannot be removed. It can be added to, though, if a new author makes changes or additions. This amounts to protection of IP, in that no-one is allowed to legally "steal" the courseware. While they can use it or change it, they cannot remove the moral right of any author to be asserted as an author.

The principal feature of most Open Source licenses is that they permit others to do things to the software, without having to seek permission. They can copy the software and distribute it. They can make changes to it. They can use it in other projects.

Many of the Open Source licenses do not make any obtrusive requirements. The most extreme license, the GNU GPL license [9], does make some requirements that force any changes, extensions or uses to also become open (to become "free", in Stallman's terminology - to become a "virus" in the terminology of some others). Inappropriate uses of this license can have unforseen consequences, and on many occassions it is better to use the less demanding LGPL (the Library GPL, which the Free Software Foundation now prefers to call the Lesser GPL for philosophical reasons) [10].

Open Content Licenses

The Open Source licenses are designed to apply to software. There are also Open Content licenses, deigned to apply to more general "literary" works, in particular to books and documentation [11]. These licenses function in the same way as Open Source licenses, in that they guarantee rights to copy and modify the content, rather than taking rights away.

Advantages of Open Courseware

Much of this paper has been written from the viewpoint of an open source adherent. Just in case this has been missed, here are some of the equivalents to the open source points above.

Correctness

Just like software, and indeed any human endeavour, courseware will contain errors. Since courseware is usually expressed in English rather than a formal computer language, the potential for ambiguity or erroneous understanding is far higher. Courseware intended for formal distance education courses has to be vetted far more extensively than other courseware, since financial considerations are involved. Courseware given away freely does not have the same requirements for accuracy, although any academic worth their salt will not knowingly publish erroneous work.

In my own publically available courseware I get "bug reports" sent in by readers. The courseware is improving by global peer assessment.

Use by others

Open content courseware can be used by others. Increasingly, I use online tutorials for parts of my own courses when appropriate. I don't usually copy and modify, just make links. Much online courseware does not have a clear copyright policy, but links are generally okay as long as no implicit ownership claim is made by the linking.

The advantages of using material already on the Web are numerous. It reduces the time spent getting a new piece of courseware online; reusing already debugged material is likely to lead to less errors; it can allow multiple views on a topic to be presented, and so on.

There are many Web sites such as the World Lecture Hall [12] which exist only to make links explicit to publically available courseware. These are efforts to build global encyclopedias of knowledge that anyone can dip into, for the good of the community as a whole.

Peer recognition

Researchers achieve recognition outside of their own institution based on peer evaluation of research work. It has traditionally been difficult to assess the ability of teachers, in part due to a lack of peer assessment. While students may often be vocal about the abilities of academics, it has still proven difficult to accurately assess teachers solely from student evaluations.

Making courseware public can provide additional measures of recognition. Web access statistics can provide valuable information about how much use is being made of Web courseware. Some search engines such as Google rate a page as having high relevance if there are a large number of links to that page. This "rating" may also be a measure of peer judgement: valuable courseware will have many links to it.

Many university promotion committees will need to change their criteria of ability to include such Web-based measures. With the increasing insistence by universities on Web courseware, one can hope that this will occur.

University Recognition

In the same way that universities gain research reputations based on the quality of their peer-assessed research, so can universities gain teaching reputations based on the quality of their peer-assessed teaching. I do not know of any university that is making any sensible use of these measures. Many universities advertise that they have flexible delivery Web-based systems. If all are doing it, then this amounts to the typical level of advertising with no substantive content.

Advertising

The previous section has already alluded to the failure of most universities to make use of their online courseware for sensible advertising. Advertising has so far been done by individual academics making their courseware available, and promoting this by registering with portals or search engines.

This is changing a little. Some universities are now performing quality control checks on material that is publically accessible. So far these checks are not on content (but the possibility exists for censorship), but on corporate image matters, such as ensuring a "standard" look to the pages.

Conclusion

This paper has argued that open content for courseware has many positive advantages. These arguments range from ethical to commercial. There are opportunities for professors and their universities to benefit from open distribution of their Web courseware. To achieve full benefit from these measures, universities may have to change some procedures such as promotion criteria to take into account the positive information that can result from being open.

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Editorial history

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