

At the limits of social constructivism: Moving beyond LMS to re-integrate scholarship

Lisa Wise, James Quealy

Biomedical Multimedia Unit, Faculty of Medicine, Dentistry and Health Sciences

The University of Melbourne

After more than a decade, the early claims that elearning would transform university teaching are yet to be realised. As elearning, with learning management systems as the centrepiece, becomes entrenched in the mainstream, there is growing demand for a solid theoretical research base to inform elearning practice. We argue that the lack of a solid research base is in part due to the inherent difficulties with cross-disciplinary research where shared terminology does not always equate to shared meaning, and in part due to the dominant applied research approach emphasising a case-based approach over research aimed at addressing specific hypotheses derived from educational theory. We use the popular social constructivist theoretical framework to illustrate a lack of theoretical rigour in elearning research. We examine traditional university teaching as portrayed through a social constructivist lens and argue that academics already adopt the 'reflective practitioner' model in their teaching practice. We then examine the concept of adaptive self-organising learning networks in elearning. We argue that, while a social constructivist framework may be ideal for understanding the way people learn, it is at odds not only with the implicit instructional design agenda, but also with current university elearning governance and infrastructure.

Keywords: educational paradigms, learning communities, collaborative learning, organisational change, research methods and approaches

Introduction

The emerging use of computers in tertiary education dates back more than 20 years, with the First Annual Computer-Assisted Learning in Tertiary Education Conference (CALITE '83) being hosted by the University of Queensland in 1983. Online learning is a more recent phenomenon, with the birth of the World Wide Web in the early 1990s and the first Australian World Wide Web conference (AusWeb95) held in Ballina in 1995. The use of web-based delivery for computer-based learning content is now more than a decade old, and sufficiently entrenched to be the dominant model for 'elearning'.

E-learning as we know it has been around for ten years or so. During that time, it has emerged from being a radical idea – the effectiveness of which was yet to be proven – to something that is widely regarded as mainstream. It's the core to numerous business plans and a service offered by most colleges and universities. (Downes, 2005)

Moreover, the widespread consensus at an organisational level is that central web-based Learning Management Systems (LMS) are the required infrastructure to support elearning in a quality university. According to Coates, James and Baldwin (2005)

There is something so seductive about LMS that, despite their complexities and risks, almost every university seems compelled to have one.

LMS have been widely touted, not only as the centrepiece of elearning infrastructure, but also agents of pedagogical change (Wise and Quealy, 2006). It is presumed that LMS will transform university teaching from the outdated traditional university teaching model based around passive transfer of content to a privileged few into a broadly accessible student-centred, interactive learning model based around learning networks, interactive and collaborative technologies and communities of practice. So long as universities support LMS and elearning initiatives, it is assumed to be self-evident that innovation, change and broad-based access to higher education will follow.

As expressed by Laurillard (2005, p6)

We could position e-learning, therefore, as the means by which universities and academics manage the difficult trick of making the learner's interaction with the academic feel like a personalised learning experience, focused on their needs and aspirations, developing their skills and knowledge to the high level universities have always aspired to, while doing this on a large scale. Elearning enables academics and students to communicate through networks of communities of practice in the cybernetic approach that makes change and innovation an inherent property of the system.

The implicit research framework of elearning

Elearning's Tower of Babel

Despite Laurillard's and others' claims that LMS, online learning and educational technology will result in a transformation of the teaching and learning paradigm, the outcomes have not quite measured up to the hype (e.g. Reeves et al., 2004; Twigg, 2001; Zemskey and Massey, 2005). Moreover, the extensive case-based literature on multimedia projects, has been partnered by only limited attempts to develop a solid scientific research base to support multimedia elearning practice underpinning this transformation (Mayer, 2005).

One of the major challenges of providing a coherent research framework for elearning derives from the inherently cross-disciplinary nature of elearning, and the resultant difficulty in discourse across discipline boundaries. This difficulty exists between any disciplines within academia but is significantly magnified when discourse crosses beyond academic disciplines themselves into areas of educational practice, professional practice, technology and management. One outcome of the difficulty in discourse is the absence of rigorous debate because proponents of different viewpoints can all too easily retreat to the insulation and comfort of their own discipline any time cross-disciplinary differences in perspective become too confronting.

