

Open Research Online

The Open University's repository of research publications and other research outputs

A pedagogy of abundance

Journal Item

How to cite:

Weller, Martin (2011). A pedagogy of abundance. Spanish Journal of Pedagogy, 249 pp. 223–236.

For guidance on citations see [FAQs](#).

© 2011 The Author

Version: Accepted Manuscript

Link(s) to article on publisher's website:

<http://revistadepedagogia.org/en/nº-249-mayo-agosto-2011/una-pedagogia-de-la-abundancia.html>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

A pedagogy of abundance

Martin Weller
Institute of Educational Technology
The Open University
Milton Keynes
MK7 6AA
United Kingdom
Email: m.j.weller@open.ac.uk

Abstract

The digitisation of content combined with a global network for delivery and an open system for sharing has seen radical changes in many industries. The economic model which has underpinned many content based industries has been based on an assumption of scarcity. With a digital, open, networked approach we are witnessing a shift to abundance of content, and subsequently new economic models are being developed which have this as an assumption. In this article the role of scarcity in developing higher education practice and pedagogy is explored. The shift to abundant content has as profound implications for education as it has for content industries. The possible contenders for a 'pedagogy of abundance' are examined and the necessary requirements for such a pedagogy outlined.

Keywords: pedagogy, e-learning, higher education, web 2.0, digital economy

Introduction

Probably the most influential work on scholarship in recent years is that of Boyer. Using data gathered from more than 5,000 faculty members, Boyer (1990) classified the types of activities scholars engaged in. This was partly a response to the research vs teaching conflict, with recruitment and promotion often being based on research activity, while it is teaching that is significant to most students, and to over 70% of faculty. The report sought to place all scholarly activity on an equal footing:

"What we urgently need today is a more inclusive view of what it means to be a scholar--a recognition that knowledge is acquired through research, through synthesis, through practice, and through teaching." (Boyer 1990: 24)

In Boyer's definition of scholarship there are four components, each of which he suggests should be considered as of equal value by Universities and government policy:

- **Discovery** - the creation of new knowledge in a specific area or discipline and is often taken to be synonymous with research. This is probably closest to the public conception of scholarship, as universities are often the site of significant breakthroughs.

- **Integration** – integration is focused on interpretation and inter-disciplinary work. It is moving away from the pure, ‘genesis’ research of discovery. Boyer states that it is ‘making connections across the disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating non-specialists’
- **Application** – this is related to the concept of ‘service’, but Boyer makes a distinction between citizenship and scholarly types of service, and for the latter it needs to build on the scholar’s area of expertise. It can be seen as engagement with the wider world outside academia, which might include public engagement activities as well as input into policy and general media discussions. This can also include the time spent peer reviewing journal articles and grant applications and sitting on various committees.
- **Teaching** – much of the interpretation of Boyer can be seen as an attempt to raise the profile of teaching. He argues that ‘the work of the professor becomes consequential only as it is understood by others. Yet, today, teaching is often viewed as a routine function, tacked on’.

New technology has the potential to impact upon all four scholarly components, but is perhaps in the last category, that of teaching, where there is the greatest potential for a radically different approach to emerge.

Economics of abundance and scarcity

One perspective of relevance to teaching and learning is the effect that sudden, and great, abundance of learning content and resources has on how we approach learning. There is an obvious relation to economics. Traditional economics can be viewed as a study of the impact of scarcity. In his 1932 essay Robbins defined economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses." It is this link between the availability of goods and their price that drives the standard economic model.

But when goods become digital and available online then scarcity disappears. They are non-rivalrous in nature, so if you take a copy, it is still available for others. They are distributed free on a global scale (if we ignore infrastructure costs which apply to all content). One can view many of the dilemmas facing content industries such as music, newspapers and broadcast as essentially making a transition from an economics of scarcity to an economics of abundance. If we consider the music industry from this perspective then we can see that the traditional model was based around the following assumptions:

- Talent is scarce
- Locating it is difficult
- Content is physical
- Content is manufactured according to demand
- Access to it is scarce

What follows from this is the structure of the entire industry. Talent is discovered by Artists and Repertoire (A & R) agents, who spent their time attending gigs, building networks and talking with bands to find new talent. Once discovered the artist would be signed exclusively to a label, who would record their content and then produce it in a physical format. This was then distributed via a logistics network to a chain of shops. With limited opening hours, the consumer would then go to the shop to purchase the item, if it was in stock, or order it if not, because storage would be

limited. After time the item would cease to be produced and was available only via second hand record shops.

