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Using learning environments as a metaphor for educational change.

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Abstract:

Purpose

The central theme of this article is that the online learning environment can be seen as the means by which higher education can explore the challenges and opportunities raised by online and digital society.

Approach

The author argues that the online learning environment can be seen as a metaphor for how universities respond to the requirements and challenges of the digital age. Current learning management systems (LMSs) are examined, and compared with the values found in web 2.0 and social media. Current thinking on pedagogy for online learning is then examined. The SocialLearn project at the Open University in the UK is then explained, which seeks to create a disaggregated, decentralised, social system for learners.

Findings

The conclusion from this analysis is that there is a conflict between the centralised learning management system (LMS) and the requirements of online pedagogy. The traditional LMS can be seen as embodying the wrong metaphor, that of the traditional classroom. The paper concludes by arguing that such learning environments will be more useful to higher education in coming to understand its response to many of the changes we are seeing in society, which are facilitated by the new technologies.

Value

The paper provides a framework for considering LMS and their relation to universities and pedagogy, and an argument for the promotion of more decentralised systems.

Learning environments as metaphor

In this paper I will argue that the online learning environment is not peripheral, or merely a technological issue for universities and educators to resolve, but rather that it represents the means by which higher education comes to understand the requirements and changes in society, and thus the route by which it maintains its relevance to society.

It has often been noted that when a new technology arrives we tend to use it in old ways (eg Twigg 2001), before we begin to understand what it really offers. So, for

example the television was initially treated as ‘radio with pictures’, before those working in television began to appreciate what could be done with the new medium. This is to be expected, as we search for new metaphors to understand the ways in which the new technologies can be used.

A similar thought process can be seen with the first wave of commercial learning management systems (LMS) or Virtual Learning Environments (VLEs). In an attempt to move towards the possibilities offered by a completely digital, online world, they have started with the education model we are familiar with. They are, in effect, a virtual classroom, or course, with content (which map onto lectures) laid out in a linear sequence with discussion forums linked to this (mapping onto tutorials). In one LMS (the open source Bodington system, <http://bodington.org>) they even went as far as to make this mapping explicit by making the interface a building which you had to navigate to your lecture room.

This is a sensible way to proceed, since the uptake of technology is rarely a revolution, and more of an evolutionary approach. I have suggested (Weller 2005) the process is analogous to that of succession in plants:

“When there is a new environment, for example barren rock, a few pioneer species, such as lichens begin to grow. The acid from these decomposes some rock particles, and their own death creates a coarse soil. This is suitable for mosses, which require little soil, and in turn these decompose to enrich and deepen the soil, until it is suitable for some grasses to grow. The process ends with the establishment of a stable, climax community. In elearning terms, VLEs, and in particular commercial VLEs have acted as the pioneer species, moving in to the new environment and creating slight changes which make the habitat suitable for secondary colonizers.”

However, this suggests that there will be a ‘natural’ progression towards other tools, other systems, other *ways of thinking*, when it comes to learning in a connected, digital world. This is not always the case, and indeed the representation of current approaches in software can act to reinforce these ways of working. For example, Heppell (2001) argues that “we continually make the error of subjugating technology to our present practice rather than allowing it to free us from the tyranny of past mistakes.” Lanier (2002) refers to ‘software sedimentation’, arguing that:

“Software sedimentation is a process whereby not only protocols, but the ideas embedded in them become mandatory. An example is the idea of the file.... Files are now taught to students as a fact of life as fundamental as a photon, even though they are a human invention.”

In elearning terms, current LMSs can be seen as the embodiment in code of the physical structures of learning. In Lanier’s phrase they are further sedimentation as to *how* education should be conducted. This is acceptable if we believe that the existing educational model is the best there can be, but there are many issues in education which the current model struggles to address. Amongst these are:

- Limited curricula – Anderson (2004) coined the term The Long Tail to refer to the niche strategy of businesses, such as Amazon, that sell a large number of unique items in relatively small quantities. In higher education, the demands of a physical campus and associated costs (staff, rooms, etc) mean that the long tail of interests are not met by higher education. If you have a very niche

interest then it would be difficult to find enough people to attend the same university to make a course financially viable. And conventional elearning is costly to produce and deliver, so encounters many of the same problems. The curricula that is available to study is thus confined only those subjects that can be accommodated economically within the existing system, and this is a small fraction of a much larger (possibly infinite) set of subjects.