Geoghegan et al. (2002) capture the role of language in perpetuating existing ideas and ways of doing things within an organisation or discipline area, and the requirement to develop shared language from outside the system to support innovation and change.

... an organization's language is critically important. It becomes more than simply a means for communication. It becomes a field for action, and a way of constructing truth. It becomes the basis for all transactions, the basis for all business.

... The organization's internal language is designed to help managers facilitate present-day business—not look beyond it. Using the internal language, managers increase efficiencies, but cannot recognize new fields of research, new discoveries, new approaches.

Like all of us, they cannot recognize their own limitations. Constrained by the previously successful language, we do not know that we do not know. Consequently, we think we know—and thus cannot learn. Developed as a tool to increase efficiencies, the organization's language, paradoxically, becomes a trap.

The conversations necessary for creating fundamental change do not come naturally. They pose questions that cannot be understood in the organization's present language. The conversations necessary for generating new opportunities come from outside the system. Their language has a different history. It is often technically and intellectually demanding. Consequently, it is often dismissed. (Geoghegan et al., 2002)

The internal language of an organisation constrains its ability to adapt, and so it is with research activities that use their own internal language. In elearning a particularly frustrating aspect of the existing literature is the seeming lack of connection between theory and practice in the dominant applied research paradigm. Much of this research claims to be "situated within a framework" but, despite using some of the language of that framework, does not actually test any specific hypothesis deriving from the theoretical perspective.

And yet it does not seem entirely unreasonable to suggest that if research is to guide the use of technology to enhance learning, it is an important prerequisite to have firmly-grounded and plausible models of learning and of teaching, and a clear articulation of the desired outcomes from our teaching practice. It is not enough to describe specific elearning projects, addressing explicit questions relating to these projects but ignoring the deeper implicit theoretical positions reflected in the project design, if this research is to drive a far-reaching agenda for change of practice within the higher education sector.

An implicit theoretical position loosely based around social constructivism (e.g. Brown, Collins and Duguid, 1989), communities of practice (e.g. Lave and Wenger, 1991) and learning networks (e.g. Siemens, 2005; 2006) has been used to underpin the transformational potential of elearning in higher education. We argue that, far from providing an appropriate theoretical framework for university elearning practice, a social constructivist perspective is at odds not only with much of the implicit instructional design agenda but is also at odds with current university elearning governance and infrastructure. Despite an elaborate rhetoric around social constructivism, communities of practice and learning networks, the direction of elearning practice in universities, and in fact the intrinsic nature of institution-based education itself, is not easy to reconcile with social constructivist principles. Universities are responsible for teaching their students and accrediting the resultant learning outcomes through awarding of degrees. The fact that much learning activity takes place outside formal teaching institutions does not speak directly to the relevance and effectiveness of institutional teaching *per se*, nor does it entail that universities must adapt their teaching practice to embrace social constructivist student-centred learning principles.

Elearning, communities of practice and the shattering of scholarship

Laurillard (2002) invokes a social constructivist theoretical position to argue for a new kind of university teaching, based around notions of community of practice, networks and creativity.

For some time now, academics have been arguing for a radical shift from the standard transmission model of university teaching. Donald A. Schön, for example, demonstrated the need for a “reflective practicum” in universities, where students can prepare for their future careers when existing professional knowledge will not fit every case. Practitioners have to make sense of uncertain, unique, or conflicted situations of practice through “reflection-in-action,” and they need to be able to go beyond the rules—devising new methods of reasoning, strategies of action, and ways of framing problems. This presupposes a very different kind of university teaching... (Laurillard, 2002)

She describes academic research communities in social constructivist terms as exemplars of processes which foster creation and development of knowledge:

The academic research community has perfected a process that fosters the creation and development of knowledge, and that is so effective that its basic characteristics are common to all disciplines. I think it is fair to say that all academic disciplines share a fundamental set of requirements for high quality and rigorous research. The academic professional as researcher is:

- fully trained through an apprenticeship program, giving them access to competence and personal engagement with the skills and scholarship in their field;
- highly knowledgeable in some areas;
- licensed to practice as both practitioner and mentor to others in the field;
- building on the work of others in their field whenever they begin new work;
- conducting practical work using the agreed-on protocols and standards of evidence in their field;
- working in collaborative teams of respected peers;
- seeking new insights and ways of rethinking their field; and
- disseminating findings for peer review and use by others.