This model seems antiquated already, and yet it is one of recent history. The first 'attack' it suffered was that of online purchasing, through the likes of Amazon. The small storage space of the local record shop was no longer a limiting factor, and entire back catalogues were available at the click of a mouse. The necessity of travelling to the shop was removed, and although there was no restriction on when you ordered, there was still a delay in receiving the physical goods.

The changes brought by the advent of online shopping were significant, but essentially it was utilising the same model for the music industry, but with an improved, almost limitless shop capacity. The structural change to the industry arose when the format of music changed to the digital file, which could be freely distributed online. In this model talent is still scarce, but the act of locating it has changed. The artists can promote themselves, listeners locate music through alternative routes such as shared playlists, streaming services such as Spotify and LastFM, social network recommendations, etc. For the consumer the changes are now significant: availability of music is instant; the granularity of purchase has altered from the album to the track; and if one uses bit-torrent type downloads then entire back catalogues are as easily downloaded as one track. This changes the consumer's relationship to content, it is no longer the content that is scarce, but their own time and attention becomes the key scarce resource now.

One can classify responses to the digital era as 'abundance' and 'scarcity' responses. The former takes the assumption of new abundance and tries to work it to their advantage. The Freemium model is one such example, as realised by Flickr. Here users get a very good level of service free, to attract sufficient number of users. The additional value that requires payment only attracts a small percentage of users, (estimates vary between 5 and 10% of Flickr users who convert to 'Pro' customers) but with a large base it becomes significant. As Chris Anderson (2008) puts it:

“Freemium as the opposite of the traditional free sample: instead of giving away 1% of your product to sell 99%, you give away 99% of your product to sell 1%. The reason this makes sense is that for digital products, where the marginal cost is close to zero, the 99% cost you little and allow you to reach a huge market. So the 1% you convert, is 1% of a big number.”

Chris Anderson also coined the term 'The Long Tail' (2006) which can again be viewed as an 'abundance response'. The long tail argues that with an abundant stock range, businesses make money not by selling large quantities of a few items (the blockbusters) but by selling small quantities of a large number of items.

Other models include giving away the digital object free and where one exists, charging for the physical object. This is a model being explored by publishers such as Bloomsbury Academic and FlatWorld Knowledge. Where no physical object exists then it is associated services which attract a cost, for example while many users download and install open software solutions freely, a small number are willing to pay for consultancy services around these. The most widely deployed abundance response is to use advertising revenue to allow free access to content. It still remains to be seen how successful many of these approaches will be, we are after all, in transitory times. Scarcity responses on the other hand seek to re-establish, or retain, the existing economic model by introducing scarcity into digital content. An obvious example is that of Digital Rights Management (DRM), which attempts to encode legislation and usage within the content itself. For example, iTunes limits the number of computers that you can have accounts on, and restricts the devices you can associate with an

iTunes account. DRM is often backed up with strong legal enforcement, for example the recent case of torrent sharing site Pirate Bay being fined 30 Million Swedish Kronor and receiving a jail sentence for encouraging illegal file sharing. In the UK the Digital Economy Act was passed in 2010 which will identify copyright infringements and then require the user's Internet Service Provider to issue a notice. In many of the arguments put forward for such approaches analogies are made to rivalrous, scarce goods or services, for example Paul McCartney, commenting on the Pirate Bay case said "if you get on a bus, you've got to pay. And I think it's fair, you should pay for your ticket" (http://en.wikipedia.org/wiki/The_Pirate_Bay_trial). Paywalls and subscription models can also be seen as an attempt to re-establish the scarcity of content.

Education and abundance

If we use this perspective to examine education we can consider how education may shift as a result of abundance. Traditionally in education expertise is analogous to talent in the music industry – it is the core element of scarcity in the model. In any one subject there are relatively few experts (compared with the level of knowledge in the general population). Learners represent the 'demand' in this model, so when access to the experts is via physical interaction, for example by means of a lecture, then the model of supply and demand necessitates that the learners come to the place where the experts are located. It also makes sense to group these experts together, around other costly resources such as books and laboratories. The modern university is in this sense, a solution to the economics of scarcity.

