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Final Report

Learning in Networks of Knowledge: improving student outcomes using Web 2.0 concepts and a knowledge-networking approach

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<http://knowledgenetworklearning.net>

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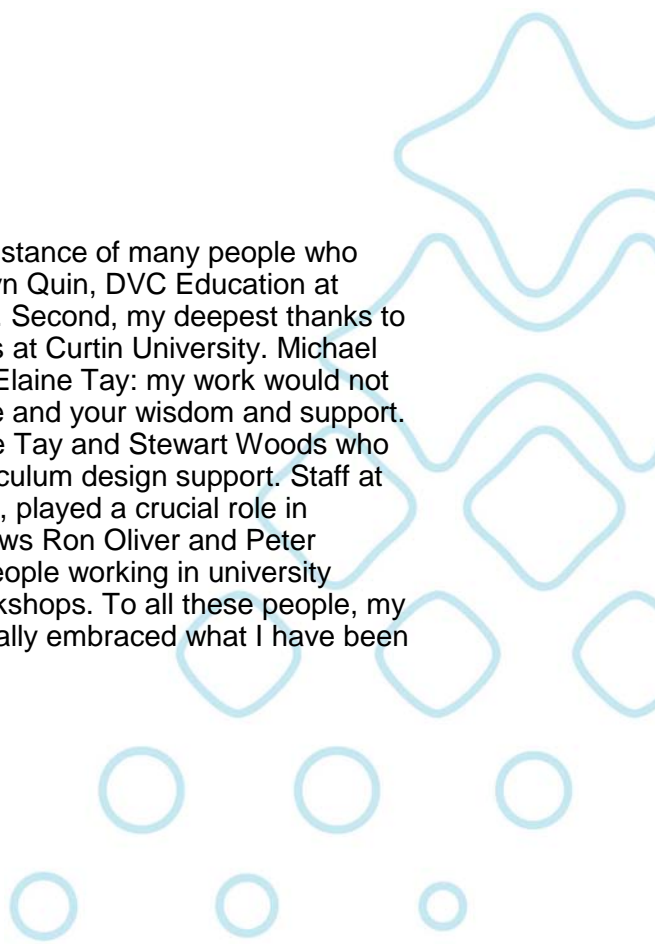
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Executive Summary

This report presents an overview of the Learning in Networks of Knowledge (LINK) fellowship program for the ALTC. It should be read in conjunction with the website <http://knowledgenetworklearning.net> that is the substantive outcome of the LINK program as well as conference papers and other publications made available through that site.

The Fellowship involved innovative applications of Web 2.0 technologies (as they are called) for online learning. Web 2.0 was defined for this purpose in a very practical sense, being any and all, Internet delivered applications, websites and services that (regardless of their specific technological base or social purpose) enable public or semi-public, collaborative or shared, distributed knowledge work. In other words, Web 2.0 is that which makes knowledge networking possible: the services that are identified as Web 2.0 also demonstrate how knowledge networking is becoming a dominant paradigm for information and communication online.

Web 2.0 is often loosely associated with blogging, social networks and so on. However the program went well beyond the 'standard' forms of Web 2.0. Based on workshops and extensive research, the program has identified 50 applications that are particularly useful for academics and these are presented at the website along with supporting material. The program also involved in-depth application of techniques and approaches of public knowledge networking within the course BA (Internet Communications) at Curtin University. Reports of these examples are provided on the website. In time, research data already collected from these trials will be analysed and reported via scholarly publications.

Five key findings have emerged so far, with general applicability to educators using and developing online learning approaches especially when working from a knowledge-networking perspective. The Fellowship has found that:

- students 'get' online collaborative communication – for informal learning;
- technology adoption is less of a challenge than judgments of relevance ;
- the audience for online work is more complex than just 'the public';
- assessment via portfolios is less relevant than expected; and
- Web 2.0 applications form a digital ecology – a network underpinning networking.

These findings and more will be explored in a series of publications emerging from the Fellowship, based on the data collected and on a further analysis of the conceptual field. These papers will be published and presented in 2011 and 2012.