In the context of research, academics measure up well to the idea of ‘the reflective practitioner’ (Shon, 1983) working within a ‘community of practice’ (Wenger, 1999). The progress of innovation is rapid and effective. (Laurillard, 2005, p4)

The initial impression is that Laurillard is lauding academics for creating a ‘community of practice’ apprenticeship model within their discipline. But surprisingly, although such a model (whereby the expert academic is guiding students into the community of practice of their academic discipline) is deemed appropriate for fostering research communities, Laurillard does not credit this model to be an appropriate university *teaching* model to lead to the learning outcomes required for the discipline. Laurillard assumes that there is a separate pedagogy above and beyond an academic’s expert knowledge that applies to teaching a discipline.

Now run through the above list again and consider whether the academic professional as teacher possesses these characteristics in relation to the field of the pedagogy of their subject. None of them, typically, apply. Not even number 2, since academics are rarely specialists in the pedagogy of the subject, beyond a simple reliance on expert knowledge. (Laurillard, 2005, p5)

The ‘community of practice’, social constructivist, contextual model of learning that Laurillard overtly subscribes to surely entails that an expert academic researcher as teacher is one and the same as the reflective practitioner working within a community of practice, particularly in academic institutions emphasising a commitment to ‘research-led teaching’. Expert knowledge is precisely what an academic does rely on. Learning around communities of practice assumes that the focus of learning is around how to become a reflective practitioner within that specific discipline or practice. The community is the mechanism by which like-minded groups of practitioners define themselves as a discipline and define the nature of their expertise.

Although social constructivist learning is a fashionable and pliant framework for elearning, the challenge for educationalists is that within this framework, there is inherently limited formal control over what is being learned or how it should be learned. This, one would think leaves little room for any explicit educational design role in terms of curriculum and learning design. Individual learning is the responsibility of the learner and the nature of discipline expertise is the responsibility of the community. And if, as we would argue, the core discipline-based knowledge evolves through activity within the communities of practice rather than through the outside agency of educational design, what is left for the social constructivist educational designer to do other than sit back and watch the learning unfold? If learners construct their own understanding within their learning community rather than being taught a set curriculum, there should be little need for explicit teaching methodology.

Yet Laurillard suggests that academics must learn a specific model of expert university teaching, a position that is difficult to reconcile with a social constructivist, community of practice framework.

All academics, therefore, need to cover the full range of professional skills of both research and teaching. They will differ in proportion, of course, but there is no easy exit from the responsibility of every university to offer its students access to expert teaching informed by current research, to give them the capabilities they need for their own professional lives. University teaching must aspire to a realignment of research and teaching and to teaching methods that support students in the generic skills of scholarship, not the mere acquisition of knowledge. Forward to the past: universities have to manage on a large scale the same values, aspirations and modus operandi they used for a privileged elite. (Laurillard, 2005, p5)

It is difficult to conceptualise ‘generic skills of scholarship’ outside the context of the act of ‘acquisition of knowledge’ It is also difficult to find a substantive argument with respect to models of university teaching initiating, let alone directing, a change in practice. Nevertheless, one is asked to accept that changes in teaching practice are required on the grounds of technology, knowledge economy, and student demand:

If there is to be innovation and change in university teaching –as the new technology requires, as the knowledge economy requires, and as students demand – someone has to take responsibility for it. (Laurillard, 2005, p5)

In this argument and the many like it, there has been no clear link built between specific problems with university teaching and specific affordances of new technology. There has been no clear articulation of the characteristics of the 'knowledge economy' and its unmet requirements in current university teaching. There has been no examination of the nature of 'student demand'. There is only a juxtaposition of discussion regarding communities of practice in research and an unsubstantiated claim that it is somehow the *new technology* itself that requires innovation and change in university teaching. It is not at all clear how one claim leads to the other, and why new technology requires change and it would seem somewhat irresponsible, if not downright dangerous, to transform an educational institution without a well-established, soundly reasoned cause. While Laurillard frames her work in a social constructive setting, she seems reluctant to accept the consequence of this position in terms of educational design and the nature of academic teaching.