The production of books and journals can be seen as an initial weakening of this model, as it separated some level of expertise from the individual. However, access was still limited to physical artifacts, and the prohibitive costs of many of these meant that the only way to access them was through libraries, reinforcing the centralised physical campus model.

As a result a 'pedagogy of scarcity' developed which is based around a one to many model to make the best use of the scarce resource (the expert). This is embodied in the lecture, which despite its detractors, is still a very efficient means of conveying certain types of learning content. An instructivist pedagogy then can be seen as a direct consequence of the demands of scarcity.

In a digital, networked age, while expertise is still rare, the access to content associated with it is now on a different scale. We have (often free) access to journal articles, videos, podcasts, slidecasts and blog posts. And it is not only content that is accessible, but also discussion through forums, comments and blogs. In addition there is access to social networks of peers, experts and learners. The experts themselves may be more approachable, or there may be discussion around their content in dedicated forums. People may have shared annotated versions of their work, or associated reading lists through social bookmarking. This scale and range of learning related content at least raises the question of whether we have developed the appropriate teaching and learning approaches to make best use of it. In short, what would a pedagogy of abundance look like?

The advent of elearning has seen an exploration of new pedagogies, or at least the emphasis placed on different ones. Siemens (2005) argues that "Learning theories, such as constructivism, social constructivism, and more recently, connectivism, form the theoretical shift from instructor or institution controlled teaching to one of greater control by the learner." In examining the current physical space of a lecture hall

Wesch (2008) asked students what it ‘said’ about learning, in essence what were the affordances (Gibson 1979; Norman 1988) of the physical learning environment. His students listed the following:

- To learn is to acquire information
- Information is scarce and hard to find
- Trust authority for good information
- Authorized information is beyond discussion
- Obey the authority
- Follow along

These are at odds with what most educators regard as key components in learning, such as dialogue, reflection, critical analysis, etc. They are also at distinct odds with the type of experience students have in the online world they inhabit regularly, particularly the social network, read/write web. These environments are characterised by

- User-generated content
- Power of the crowd
- Data on an epic scale
- Architecture of participation
- Network effects
- Openness

It may be that we do not require new pedagogies to accommodate these assumptions as Conole (2008) points out

“Recent thinking in learning theory has shifted to emphasise the benefit of social and situated learning as opposed to behaviourist, outcomes-based, individual learning. What is striking is that a mapping to the technologies shows that recent trends in the use of technologies, the shift from Web 1.0 to Web 2.0 echoes this; Web 2.0 tools very much emphasise the collective and the network.”

But, she goes on to say that,

“Arguably then there has never been a better alignment of current thinking in terms of good pedagogy – i.e. emphasising the social and situated nature of learning, rather than a focus on knowledge recall with current practices in the use of technologies – i.e. user-generated content, user-added value and aggregated network effects. Despite this, the impact of Web 2.0 on education has been less dramatic than its impact on other spheres of society – use for social purposes, supporting niche communities, collective political action, amateur journalism and social commentary.”

In examining the changes that education needs to accommodate to be relevant to the digital society, Seely-Brown and Adler (2008) emphasise the shift to participation, arguing that in order to meet the growing demand for education, and the requirements of a rapidly changing workplace, the traditional model of supply-push needs to be replaced with one of demand-pull. Learners need to be able to learn throughout their lives and to be able to learn about very niche subjects (an example of Anderson’s long tail). The only way to accommodate these needs they argue is to move to a more participatory, socially constructed view of knowledge. They stress the significance of new technologies in realising this:

“Tools such as blogs, wikis, social networks, tagging systems, mashups, and content-sharing sites are examples of a new user-centric information infrastructure that emphasizes participation (e.g., creating, re-mixing) over

presentation, that encourages focused conversation and short briefs (often written in a less technical, public vernacular) rather than traditional publication, and that facilitates innovative explorations, experimentations, and purposeful tinkering that often form the basis of a situated understanding emerging from action, not passivity.”