Overall the Fellowship has successfully achieved its aims of developing new techniques for online learning which better embrace the world of knowledge networking and move us beyond excessive reliance on learning management systems as the only form of 'educational technology' online. The program has shown that students benefit from a more 'open web' approach, less focused on learning management systems by enabling them more readily to form learning networks and to see their knowledge work as part of an authentic context, not merely an artefact of study. In particular, the Fellowship showed that, given the right context and curriculum design, students are comfortable with, and indeed positively embrace, online learning experiences outside of the constraints and norms of learning management systems. The Fellowship showed that a wealth of free and easy-to-use tools exist which, while not replacing such systems, can significantly enrich it because they far more extensively promote cognitive partnerships and activity-based learning. In some cases, these tools should be used instead of a learning management system in situations (such as on-campus education) where most features of a learning management system are irrelevant or distracting.



Aims

In simple terms, LINK sought to develop, trial and assess new methods of learning via the Internet. The aim was to assist the re-invigoration of university-level online learning by updating techniques and underlying pedagogic approaches to take account of the changing nature of the Internet in society today. The Fellowship focused on the way the Internet now easily and with sophistication hosts networks of knowledge and that this capability is its foundation for making learning more effective. To successfully exploit the Internet's capacity for enhanced student learning, the program focused on the pedagogic challenges of creating a student experience that is centred on knowledge production in a networked environment.

This broad aim was a response to three emerging issues of direct relevance to Australian higher education. First, learning management systems (LMS), that conveniently collect Internet functions within a walled-garden of content and communication to ease the administrative and cognitive burdens for teachers and learners utilising the Internet, are now declining in relevance as more users and academics are long-term Internet users with their own expectations of how to use the Internet in knowledge work and as LMS fall behind current Internet applications.

Second, the emergence of Web 2.0 technologies allows more functional and open engagement with knowledge, through such applications as wikis, blogs, link directories, audio-visual content sharing systems, and collaborative tools. Web 2.0 also means the 'programmable web' in which data sources are automatically collated into new forms ('mash-ups') without the need for 'from scratch' system or content development. Collectively, educational possibilities now must focus on the networks of knowledge that can develop and the networking of learners beyond the traditional 'virtual community' paradigm.

Third, online learning must be economically sustainable. Extensive innovative utilisation of the Internet in future has to be sustainable and cost-effective and should not involve expensive development and maintenance of software and web infrastructure nor the creation of content methods that are dependent on extraordinary funding over and above recurrent employment of teaching staff. As a result, low-cost, low-level innovations which also involve changes in the way academics use and think about the Internet are more likely to be successful in the longer term, both in the uptake of technology and the development of staff.

The overall aim of LINK was to explore how students may be encouraged and enabled to learn online, by recognising that online learning – whether part of on-campus studies or the sum total of their learning environment – is a form of *knowledge work*. While some of the development work was undertaken in the context of the BA (Internet Communications) and related courses at Curtin University, LINK was partly designed to explore the synergies that can be effected between what students learn and how they learn. LINK, however, was also designed to produce outcomes that could be applied in many different disciplinary fields in which this synergy is less pronounced; whether taught mainly on-campus, or online, regardless of discipline.

LINK did not focus solely on so-called Web 2.0 technologies, though recognising that the emergence of this new cultural and technological form of the Internet has had a major impact on discussions about online learning. However, LINK took seriously the idea that Web 2.0 tools can be thought of as the most productive mechanisms by which online knowledge work and networking can be done. Web 2.0 prioritises user generation of content through innovative tools and interfaces, often breaking down knowledge work into component tasks, each with their own kind of technology. As a result, Web 2.0 promotes ease of interaction between user and screen, the formation of linkages between the content / knowledge produced, and between the users themselves.



