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BOUNDED AND UNBOUNDED KNOWLEDGE: Teaching and Learning in a Web 2 world

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ABSTRACT

In the recent past, the proliferation of digitally available content heralded the beginning of serious problems for the business models of publishers. The ease with which content can be accessed, copied and distributed disrupts the control of those whose role has been to manage and profit from the intellectual property rights of content producers. In effect, the number of "publishers" increased many fold as the Web and other Internet-based technologies became the dominant mode of content distribution. In education, and in other fields, matters of intellectual property, copyright and quality control came to the fore. More recently, with the advent of web-based software that makes publishing online available to *anyone* with access to the Internet the number of "publishers" and modes of publication have increased massively. The shift from a Web which was, for many a read only environment to a read/write Web poses not only ongoing problems for the traditional distributors of content but also now, for the traditional producers of content and knowledge. In this respect, the role of universities as designers and producers of learning materials for credentialed learning is also under challenge. Just as publishers explore alternative business models to adapt to the new digital environment, now universities have begun to explore new ways of working with so-called Web2 software to support teaching and learning online. In particular, some Web2 software affords new opportunities for and different modes of collaboration, which in the view of some points to student participation in knowledge production. While these developments represent important and significant shifts for universities, this paper draws attention to the lack of empirical data and situated contextual knowledge concerning intellectual property rights for knowledge constructed in a collaborative context. In addition, we explore issues in relation to the maintenance of academic integrity and quality where knowledge building takes place in a collaborative, online environment.

Keywords: Web 2, teaching; learning; bounded knowledge; Australia.

INTRODUCTION

In 1995 Nicholas Negroponte (1995, 11-12) wrote about a visit to an American manufacturer of integrated circuits. He was asked if he had a laptop with him and when he said that he did he was asked for the model, serial number and its value.

He indicated the value to be between somewhere between one and two million dollars. The receptionist asked to see the laptop and when he showed her his old Powerbook she wrote down $2000.

As he put it, "while the atoms were not worth much, the bits were priceless." Since then the world has become increasingly better at working with bits but, as we will argue in this paper, not quite so advanced in the way we think about them. In what follows, we make a distinction between two spaces to which Negroponte drew attention: first, the familiar space of the physical world; and second, there is a space which is physical in terms of how it is stored and transmitted but which is comprised of bits, what William Gibson (2003), in 1982, labelled cyberspace[1].

Making a distinction between bits and atoms is a useful way to examine the practices that have grown up around various attempts to manage and control activities in bit space. In this paper, the work of universities in the production, dissemination and managing access to knowledge is our interest. Since the mid 90's web-based technologies have become a significant means for the publication of digital artefacts. How such technologies are developed and deployed in various institutional settings, we suggest, is very much framed by the habits of mind or mindsets that for some have been developed and finely honed in an industrial era (Barlow, 1998). According to Barlow (1994) the nub of most of these issues is that of digitised property:

> ***Throughout the time I've been groping around cyberspace, an immense, unsolved conundrum has remained at the root of nearly every legal, ethical, governmental, and social vexation to be found in the Virtual World. I refer to the problem of digitized property. The enigma is this: If our property can be infinitely reproduced and instantaneously distributed all over the planet without cost, without our knowledge, without its even leaving our possession, how can we protect it? How are we going to get paid for the work we do with our minds? And, if we can't get paid, what will assure the continued creation and distribution of such work?***

Debate and analyses around these matters have continued and have been extended by the work of many scholars and commentators. What generally characterises this work is a basic assumption that bit space is different from atom space and hence not simply amenable to the ways of working which pertain to the physical world (see, for example, (Locke, Levine, Searles, & Weinberger, 1999). However, in many spheres of human activity, it is not the case that the kind of thinking prompted by such an approach has had much impact on the still dominant, industrial age informed view.

For instance, prior to the Web emerging as an alternative means for the distribution of the products of knowledge work, publishers of books and journals played an important role in managing the output of such work. Traditionally, publishers profited from their control over knowledge production and dissemination by virtue of their ability to decide what was worth publishing. As with other forms of physical property, the rules in relation to ownership were important in securing profits from publications. Publishers were effective and efficient gatekeepers in that they controlled what was published, how something was published and where it was published.