Any pedagogy of abundance would then, I suggest, be based on the following assumptions:

- Content is free – not all content is free and not yet, but increasingly a free version can be located and so an assumption that this will be the default is more likely than one based on paywalls or micropayments.
- Content is abundant – as covered above, the quantity of content is now abundant as a result of easy publishing formats and digitisation projects.
- Content is varied – content is no longer predominantly text based.
- Sharing is easy – through the use of tools such as social bookmarking, tagging, and linking the ‘cost’ of sharing has largely disappeared
- Social based – this may not necessarily entail intensive interaction, filtering and sharing as a by-product of individual actions constitutes a social approach to learning
- Connections are ‘light’ – as with sharing, it is easy to make and preserve connections within a network since they do not necessitate one to one maintenance
- Organisation is cheap – Clay Shirky (2008) argues that the ‘cost’ of organising people has collapsed, which makes informal groupings more likely to occur and often more successful: “By making it easier for groups to self-assemble and for individuals to contribute to group effort without requiring formal management, these tools have radically altered the old limits on the size, sophistication, and scope of unsupervised effort”
- Based on a generative system – Zittrain (2008) argues that unpredictability and freedom are essential characteristics of the internet and the reasons why it has generated so many innovative developments. Any pedagogy would seek to harness some element of this generative capability.
- User generated content – related to the above, the ease of content generation will see not only a greater variety of formats for content, but courses being updated and constructed from learner’s own content.

As Conole (*ibid*) suggested, there are a number of pedagogies which meet some of these assumptions. We will now examine some of the contenders for a pedagogy of abundance.

Resource Based Learning

Resource based learning (RBL) places resources in the foreground of learning, and the learner’s interaction and selection of these (which may include human resources) is the driving principle. Ryan (2000) uses the following definition for RBL, taken from the Australian National Council on Open and Distance Education RBL is ‘an integrated set of strategies to promote student centred learning in a mass education context, through a combination of specially designed learning resources and interactive media and technologies.’ If one views the abundance of resources as the primary factor in a pedagogy of abundance then RBL looks like an appropriate strategy. I think it is often still grounded in a scarcity approach though, for example Ryan goes on to argue that ‘these integrated strategies for RBL should be based on the

application of a range of instructional design principles to the development of learning materials...'. In a world of abundance the emphasis is less on the development of specific learning materials than on the selection, aggregation and interpretation of existing materials.

Problem based learning

Barrows and Tamblyn (1980) summarise PBL as 'the learning that results from the process of working toward the understanding or resolution of a problem. The problem is encountered *first* in the learning process.' In PBL students are given an ill-structured, or open ended problem. They work often in small collaborative groups to a solution, but often there is no definite answer. The role of the teacher is one of facilitator, helping groups if they get stuck, providing useful resources and advice. In medical education in particular PBL has been well researched and there has been some modest evidence that it is more effective than traditional methods (Vernon & Blake 1993, Smits, Verbeek & de Buissonje 2002), so it has a solid grounding. With its emphasis on learner direction, use of diverse resources and open-endedness it meets many of the requirements set out above. As with RBL it may need recasting to fully utilise the new found abundance of content, where there is greater stress on finding and evaluating resources from a wide range, and the utilisation of social networks as a resource.

Constructivism

This theory of learning gained much popularity in the 1990s, particularly with the advent of elearning. It is a view of learning that places the focus on the individual who constructs their own knowledge through activity. Jonassen (1991) describes it thus: "Constructivism... claims that reality is constructed by the knower based upon mental activity. Humans are perceivers and interpreters who construct their own reality through engaging in those mental activities... What the mind produces are mental models that explain to the knower what he or she has perceived.... We all conceive of the external reality somewhat differently, based on our unique set of experiences with the world and our beliefs about them." In practice this has been realised as courses which often have a strong group, discursive and reflective component, with the emphasis on the individual to develop their own interpretations, with the educator in less of a teacher role and more as a facilitator. Given that it has a loose definition, it is hard to pin down a constructivist approach exactly. Mayer (2004) suggests that such discovery based approaches are less effective than guided ones, arguing that the "debate about discovery has been replayed many times in education but each time, the evidence has favored a guided approach to learning." It could be argued that with everyone able to publish content in a web 2.0 world, then the 'dangers' inherent in constructivism become more pronounced, as the proliferation of conspiracy theories might attest. However, given that this is the environment everyone has to operate within, the ability to construct appropriate and rigorous knowledge from a range of sources is even more relevant. When Kirschner, Sweller and Clark (2006) claim, with some justification, that "the epistemology of a discipline should not be confused with a pedagogy for teaching/learning it" that only highlights that the epistemology of a discipline is now being constructed by all, so learning how to participate in this is as significant as learning the subject matter of the discipline itself.