Therefore, in sum, LINK proposed that Web 2.0 technologies and approaches constitute the means by which online learning can be organised so that it becomes a sub-set of online knowledge networking. While learning remains a special case of such knowledge work, because it is learning, not doing, nevertheless we can better approximate the conditions of knowledge in a network society using LINK approaches than if we remain focused on the paradigm that replicates 'education' in an online environment by treating online learning as a subset of educational practices.

Within this broad objective, LINK focused on two specific goals, which are best phrased as questions in need of answers:

- What are the kinds of Web 2.0 sites, applications and services which might enable knowledge networking, and how might these be adapted to the specific ways in which we want students to study to promote effective learning?
- What are the specific ways in which we might assess the conduct and outcomes of such knowledge networking on the assumption that good assessment practices will greatly assist students in participating in and learning from education when understood as 'learning in networks of knowledge?'

In concrete terms, then, the aims of Link were to explore and identify Web 2.0 applications and tools that can contribute to a teaching and learning approach that is explicitly designed as 'knowledge networking' and then test, in the longer term, some of these applications and approaches within an applied research setting at Curtin University, in the Department of Internet Studies.



Approach

The approach taken to achieving these aims was planned as follows. First, desk research was to be undertaken into the current state of thinking about pedagogy, assessment, online learning and the most current conceptualisations of the state of knowledge work in a Web 2.0-influenced world. Second, research was to be conducted to elicit the current state of practice and experience among experienced Australian academics using Web 2.0 approaches, using interviews with colleagues in the Department of Internet Studies and a series of workshops to be held around Australia. Third, ideas and approaches refined from this research would be applied in specific cases within the Department of Internet Studies' revised curriculum (to be first taught in 2010). Diagrammatically, the process was as shown in Figure 1 below.

However, as the Fellowship matured, the approach changed to some extent. The workshops (as described below, *Activities*) revealed that there was a lack of knowledge, rather than a wealth of experience, and that the need was for more direct advice, from the Fellow, to meet that lack. As a result, a significant amount of time was then devoted to identifying, analysing and selecting key Web 2.0 applications and technologies via a grounded-theory research investigation. As well, it proved more practicable, given the complexity of curriculum development and implementation at Curtin, for the members of staff in the department to work individually on their approaches and novel techniques rather than for me to distil from interviews their views and then design techniques for them.