LMS, communities of practice, networks and pedagogy

As discussed in the previous section, much of the conversation around elearning and its transformational potential refers loosely to a social constructivist pedagogy, communities of practice and learning networks. And, as described in the introduction, most universities construct their elearning environment around some form of LMS. In this section, we explore how social constructivist theory fits within typical university LMS implementations.

The majority of university degrees are based around degree programs made up of individual units of study (courses, in the US-dominated LMS world) and LMS are structured around course-based delivery of content to nominated cohorts of students. LMS operate around formal structure rather than organic growth and therefore do not encourage the flexibility and autonomy inherent in communities of practice. The basic element of LMS architecture is the course and there is little genuine opportunity for unstructured between-course communication and sharing. As Downes asserts:

Probably the greatest misapplication of online community lies in the idea that it is an adjunct to, or following from, the creation and design of an online course.... the relation ought to be the other way around: that the course content (much less its organization and structure) ought to be subservient to the discussion, that the community is the primary unit of learning, and that the instruction and the learning resources are secondary, arising out of, and only because of, the community. (Downes, 2004)

Of course it is possible to build a community of practice within an LMS, just as it is possible to ride a bicycle on a freeway, but standard LMS architecture and roles do not encourage it. Even Moodle (<http://moodle.org>), specifically built around a social constructivist philosophy, does not easily support organic growth of communities of practice except within a course-related metaphor – that is to say, a community of practice 'course' needs to be created and people join it rather than natural aggregations of like-minded people evolving into a community of practice through the nature of their interactivity. This is not a criticism of Moodle, since it was designed to support online delivery of courses. It is a criticism of the way in which social constructivist pedagogies and online learning have been conceptually conjoined with little attention to theoretical detail.

Social constructivist learning does not require technology, and does not emerge directly from use of online environments. Educational technology is agnostic with respect to pedagogy, and can support the most didactic teaching methods – in fact, the more didactic it is, the easier it is to support. The link between LMS, learning networks, and communities of practice, despite the upbeat marketing rhetoric of LMS vendors such as Blackboard (<http://www.blackboard.com>), is by-and-large one of 'guilt by association' in that both terms are closely associated with the term elearning. Laurillard (2005) adds to the chain of association by positing the centrality of learning networks, communities of practice, and computer networks in the supposed "new pedagogy".

E-learning enables academics and students to communicate through networks of communities of practice in the *cybernetic approach that makes change and innovation an inherent property of the system*. At the same time, we need a way of creating the common infrastructure of agreed standards of interoperability that enable, and do not frustrate innovation. (Laurillard, 2005, emphasis added)

Dynamic, adaptive, self-organising networks have been described in the artificial intelligence and cognitive neuroscience domain (e.g. Edelman et al., 1984) and may provide appropriate models for exploring knowledge representation and governance from a cybernetic epistemological stance as will be discussed further below. The adaptive, self-organising cybernetic properties of social networks are based around the idea that humans themselves form the integrative nodes of such networks. However the '*common infrastructure of agreed standards of interoperability*' invoked by Laurillard presumably refers to computer networks and to internet protocols that allow software agents to interoperate rather than to interactions between people. The fact that social networks communicate via computer networks does not entail any formal mapping of network architecture between the social and computer domains although one, both or neither could behave as self-organising and adaptive networks in any number of possible predetermined or emergent mappings.