Communities of practice

Lave and Wenger's (1991) book on situated learning, and Wenger's (1998) influential book on communities of practice highlighted the social role in learning and the importance of apprenticeship. They proposed the concept of 'legitimate peripheral participation', whereby participants move from the periphery in a community to its core by engaging in legitimate tasks. A very practical example of this is seen in open source communities, where participants move from reading and occasionally commenting in forums to suggesting code fixes, and taking on a range of functions such as moderation and code commenting. Crowston and Howison (2004) propose a hierarchical structure for FLOSS communities, consisting of the following layers:

- A center of core developers, who contribute the majority of the code and oversee the overall project.
- In the next layer are the co-developers who submit patches, which are reviewed and checked in by core developers.
- Further out are the active users who do not contribute code but provide use-cases and bug-reports as well as testing new releases.
- Further out still, are the many passive users of the software who do not contribute directly to the main forums.

Bacon and Dillon (2006) suggest that some of the practices seen in open source communities can be adopted by higher education, in particular the process of peer-production and the situated method of teaching and learning. With its practical approach, self-direction, user generated content and social aspect, the communities of practice approach as realised in open source communities provides an interesting model for a pedagogy of abundance, since it devolves much of the work to a community, from which all benefit. However, the number of successful open source communities is relatively small compared with the number of unsuccessful ones, and thus the rather tenuous success factors for generating and sustaining an effective community may prove to be a barrier across all subject areas. Where they thrive however, it offers a significant model which higher education can learn much from in terms of motivation and retention (Meiszner 2010).

Connectivism

This is a learning theory proposed by George Siemens (ibid). Of the theories listed here it is the only post-network theory, which has as its starting assumption the internet and the mass of connections we establish. As Siemens states "Learners as little as forty years ago would complete the required schooling and enter a career that would often last a lifetime. Information development was slow. The life of knowledge was measured in decades. Today, these foundational principles have been altered. Knowledge is growing exponentially." Connectivism then stresses that learning takes place within a network. The principles of connectivism are given as:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.

- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivism can be seen as an approach to learning that foregrounds the significance of the network and connections. Using its principles Stephen Downes and Siemens have run large scale open online courses. Given its starting assumption it is probably closest to a pedagogy of abundance, but it is still relatively new and while it sets out some clear principles and draws on other theories it is not yet fully formed as a pedagogic theory.

Conclusion

The intention of this article is not to set out a guide for teaching with abundance or even to evaluate the effectiveness of these theories, but rather to view them with the perspective of abundance. We are witnessing a fundamental change in the production of knowledge and our relationship to content. This is producing an abundance of content which is unprecedented. Google CEO Eric Schmidt claims that society produces more information in two days than was created from the beginning of human history until 2003, stating “the real issue is user-generated content.” (<http://techcrunch.com/2010/08/04/schmidt-data/>). Many of our approaches to teaching and learning were developed in a different age, and this basic shift from moderate scarcity to excessive abundance constitutes a challenge to higher education, and to individual information processing abilities. It may well be that our existing theories are sufficient, they just need recasting or reimagining for a world of abundance. Bill Kerr (2007) for example argues that “the new territory which George Siemens connectivism and Stephen Downes connective knowledge seeks to claim has either already been claimed by others” (<http://billkerr2.blogspot.com/2007/02/which-radical-discontinuity.html>). Abundance does not apply to all aspects of learning, indeed the opposite may be true, for example an individual’s attention is not abundant, and is time-limited. The abundance of content puts increasing pressure on this scarce resource, and so finding effective ways of dealing with this may be the key element in any pedagogy.