- Personalisation – as well as learning the subject area you are interested in the choice as to how you learn and which tools you use is also largely predetermined. The (higher) education process is largely one of enculturation, whereby students learn how to become members of the higher education community. This is appropriate for many domains and careers, but not for all and while the inflexibility in the content may be addressed, the inflexibility of the process is not, because the process is itself embodied in physical structures. As it stands, higher education is rather akin to freeze dried coffee – regardless of the input, the output invariably tastes of the *process*. In her report to the UK Government setting out a vision for education in 2020, Christine Gilbert (2006) made personalisation the fundamental factor for change, claiming

Personalisation is a matter of moral purpose and social justice: pupils from the most disadvantaged groups are the least likely to achieve well and participate in higher levels of education or training. Personalisation also reflects wider changes in society, which are likely to continue at an increasing rate. Together, these present the education system with its most acute challenges.

- Meeting changing demands – Daniel (1996) has argued that elearning is the only way to cope with expanding global demand for higher education, claiming that “a major university needs to be created each week” to meet the proposed demand. Even if this demand is not realised, the learning requirements of a global, knowledge economy are very different from those of a localised, industrial one. For instance, an e-skills report for the European Union (COM 2007) suggests that conventional higher education is failing to meet the needs of the workforce, stating

National educational and professional training systems are facing a huge challenge to deliver the skills needed by our economy and society. Despite their efforts, they still find it difficult to cope with the situation, and lifelong learning is still far from being a reality. New forms of partnerships and flexible approaches (such as those based on e-learning) need to be much more actively promoted.

- Informal learning – the learner sphere is much more complex than it ever has been before, with much greater choice for any individual learner. If an individual wants to learn about a subject there are many options available to them: they can search for information, they can join online communities, they can go to trusted content providers (e.g. the BBC), or they can seek formal study. If the previous point suggested that there was a greater demand from society for education, a top-down push, then this is the counter to that, a bottom-up pull. Many people engage in learning every day, often without realising it because new technologies have lowered the threshold to engagement. An individual doesn't need to go to a physical library to find

resources, they simply use Google now. The actual goal of learning is made less explicit, and thus to an extent, learning itself has become further democratised. Encouraging, recognising and supporting this informal learning process without necessitating learners to engage in formal study could be a key factor in sustaining knowledge economies.

If we view our online learning environments not as analogies of how we currently teach, but rather as a metaphor for how we engage with changes required for a digital society, then this provides us with some insight in to how to tackle the issues above (and others).

In order to think about what we might want from new learning environments it is useful to look at current theories of online learning, and how these can highlight differences between existing learning environments and the requirements of a digital, online society.

Online pedagogies

The advent of elearning has seen an exploration of new pedagogies, or at least the emphasis placed on different ones. Siemens (2008) 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 Wesch (2008) asked students what a lecture hall ‘said’ about learning, in essence what were the affordances (Gibson 1979; Norman 1988) of the standard learning environment. They 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 obviously 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

Given this conflict Heppell’s comment seems particularly relevant with regards to learning environments. Why would we seek to recreate the sort of learning

affordances Wesch highlights in a virtual environment, when we are free to construct it however we wish? This is not through lack of pedagogic understanding, 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 (Anderson’s long tail). The only way to accommodate these needs he argues 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.

Centralisation and decentralisation

The technology lag Conole highlights can partly be accounted for by the conservatism of educational establishments. However, it also reveals a more fundamental difference. The sort of pedagogies that Siemens, Seely-Brown and Conole suggest are now coming to the fore as a response to the possibilities of digital technologies, all have one theme in common – they are essentially based on a decentralised model. Indeed, Siemens own pedagogic theory, connectivism (Siemens 2005) places decentralisation at the heart of learning:

Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the

connections that enable us to learn more are more important than our current state of knowing

Decentralisation is at the heart of the success of web 2.0 also, both in a technical and social sense. Wikipedia succeeds by decentralising the authoring process, YouTube succeeds by both decentralising the broadcasting production process, but also by allowing embeds within blogs and other sites, thus decentralising the distribution process. By allowing users to take, embed, remix and share content the central control is decentralised, but the content is more widely distributed.