The juxtaposition of like terminology across domains is not a strong argument for the claim that social learning networks will inherently acquire adaptive "cybernetic" properties. It does *not* mean that substantive change and innovation will be inherent properties of any learning network. The essence of an adaptive system is that it *responds* to change and innovation, but this is not the same as initiating it. In complex systems, the source, direction and value of changes are hard to predict. In some complex adaptive systems, the nature of the overall network response to changed inputs at some or all of the nodes is sufficiently complex that it changes the nature of the system, resulting in true change and innovation. But the direction and value of such emergent transformation is hard to predict. And the idea that any change and innovation in traditional teaching practice is of itself necessary and "good" is neither self-evident nor well supported by reasoned argument. The contiguity of statements about change, elearning, adaptive networks and cybernetics has a pleasing ring of authenticity about it but requires much deeper domain-specific argumentation to provide any insight into the role of elearning in pedagogy and knowledge representation, and the effect of change on the traditional university as an organisational system.

Organisation and quality control

Coates et al. (2005) bring to light the inherent tension between different conceptualisations of the role of LMS by highlighting the opportunity afforded by LMS to regulate teaching practice.

LMS offer universities hitherto undreamt-of capacity to control and regulate teaching. From a managerial perspective, the disorder associated with academic independence and autonomy in the teaching and learning process can appear chaotic and anarchic. The management and leadership of academic communities requires, correspondingly, a high tolerance of uncertainty, but such tolerance is increasingly in short supply in an era of attention to quality assurance and control. LMS may appear to offer a means of regulating and packaging pedagogical activities by offering templates that assure order and neatness, and facilitate the control of quality. The perceived order created by teaching and learning by LMS is, we suspect, one of the more persuasive reasons for their rapid uptake. (Coates et al., 2005)

The ability to control, regulate and audit teaching through an LMS sits uneasily with the portrayal of LMS and elearning as harbingers of innovation and change to traditional university pedagogy. On the one hand, it is claimed that elearning (delivered via a central LMS) will allow unprecedented opportunities to build enriched student-centred learning environments and communities of practice free of spatiotemporal constraints; on the other hand, it appears that LMS provide a means to create perceived order in teaching and learning practice. This brings to the foreground the intrinsic tension between creativity and innovation versus regulation and control in the domains of pedagogy and management respectively. Any serious advocate of elearning as a vehicle for pedagogical transformation will need to confront and resolve the inherent conflict between order and creativity, between the checklist-based quality of

observable outputs (“content”) and the qualitative evaluation of teaching and learning quality, and between autonomy and independence on the one hand and regulation and control on the other.

Laurillard acknowledges the dichotomy in her use of the deterministic versus cybernetic metaphors in her consideration of governance structures which might support innovation in higher education:

... if we try to innovate through command and control methods, the innovative idea weakens as it travels down the hierarchy and confronts the local knowledge system ... in an adaptive, or cybernetic structure, the model is not a unidirectional graph, but a network, with multiple two-way links between all nodes, even if there is a hierarchical organisational structure. These localised dialogues allow localised versions of the innovation to spread downwards, customised versions to spread sideways to peer groups, and generalised versions to travel upwards to managers and leaders... (Laurillard, 2005, p3)

There is much to recommend in an approach favouring multiple adaptive linking between nodes of the governance network, but Laurillard’s use of the terms adaptive and cybernetic is a re-description of the desired outcome rather than a meaningful discussion of the method by which it can be achieved. Innovation does not spread merely by virtue of being injected into a network. Self-organising adaptive networks are generally implemented as a system of interconnected nodes with predefined weights which can be (but do not have to be) modified by the pattern of input across the network. The syntax of the network (how information is put together) is a non-trivial aspect of semantics, but once the syntax is in place, semantics in a given network is primarily a function of input to that syntactic structure. The ability of a network or organisation to reconfigure its weighting of inputs adaptively (change the nature of interaction between input at fixed network nodes) is possibly more about efficiency or subtle nuance rather than a true capability to initiate innovation or respond to change since by definition the syntax of the network specifies the constraints underlying the meaningful combination of inputs. The critical issue of how reciprocal interactions between different hierarchical levels of governance could be structured to support the injection of “good” change while ensuring protection from “bad” has not been addressed by Laurillard.

Self-organising adaptive network models sit uneasily within the governance framework for LMS, because LMS are inherently structured around a command-and-control governance mentality and are not dynamically adaptable. It is difficult to see how course-based LMS could support self-organising communities of practice and learning networks and their associated highly adaptive and flexible governance structures. The social constructivist pedagogical mantra of many online learning experts is hard to reconcile with the implicit “command and control” mentality underpinning educational design and LMS.