[1] http://en.wikipedia.org/wiki/Cyberspace

Traditional business models on which publishers relied were premised on atom space notions of property and ownership. We have grown up with material things and understand that in order to acquire any object or service that we need to pay for it directly or indirectly. For the publisher, working in the physical world, in atom space, control of intellectual property was paramount. It was important to prevent unpaid copying of published work. It was important to be able to control access to content through laws which protected the intellectual property of those who produced content. Authors were rewarded by publishers with royalties. Work submitted by authors for publishing inevitably traversed the internal processes of publishing that included editing, decisions about style and presentation and methods and timing of distribution. The lead times required for these processes often meant that the time between completion of a manuscript and its release was considerable. Quality was enacted through reviewing and editing. Particular publishers established reputations not only on the collection of journals and writers they published but also for the intellectual and technical quality of the finished product. Knowledge work was effectively *bounded* by these practices.

The advent of computing and communication technologies provided knowledge workers and the consumers of their products with alternative means of production and distribution, thereby directly challenging the role of publishers. Publishing on the Internet significantly reduced the time it took for a consumer to obtain product. The use of the Internet in this way highlighted the role of publishers as essentially 'the middleman' in the knowledge production and dissemination of knowledge products. Today, large publishing houses now represent one of a range of publishing alternatives available to writers. Authors, including those previously considered unworthy by publishers, could publish in the style and format they preferred with control over dissemination and with the time from production to distribution greatly reduced. "For a whole range of groups, new models of publishing can help different voices to be heard. The creation and distribution of many kinds of knowledge, academic, scientific and cultural" adds to knowledge sharing and building (Geiselhart, 2001, 207).

In Higher Education too, a related shift in distribution and access occurred as students acquired access to the Internet and university teachers made available their knowledge products in digital form. As is always the case with any new way of doing things, existing practices were migrated, more or less, into the new medium. Coupled with these new practices were the ways they were understood.

Early understandings of most new technologies can be often misplaced to the point of being humorous (Marvin, 1988). When the first automobiles appeared they were spoken about as horseless carriages. When the first motion pictures were made, actors were filmed on a stage. When the Internet first began to be noticed, it was described as an information superhighway.

While it is the case that motion picture technologies and products have matured significantly over time as has the automobile industry what has necessarily matured with these developments has been the way we think about and understand such technologies.

We want to argue in what follows is that the atom space mindset of property and property rights and associated thinking about quality represents a significant bias in the maturation of knowledge work in the new digital environment.

While it is the case that various institutions have acted to bind the products of knowledge workers, a more significant binding is that which operates to maintain the view that the ways of thinking about and, in particular, making rules for bit space are more or less the same as the familiar ways of thinking about property and rights in atom space.

UNIVERSITIES AND BOUNDED KNOWLEDGE

The enactment of what Barlow (1998) has described as industrial age thinking in relation to digital artefacts is seen in many aspects of contemporary practices associated with universities. Of course, a few universities are key sites for the promotion of research and scholarship in relation to such matters[2] but in the main, patterns of policy and practices reflect mindsets about bit space which derive from understandings of the physical world. Such patterns are apparent in the publishing and dissemination of knowledge products.

As the means of production and distribution of knowledge products moved more and more to bit space, universities have been able to publish more and more easily. Universities with distance students effectively became publishing houses with in-house assistants[3] to support the use of their knowledge products. Today, with the widespread use of software that is described as learning management software, the development of online teaching continues to be informed by a mindset which sees knowledge products as things to be managed, controlled and paid for by students. This is a long established view based upon the property and rights of the physical world.