Weinberger (2007) argues that there are three 'orders of order': the first is where information is bound up in the object itself (e.g. the product packaging); the second is when metadata is created, so that information about the object is separated but still paper bound (e.g. a catalogue); and the third is digital, wherein *everything* is metadata – the content itself, the title, descriptions, image, etc. . With the third order comes significant change because many of the existing roles we have defined in society are to deal with information in the first two orders, as processing these is difficult and time-consuming. In essence, we require others to act as a filter for us. But in the third order, much of the need for this filtering is removed, since search and data mining provide it for us. He suggests that:

We have entire industries built on the fact that the paper order severely limits how things can be organised. Museums, educational curricula, newspapers, the travel industry, and television schedules are all based on the assumption that in the 2nd order world we need experts to go through information, ideas, and knowledge and put them neatly away

Centralisation is a consequence of this filtering process because information needs to flow to a central area of expertise. Decentralisation is a consequence of the removal of this filter, since it does not matter where the data resides, and knowledge is distributed in the network.

Higher education is largely a centralised practice. Originally, in a physically bound system, this was of necessity. In order to gain expertise in a field it was necessary to go to the location of the experts and receive their knowledge. It made sense then to group several such experts together so many people could come to one place, hence the university campus. This is a logical response to the 'information is scarce' world and as Wesch indicates, our physical learning environments are still structured in accordance with this response. Nearly all of the modern attributes of a university flow from this centralised model: the authority of the professor, the filtering of knowledge through recognised outlets, the length, structure and subject matter of courses, the assessment procedures and the means through which knowledge is shared.

It is thus no easy task to adopt a decentralised model, since it will require massive procedural, economic and professional change in higher education. However, higher education will face a challenge: when learners have been accustomed to very facilitative, usable, personalizable and adaptive tools both for learning and socialising, why will they accept standardised, unintuitive, clumsy and out of date tools in formal education they are paying for? It won't be a dramatic revolution (students accept lower physical accommodation standards when they leave home for university after all), but instead there will be a quiet migration. It is not just that the monolithic LMSs will be deserted, digital tumbleweed blowing down their forums and that students will abandon these in favour of their tools, but rather that the very skills we teach in

education begin to look redundant. The back channel will grow and it will be constituted from content and communication technologies that don't require a training course to understand and that come with a ready made community.

Let us take a small, but revealing example, namely that of academic referencing. This is deeply entrenched in academic practice - we often give explicit marks for it in assessment, teach it as a key skill, provide explicit schemas such as the Harvard Reference scheme to follow and demand it in publication. As such you could view it as a cornerstone of the enculturation process in higher education - we are bringing people in to the culture of higher education and referencing is one means of exhibiting your membership of this club.

There are two elements to this practice: the proper acknowledgement of prior work and allowing others to find your sources. Hence the reference schemas are essentially information for finding *physically located* resources (they are a form of Weinberger's second order of order). While the need to acknowledge the work of others is always relevant, the strict process by which we do it, the skill we teach students, is largely redundant, and anachronistic in a search-driven world, because it assumes a centralised model of information. Knowing how to link to and locate resources in databases and search engines is a skill for a decentralised information world. The result is that online references are forced into an existing scheme, which has an inherent preference for physical resources. The traditional reference is often provided in papers, when it is the online one that has actually been used because the referencing system is biased towards the paper version. This is an example of the small, but highly relevant changes that face higher education, and which the learning environment acts as metaphor. Knowing *to* reference is a persistent skill, but knowing *how* to reference is changeable.

To return to the theme of this paper then, the online learning environment can be seen as the means by which higher education explores the solution to this challenge, for it is not just one about technical preference, but rather more fundamentally about the relevance of universities to society in general.

The SocialLearn project

At the Open University in the UK we are developing a social network oriented approach to learning, in a project called SocialLearn. It is predicated on a number of assumptions:

- There is a major shift in society and education driven by the possibilities new technologies create for creating and sharing content and for social networking.
- Higher education, to date, has not really addressed how to engage with these fundamental shifts and their impact on the core business model of higher education.
- There is educational value in the application of both the technologies seen in web 2.0 and the approaches they embody.
- The status quo is no longer feasible or advisable; we need to apply the best of our expertise and experience to address the necessary change.

- Competition in the learner sphere is ever more complex, multi-faceted and fragmented; If higher education doesn't address the issues this raises someone else will

The concept is that learners have a central profile where they list their learning goals, contacts, resources, and tools. The system uses an open API (Application Program Interface), so any third party application can write to it. In essence this allows any application to become a learning tool.

This is one means of allowing users to create their own Personal Learning Environment (PLE). In fact, when you ask users what tools they use on a daily basis, you very quickly sketch a PLE, for instance the diagram below was constructed from a discussion with a group of Open University part-time tutors.