The issue for educators is twofold I would suggest: firstly how can they best take advantage of abundance in their own teaching practice, and secondly how do we best equip learners to make use of it? It is this second challenge that is perhaps the most significant. There is often consideration given to transferable or key skills in education (eg Dearing 1997), but these have not been revisited to take into account the significant change that abundant and free content offers to learners. As Schwartz (2004) argues, an increase in choice is not always beneficial, and learners will find themselves with many choices to make in evaluating learning content for their own needs. Coping with abundance then is a key issue for higher education, and one which as yet, it has not made explicit steps to meet, but as with many industries, adopting a response which attempts to reinstate scarcity would seem to be a doomed enterprise. Exploring pedagogies of abundance will be essential for educators to meet this challenge and equip their learners with the skills they need in an age of digital abundance.

References

- Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate*. Princeton, N.J: Carnegie Foundation for the Advancement of Teaching.
- Robbins, Lionel(1932, 2nd ed., 1935). *An Essay on the Nature and Significance of Economic Science*, London: Macmillan: pp 16.
- Anderson, C (2008) Free! Why \$0.00 Is the Future of Business. *Wired*, 16(3) http://www.wired.com/techbiz/it/magazine/16-03/ff_free
- Anderson, Chris (2006). *The Long Tail: Why the Future of Business Is Selling Less of More*. New York: Hyperion
- Siemens, G. (2005) 'Connectivism: A Learning Theory for the Digital Age.' *International Journal of Instructional Technology*, 2(1). http://www.itdl.org/Journal/Jan_05/article01.htm
- Wesch, M (2008) A portal on media literacy. <http://www.youtube.com/watch?v=J4yApagnr0s>
- Norman, D. (1988) *The psychology of everyday things*. Basic Books
- Gibson, J. J. (1979) *The ecological approach to visual perception*, Lawrence Erlbaum.
- Conole, G. (2008) 'New Schemas for Mapping Pedagogies and Technologies'. *Ariadne*, 56. July 2008 <http://www.ariadne.ac.uk/issue56/conole/>
- Seely-Brown, J & Adler P (2008) 'Minds on Fire' *EDUCAUSE Review*, vol. 43, no. 1 (January/February 2008): 16–32. <http://connect.educause.edu/Library/EDUCAUSE+Review/MindsonFireOpenEducation/4582>
- Ryan S (2000) *The virtual university: the Internet and resource-based learning*. Routledge.
- Barrows H, & Tamblyn R (1980) *Problem-based learning: an approach to medical education*. Springer
- Vernon D, & Blake RL (1993) ' Does problem based learning work? A meta analysis of evaluation research.' *Acad Med* 68: 550–563.
- Smits, P, Verbeek J & de Buissonjé C (2002) Learning in practice: Problem based learning in continuing medical education: a review of controlled evaluation studies *BMJ* 324:153
- Jonassen, D. (1991). Objectivism vs constructivism: Do we need a new philosophical paradigm? *Educational Technology, Research and Development*, 39(3), 5-13.
- Mayer, R. (2004). Should there be a three-strikes rule against pure discovery learning? The case for guided methods of instruction. *American Psychologist*, 59(1), 14-19.

Kirschner, P. A., Sweller, J. & Clark, R. E. (2006). Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. *Educational Psychologist*, 41(2), 75-86

Lave J & Wenger E (1991) *Situated learning: legitimate peripheral participation*. Cambridge University Press

Wenger E (1998) *Communities of practice: learning, meaning, and identity*, Cambridge University Press

Bacon, S. and Dillion, T., (2006). 'The Potential of Open Source Approaches for Education'. Futurelab, TeLearn Online, Available from: <http://telearn.noe-kaleidoscope.org/warehouse/bacon-2006-OpenSource.pdf>

Crowston, K., and Howison, J., (2005). 'The social structure of Free and Open Source software development'. First Monday, 10 (2). Available from http://firstmonday.org/issues/issue10_2/crowston/index.html

Meiszner A (2010) The Emergence of Free / Open Courses - Lessons from the Open Source Movement. PhD Thesis. <http://www.scribd.com/doc/33852509/The-Emergence-of-Free-Open-Courses-Lessons-from-the-Open-Source-Movement>

Dearing R (1997) Higher education in the learning society. *National Committee of Inquiry into Higher Education*. <http://www.leeds.ac.uk/educol/ncihe/>

Schwartz B (2004) *Paradox of Choice*, Harper Perennial 2004