Like many conventional media systems such as television, radio and print, the structures and protocols of systems that are employed to distribute knowledge and information in universities are based on a one to many logic: one lecturer/teacher and many students. Access to these systems is strictly controlled, with minor exceptions. The social relations of universities are framed by this logic and the physical infrastructure is similarly based upon the same patterns of access and distribution. As Jay Weston (1994, 197) put it,

> ***The relative certainties that accompany attenuated access to the means of symbolic production is welded into the fabric of all institutional policies and practices.***

At the heart of these practices is a firm view that the issues, problems and challenges of cyberspace can be most readily dealt with by applying understandings and views that derive from the physical world. Thus dealing with copyright, intellectual property and approaches to quality in cyberspace are simply adaptions of physical world norms and rules. Business models that work well in the physical world are similarly applied in cyberspace. Enquiry that attempts to explore what, to some, are real differences between cyberspace and the physical world (Barbrook, 1998) (Greener & Perriton, 2005) and what these implications might be for online learning tend not to influence mainstream thinking in universities.

The dominance of physical world thinking about cyberspace seriously limits opportunities to examine what are important shifts and, in many instances potentially significant changes for the knowledge work that occurs in universities.

[2] The Berkman Centre at Harvard's Law School and Oxford University's Internet Institute are two instances.

[3] Also known as lecturers.

In many educational accounts of the Internet, much is made of the ready availability of information and content. Schrage (2000) however, argues that biggest impact that digital technologies are having and will continue to have are on the *relationships* between people and between people and organisations. This is not a new idea that computing and communication technologies or indeed any technology can be seen in terms of the relationships they affect or mediate, the new relationships they support and the relationships they terminate.[4] Such a shift in thinking however, does two things. It poses two interesting questions for universities about the production and consumption of knowledge products. That is, what are the new kinds of relationships that universities might have in a world in which Web-based publishing technologies are increasingly ubiquitous? And, given the valuing of skills and capacities in the world beyond universities to produce and rework information and content, what role might universities now play in this respect?

Thinking about cyberspace relationally resonates with much of the emerging internet technologies that are based upon Ajax programming. Accompanying these developments are labels which reflect a shift in the way the Internet is being used as a medium for knowledge building and sharing. In particular creator-to-consumer and peer-to-peer conceptualisations clearly remove the 'middleman'. It may be useful to ask whether higher education institutions represent the newest iteration of a 'middleman'. Where previously publishers acted as control agents to protect vested interests, universities now protect their intellectual property and knowledge processes as a means of securing revenue from students. Typically knowledge was protected by a university with circulation limited to the privileged and paid for by the state. The introduction of private universities and movements towards various models supporting a user-pays principle has empowered the consumer of education over the same time frame that the Internet released publishing constraints. In many respects the pressure to unbind knowledge creation, knowledge building and knowledge dissemination has been progressed with recent Web-based technologies. So-called, Web 2.0 or social software represents the most recent of these developments.

DeLong (1995) refers to internet advances as offering more interesting ways to engage students in learning with information being democratised. There is a fundamental shift of focus from production and delivery, to customer and content and from the academy and lecture to student and their relationships with other students, and with various knowledge products. As the Web exposes the artificiality of both informational and institutional barriers the potential for sharing of students and revenues becomes an enticing proposition. The role of a university could be conceptualised as an institution that facilitates the acquisition of knowledge by teaching discernment and by getting students to think DeLong (DeLong, 1995). A facilitator would have little need to place boundaries around knowledge and could play an active part in knowledge building by widening rather than restricting participation and connecting learners with ways of working that better reflect knowledge work underpinned by new Web-based technologies.

Challenges and opportunities of Web 2.0

The huge growth in Web 2.0 software applications represents the next new challenge for teaching via electronic learning environments. These applications allow the easy publication, remix and distribution of digital artefacts: text, image, video and sound. This means that anyone with Web access can now publish. The growth in blogs, the popularity of services such as Youtube and Flickr and the rise of shared knowledge systems like Wikipedia attest to the opportunity to publish being taken up by very large numbers. Web 2.0 applications are collaborative by design and are clearly so in

[4] Relationships with large publishers have morphed to support many electronic initiatives as add-ons to support a text, however the ease with which academics can now have their own material presented and structured on the Internet, makes the old relationship increasingly fragile with power moving away from the producers to the creators.

use. They allow learning environments in which learners can be creative, critical, constructive and become producers (publishers) of their own perspectives informed by audience and identity. The differences embodied in the functionality and unbounded nature of use, are the aspects which clearly support learning and clearly will pose challenges to formal systems of education around those parts of the world with access to the Internet.