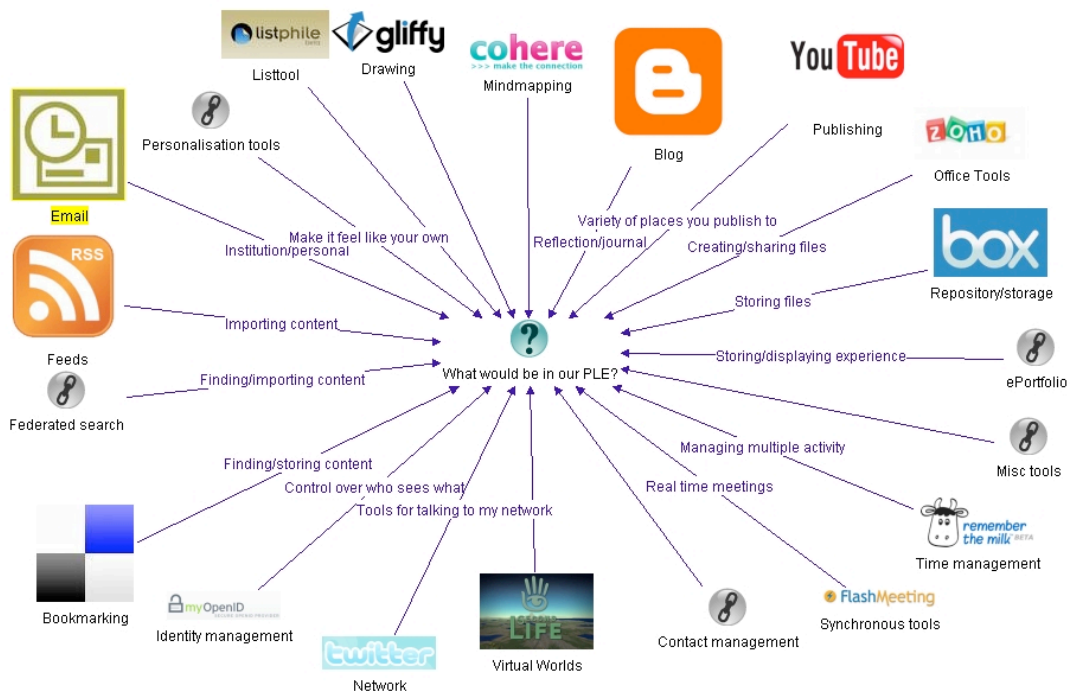


Figure 1: A typical personal learning environment constructed from many different tools

In each case it is not that an individual sets out to deliberately construct a PLE, but rather that one evolves over time as they accrue a number of sites and tools that they use on a regular basis. What is absent from such a collection of tools is any means of binding them together, they remain 'dumb' to what is happening in any other application. This binding substance (or rather data format) has been dubbed 'eduglu' (Norman 2008), and it is likely there will be many different ways of realising it, for instance a number of common data standards are beginning to appear such as OpenID, OAuth and OpenSocial which will facilitate the sharing of data between applications. The SocialLearn open API could be one means also as it provides not only data integration, but perhaps more significantly, cognitive integration. If applications are writing to a user's central profile in order to store resources, list actions or amend learning goals, then for the user they become more of a cohesive learning environment.

We are also developing a number of applications that we think will be useful for such learners. And who are 'such learners'? In one sense, the answer is 'everybody',

because as soon as you conceive of learning as something that is in the control of the learner, rather than the institution, then 'the curriculum' becomes 'whatever it is you're interested in.' That could be quantum physics, it could be the world of Harry Potter. By being part of a network, you create your own cohort, and pull in the resources that are relevant to you (which will be recommended by the network). You may want the structure and motivation a course offers, which could come from a recognised institution, or could be a user generated 'course' that is taken just for fun and run by an enthusiast. Initially however, it is likely that the project will focus on particular groups with particular needs, such as Alumni and professional development.

SocialLearn has been conceived as a deliberate attempt to discover how learners behave in this sphere, how to develop the appropriate technology and support structures, what pedagogies are required and what are the business models for education in a disaggregated educational market. The technology is the vehicle for how the institution learns about the changes it needs to make, and this could not have been realised through an existing LMS, because most LMSs are based on a centralisation philosophy. With SocialLearn the focus is not just for students in higher education, but for informal learners also. Once these boundaries blur for technology, it quickly follows that a similar disaggregation, and then reaggregation, of the various parts of the education system follow: accreditation, support, expertise, teaching. So, in SocialLearn we have explicitly set out to consider not only the technical system required, but also the business, support and pedagogical frameworks that might follow. The key question the SocialLearn project seeks to answer is: "What does the OU look like as a disaggregated suite of learning services integrated via an open web platform competing in a learning marketplace?"