The apparent lack of awareness of this glaring theoretical inconsistency is worrying and has implications for the capacity of universities to embrace Elearning 2.0 (Downes, 2005), whose underlying conceptual framework is fundamentally different from that of traditional LMS and project-based multimedia forms of elearning. The dominant grammar of Elearning 2.0 is based around active verbs rather than the passive nouns of the traditional web. The shift from a passive consumer perspective to that of an active participant is hidden in linguistic nuance. Key words like ‘interactive’, ‘transformational’, ‘hyperlink’, ‘engagement’, ‘student-centred’, ‘discovery-based’ have been used frequently in traditional discourse about elearning, but in Elearning 2.0, the interactions relate to online communities of practice across the whole web rather than to cohort-based controlled learning experiences. More importantly, interactions are inherently bi-directional and the implicit concept of centralised control is completely relinquished. Educational designers who have urged student-centred learning in which students take responsibility for constructing their own knowledge will now be faced with an embarrassing largesse of accessible content, freely available tools to interact with it, and freely available tools to create more of it.

Back to the future: Transparent ivory towers

Elearning 2.0 is the emerging theme in discussions on the future of elearning environments. Elearning 2.0 is based around open access, interactivity, creativity and sharing using freely available online tools. Elearning 2.0 is inherently not institutionally-governed in the sense of controlled delivery of approved content and communication channels to enrolled cohorts of students. With the move away from approved content and approved communication channels, Elearning 2.0 is also not focussed around educational

design. Educational designers are increasingly faced with the possibility that their mediation in the process of building elearning constructs is no longer required.

Perhaps it is time to revisit the pedagogical arguments for the need to transform outdated university teaching and learning practice to embrace the new technologies of the 21st century. There is no compelling support for the claim that LMS and elearning will transform university teaching. Moreover, the social constructivist, community of practice framework adopted by many in the elearning community does not appear to be well matched to the underlying principles of educational design nor to the concept of institutional university-based teaching. As Scott Leslie observes,

[we must acknowledge] the key role in institutional learning of 'credentialing' - not to reduce it to that, but to acknowledge that in the nirvana of self-forming online learning communities and self-directed learners someone is going to have to start talking about the relationship between that learning and the powerful role of credentialing (and to be fair, this isn't just the institutions of higher ed involved in this, it's governments, accrediting bodies, professional organizations, etc.). (Leslie, 2006)

The emerging Elearning 2.0 model has the potential to provide unprecedented opportunities to enable online learning networks and communities of practice, but it is able to do so without reference to university elearning infrastructure. A major challenge for universities around elearning will be to understand the diminishing value of specific content. Another significant challenge is to understand that, while a large proportion of learning takes place outside traditional instructional settings aligned with the principles of social constructivism, this is not a new phenomenon and is only loosely related to technology. University education has traditionally been about teaching the theory and practice of specific academic disciplines rather than providing vocational trained, job-ready students to industry, and an important aspect of the teaching role of the university is to provide accreditation that students have mastered the knowledge within their discipline of study.