A key element in the emergence of Web 2.0 software is the open source movement and in particular open source software which provides the core technologies on which Web 2.0 applications are based. Other than technical dependence, the broader philosophy of the open source e movement points to a number of a key issue which has begun to emerge around the growing use of Web 2.0 software, that is the tension between public and private knowledge.

Weber (Weber, 2004) notes the success of open source software is not the software itself but the process by which it is created. Similarly, the use of Web 2.0 software draws attention to the processes by which public knowledge is produced rather than the software that supports such collaboration. Mason & Cope (2001) suggest that "(t)he impact of open source freeware may be summarised in two ways. First, these products fuel a much more rapid growth of new businesses (because entry costs are lower) and secondly, they encourage businesses to find new ways of leveraging intellectual capital" (Mason & Cope, 2001, p. 102).

For example, the peer to peer (P2P) network operates on a premise of unbounded knowledge with open sources and open access. Distributed networks such as those supported by the P2P Foundation encourage production and knowledge exchange in ways which they describe as being different from the pre-modern society norm which is guarded and constituted by power differentials and obtained through closed circles. In particular the P2P Foundation makes the important point that the process of regulating the flow of knowledge through a series of formal rules which aim to distinguish valid knowledge from invalid knowledge was a symptom of past (publishing) models. The foundation also points out that:

> ***(a)n intellectual property rights regime also regulates the legitimate use one can make of such knowledge, and which is responsible for the privatization of knowledge. If original copyright served to stimulate creation by balancing the rights of authors and the public, the recent strengthening of intellectual property rights can be more properly understood as an attempt at 'enclosure' of the information commons, which has served to create monopolies based on rent obtained through licenses (The Foundation for P2P Alternatives, 1999).***

The P2P networks represent a paradigm shift with a presumption of equi-potency of members, de-institutionalisation and de-commodification of knowledge. The value attached to any information produced and published in the shared space reflects a value in exchange rather than a value for sale.

The embrace by IBM of open source software for some of its software products is an illustration of the acceptance of open source software as a valuable mechanism for knowledge building. However, IBM blends this aspect of its strategy with proprietary software in selective ways to harness the best of the traditional business and new distributed collaborative development environments

Translated in higher education, the usage of Web 2.0 technologies has the capacity to accelerate the pace of advancement in knowledge building and sharing but with unforeseeable consequences and outcomes.In such an environment the academic is not in control, universities are not as able to restrict the learning to those enrolled, and rights to collaboratively determined knowledge are uncertain. Web 2.0 heralds a new age of uncertainty in which the unbounded nature of knowledge production and distribution in which any mediating influences are agreed by consensus but do not have power as it is understood in conventional forms of publication.

WEB 2.0 & HIGHER EDUCATION

Public expectations of the Internet are now such that they expect instantaneous access for free to information at any time of the day. The ability to chat and discuss personal opinions, experiences and the willingness to actively criticize and complain on line has already trained the many sections of the community to utilize the Internet in ways that infuse the social and cognitive presence characterized by Garrison, Anderson and NetLibrary Inc (Garrison, Anderson, & NetLibrary Inc, 2003) as on-line learning

The obvious attraction to some Web 2.0 applications by the young warrants careful examination of the role of Web 2.0 software in teaching. The tensions we pointed to earlier will also characterise these investigations. Investigations that are framed by thinking about these developments in terms of well understood physical phenomena will inevitably miss the complexity of and potential for new educational forms and the implications these will have for existing institutional processes. Given the history of adoption of computing and related technologies in education (Bigum & Rowan, 2004), it is to be expected that a good deal of institutional effort will be directed at "applying" Web 2.0 to education. While such approaches in the past have led to relatively ambiguous and often costly outcomes, if universities misread these developments as more of the same, the consequences are likely to be significant. The prospect of a world in which "anyone can publish" is of a different order to previous computer-related changes.