Conclusions

When it was necessary for education to be performed face to face, a number of services were bundled together. When it becomes digital and online, this may no longer be the case, as we have seen in most content industries, such as music and newspapers (education has some similarities with content and also some significant differences). The first round of learning tools replicated the centralised model, but as the tools have become easier to use, and the methods for integrating them simpler, so this centralised approach seems less applicable. 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"

Part of the function of universities is to provide this organisation, for example by grouping individuals together to form a student cohort who are interested in the same subject. But as this grouping becomes easier to do online, it becomes less of a valued function of the university - ie you don't need to go to a university to find like minded people. Education then faces the same challenges regarding the cost of organisation that, say, the Encyclopedia Britannica faced from wikipedia.

Returning to the theme of this paper, Shirky's argument can also be applied to technology, namely that the 'cost' of integrating technology has drastically reduced, meaning it is now feasible for individuals to do this, thus alleviating the need for

centrally provided pre-integrated solutions. For example, we could reword the above quote to read:

By making it easier for tools to (self) assemble and for applications to contribute to the environment without requiring integration, these approaches have radically altered the old limits on the size, sophistication, and scope of any individual to create their own environment

Projects such as SocialLearn, illustrate that the conceptualisation of a learning environment goes beyond technical, or even pedagogical considerations. In a digital society it comes to represent the institutional response to changes in the nature of knowledge creation, sharing, and participation, in short to the nature of education itself. Shirky argues that ‘when we change the way we communicate, we change society’, and the new socially based technologies we have today are doing this in fundamental ways. It is only by exploring their potential that universities can remain relevant to the society they are helping to shape.

References

- Anderson, C. (2006) *The Long Tail: Why the Future of Business Is Selling Less of More*. Hyperion Books
- COM (2007) ‘E-Skills for the Twenty First Century: Fostering Competiveness, Growth and Jobs’. *Commission of the European Communities*, Brussels, 7/9/2007 http://ec.europa.eu/enterprise/ict/policy/ict-skills/2007/COMM_PDF_COM_2007_0496_F_EN_ACTE.pdf
- Conole, G. (2008) ‘New Schemas for Mapping Pedagogies and Technologies’. *Ariadne*, 56. July 2008 <http://www.ariadne.ac.uk/issue56/conole/>
- Daniel, J. (1996) *Mega-universities and Knowledge Media: Technology Strategies for Higher Education*, Routledge.
- Gibson, J. J. (1979) *The ecological approach to visual perception.*, Lawrence Erlbaum.
- Gilbert, C (2006) ‘2020 Vision: Report of the Teaching and Learning in 2020 Review Group’. *DfES Publications*. <http://publications.teachernet.gov.uk/eOrderingDownload/6856-DfES-Teaching%20and%20Learning.pdf>
- Heppell, S (2001) Preface in *ICT, Pedagogy and the Curriculum: Subject to Change*. Loveless, A, & Ellis, V. Routledge, <http://books.google.co.uk/books?id=i8a0qAOsBiMC>
- Lanier J (2002) ‘The Complexity Ceiling’ in *The Next Fifty Years: Science in the First Half of the Twenty-first Century*, Brockman, J (Ed). Vintage Press.
- Norman, D (2008) *On Eduglu Part 1* <http://www.darcynorman.net/2008/02/16/on-eduglu-part-1-background/>
- Norman, D. (1988) *The psychology of everyday things*. Basic Books
- 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/45823>

- Shirky, C (2008) *Here Comes Everybody: The Power of Organizing without Organizations: The Power of Organizing Without Organizations*. Penguin.
- Siemens, G. (2008) *New structures and spaces of learning: The systemic impact of connective knowledge, connectivism, and networked learning*
http://elearnspace.org/Articles/systemic_impact.htm
- 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
- Twigg, C. (2001) 'Innovations in Online Learning: Moving Beyond No Significant Difference' *The Pew Symposia in Learning and Technology 2001*. Center for Academic Transformation at Rensselaer Polytechnic Institute, Troy, NY.
<http://www.widernet.org/decisionmakers/TechTour03/Presentations/Webs/InnovationOnlineLearning.htm>
- Weinberger, D. (2007) *Everything is Miscellaneous: The Power of the New Digital Disorder*. Henry Holt & Company
- Weller, M. (2005) *Virtual Learning Environments: Using, Choosing and Developing Your VLE*. Routledge
- Wesch, M (2008) *A portal on media literacy*.
<http://www.youtube.com/watch?v=J4yApagnr0s>