References

- Brown, J.S., Collins, A. & Duguid, P. (1989) Situated cognition and the culture of learning. *Educational Researcher*, 1(1), pp. 32–42.
- Coates, H., James, R., and Baldwin, G. (2005). A critical examination of the effects of Learning Management Systems on university teaching and learning. *Tertiary Education and Management*, 11: 19–36.
- Downes, S. (2004) Learning in communities. *Australian Flexible Learning Community*, <http://www.downes.ca/cgi-bin/page.cgi?post=6880> [viewed 29 July 2006]
- Downes, S. (2005) E-learning 2.0. *ELearn Magazine: Education and Technology in Perspective*. <http://www.elearnmag.org/subpage.cfm?section=articles&article=29-1> [viewed 29 July 2006]
- Edelman, G.M., Gall, W.E. & Cowan, W.M. (Eds.) (1984) *Dynamic aspects of neocortical function*. New York: Wiley.
- Geoghegan, M.C., Pangaro, P. Dubberly, H. and Esmonde, P. (2002) *Notes on the Role of Leadership and Language in Regenerating Organizations* Little Grey Book prepared for Sun Microsystems <http://www.pangaro.com/littlegreybook.pdf> [viewed 29 July 2006]
- Laurillard, D. (2002) Rethinking teaching for the knowledge society. reprinted from *Educause Review*, Vol 37(1) pp 16 – 21. <http://www.educause.edu/ir/library/pdf/FFPIU017.pdf> [viewed 29 July 2006]
- Laurillard, D. (2005) E-learning in higher education. Draft chapter from Ashwin, P (2006) *Changing Higher Education*. Routledge Farmer: London. http://www.swin.edu.au/ads/educational/pd/files/E-Learning_in_Higher_Education.doc [viewed 29 July 2006]
- Lave, J. & Wenger, E. (1991) *Situated learning: legitimate peripheral participation*. Cambridge University Press.
- Leslie, S. (2006) Must read – LMS Governance Report. <http://www.edtechpost.ca/mt/archive/000794.html> [viewed 29 July 2006]
- Mayer, R. (ed) (2005) *Cambridge handbook of multimedia learning*. New York: Cambridge University Press.
- Morrison, D. (2005) Innovations in the reuse of electronic learning materials: drivers and challenges. *Auricle: learning technologies in higher education, information, issues, perspectives*. October, 2005

- http://www.bath.ac.uk/dacs/cdntl/pMachine/morriblog_more.php?id=487_0_4_0_M [viewed 29 July 2006]
- Reeves, T. C., Herrington, J. & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research and Development*, 52 (4), 53–65.
- Siemens, G. (2005) Connectivism: learning as network creation.
<http://www.elearnspace.org/Articles/networks.htm> [viewed 29 July 2006]
- Siemens, G. (2006) Constructivism versus connectivism. <http://www.connectivism.ca/blog/68> [viewed 29 July 2006]
- Twigg, C. (2001) *Innovations in Online Learning: Moving Beyond No Significant Difference*. Center for Academic Transformation, Rensselaer Polytechnic Institute.
(<http://www.center.rpi.edu/Monographs/Innovations.html> [viewed 29 July 2006])
- Wise, L.Z. & Quealy, J. (2006) LMS governance report. *Melbourne Monash Collaboration in Educational Technologies*.
<http://www.infodiv.unimelb.edu.au/telars/talmet/melbmonash/media/LMSGovernanceFinalReport.pdf> [viewed 29 July 2006]
- Zemsky, R. and Massey, W.F. (2005) *Thwarted Innovation: What happened to e-Learning and why*. A final report of the Weather-station project of the Learning Alliance at the University of Pennsylvania in cooperation with the Thomson Corporation.
<http://www.thelearningalliance.info/Docs/Jun2004/ThwartedInnovation.pdf> [viewed 29 July, 2006]

Acknowledgements

This paper develops ideas presented in the LMS Governance Project Report
<http://www.infodiv.unimelb.edu.au/telars/talmet/melbmonash/media/LMSGovernanceFinalReport.pdf>
funded by the Melbourne Monash Collaboration in Educational Technologies. We would like to thank Dr Peter Jones for his comments on an earlier draft of some of this work.

Author contact details

Dr Lisa Wise, Biomedical Multimedia Unit, The University of Melbourne, 766 Elizabeth St, Level 4, Parkville, VIC 3052, Australia. Email: lwise@unimelb.edu.au.

Mr James Quealy, Biomedical Multimedia Unit, The University of Melbourne, 766 Elizabeth St, Level 4, Parkville, VIC 3052, Australia. Email: jquealy@unimelb.edu.au.

Copyright © 2006 Wise, L., Quealy, J.

The author(s) assign to ascilite and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author(s) also grant a non-exclusive licence to ascilite to publish this document on the ascilite web site (including any mirror or archival sites that may be developed) and in electronic and printed form within the ascilite *Conference Proceedings*. Any other usage is prohibited without the express permission of the author(s). For the appropriate way of citing this article, please see the frontmatter of the *Conference Proceedings*.