While there is no shortage of euphoric and romantic accounts of the educational implications of Web 2.0[5] we argue for caution and an awareness of the limitations of the problems derived from relying upon understandings of educational practices in the physical world. To us, the emergence of Web 2.0 applications poses many questions for universities in relation to knowledge production, the authority of knowledge, its dissemination, credentialing, curriculum and assessment. What is required is careful scholarship and research which is aimed at understanding these new phenomena in anthropological terms, without the pre-determined categories and related mindsets that are found in contemporary educational theory and practice. To illustrate the problems to which we allude we briefly consider implications for quality control in this new environment and intellectual property.

QUALITY CONTROL

Unlike current Web 1.0 educational applications like learning management systems, Web 2.0 software supports online environments which are much less controllable and predictable in terms of student learning and behaviours.

The easy availability of various Web 2.0 platforms outside universities further complicates protocols which previously might have been deployed to provide quality control.

[5] A Google blog search for Web 2.0 and education will sample current enthusiasm for what is seen by many to be some kind of new age in education.

Quick perusal of freely available Wiki software, for example, will reveal usage by academics and teachers to support their teaching.

Like most information available on the Web generally and produced via Web 2.0 software, knowledge products deployed for teaching purposes are not subject to either the traditional quality control mechanisms of publishers, or of a university. While most of these sites qualify as *applications* of Web 2.0 software to support well established educational practices they are, nevertheless, beyond the gaze of existing, university managed protocols.

The question of what quality control means in a Web 2.0 environment needs to move beyond the kinds of disputes about authority that the emergence of Wikipedia has brought to the fore (Chesney, 2006) (Ciffolilli, 2003).

The well established practices of universities in which acquisition of particular knowledge and skills is credentialed and acknowledged in terms of formal qualifications maps poorly into a space in which collaboration, remixing of knowledge products and attention gathering are to the fore.

INTELLECTUAL PROPERTY

Perhaps the site where the most contentious, current debates are those in relation to Intellectual Property (IP). While issues concerning the uploading of material and the printing or copying of material from electronic sources have been addressed from the viewpoint of copyright (Nemire, 2007) (DiRamio & Kops, 2004), the World Intellectual Property Foundation and the Australian Copyright Council, and rights to free speech is supported by the Electronic Frontier Foundation-Defending Freedom in the Digital World, issues concerning rights to collaborative knowledge constructed in an educational open space are not well understood.

While the time honoured practices associated with acknowledging the ideas of others in formal academic papers underpin good scholarly practice, many Web 2.0 spaces are less careful in referencing ideas and their origins.

Web2 spaces involve users collaborating with each other without mediation of politics or money and the need to be an enrolled student. Collaborators are unconcerned about intellectual property or copyright and receive and give information without any thought of compensation. In the absence of controls by higher education providers or markets acting as mediators, they operate as networked communities formed through mutual obligation and allow users to adapt knowledge to suit their own purposes.

Typically IP concerns are about the imposition of scarcity. Applied to the internet, a technical system which is designed to maximise knowledge dissemination, current IP concepts are irrelevant (Barbrook 1998).

CONCLUSIONS

Web2 technologies present academe with opportunities and challenges. The ability to harness opportunities will be impacted by the ability to adapt mindsets from bounded traditional (or physical) space mentalities to an unbounded cyberspace mentality. However, any change of mindset must be accompanied by a new perception of concepts of control that will accommodate the nature of collaborative knowledge building. Again, we argue that there are no simple answers here.

The need for careful empirical work that better maps the new practices and ways of working is paramount. Shifting mindsets will be a much longer process as John Perry Barlow observed in an interview following a conference on copyright in Australia at which he was a keynote speaker (Tunbridge, 1995):

> ***"Yesterday when I was listening to those people arguing about copyright law I felt like I'd come across a gang of shuffleboard players on the deck of the Titanic arguing about the angle of the deck, and I couldn't direct them toward the lifeboats."***

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