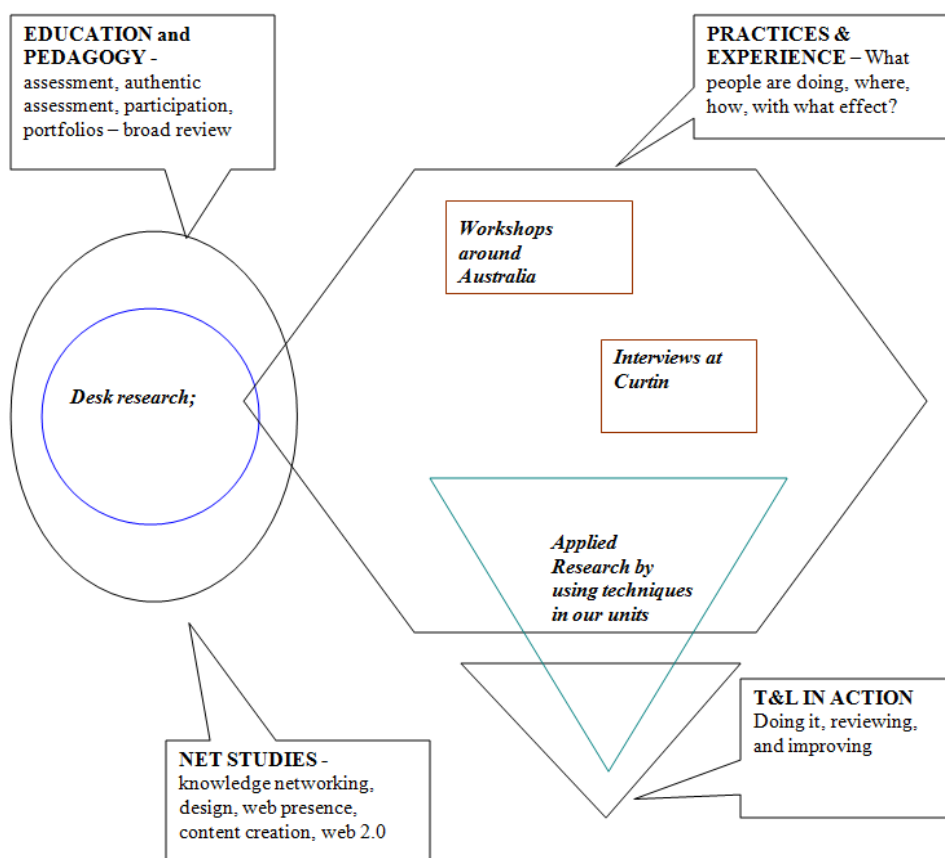


Figure 1: Original research and development approach

These changes made the Fellowship much more effective, for they produced a much more extensive, publicly addressed outcome (the Web 2.0 presentation, in 2010, and the LINK website) and they mobilised the ability and enthusiasm of staff in Internet Studies to produce many more, and more effective, innovations within the course being used to trial these techniques. However, the basic approach – applied



research that marries new conceptualisations with new applications and tests them in an applied research manner – remained.

The approach required that some key concepts be developed which would guide the analysis of Web 2.0 applications and their use in teaching and learning. These key concepts were, first of all, an understanding of Web 2.0; second, knowledge networking; and third, web presence. These concepts are discussed in detail on the Fellowship website and in various papers and presentations made during the course of the fellowship (and available on that site). This research was conducted via a literature review and abstract formation of concepts.

Critical to this conceptualisation was seeing the Internet, not as an educational technology but, rather as a change of state in society as a whole. While Web 2.0 clearly has application to education, or might afford us certain new ways of teaching and learning, or provide the capability to realise forms of educational practice hitherto only theoretically possible, Web 2.0 is not itself 'educational'. If it is to play a role in educational innovation, it must be adapted to that context, as much as being adopted for it. Third, while it is simple – and simpler – to use a shorthand term like 'Web 2.0' and to intuitively imagine it to be a set of technologies or applications found online, the term itself is challenging. Web 2.0 signifies much more than it can actually describe. Web 2.0 alludes, variously, to a new politics of media (or at least claims for some kind of political change); to new modes of cultural engagement; to the extended 'informatisation' of everyday life with consequent effects on our production and reception of knowledge; and to new forms of media subjectivity through performance and participation. And, of course, much that is claimed to be novel about Web 2.0 – either in educational or other contexts – is but a re-affirmation, or more coherent expression of, modes and means of communication that predate the formal emergence of the term in 2004, or even the World Wide Web itself. In these circumstances, Web 2.0 becomes something of an endpoint: it is a question *about* learning, which the program might provide some answers to, rather than a foundation from which to proceed.

Second, the approach involved detailed investigation of several thousand Web 2.0 applications. Drawing on various public listings of these applications, I developed a database of some 6,000 sites and services each including a short description and key words. A brief review of the entire listing identified some 500 sites that held promise for educational adaptation and these were visited and reviewed quickly. Some 100 sites were then identified for detailed investigation, normally by way of creation of a test account, 'playing' with the site and its affordances, and the generation of possible scenarios for use in higher education. Key criteria for selection included: ease-of use (to reduce cognitive load external to learning); cost (free so as to ensure usable by all); browser-based (to ensure use on university computers that do not permit downloads); and diversity and difference (applications which do not already have a 'home' inside traditional learning systems). This investigation was conducted within the broad parameters of grounded theory: while there were some initial expectations or hypotheses about how such applications might be used and understood, the theorisation of them proceeded in response to the investigation, changing and developing to the point where a coherent overall picture of 'what is Web 2.0 for knowledge work' emerged.

Third, the fellowship involved the implementation of specific, detailed versions of possible knowledge networking approaches in the 10 main units of study which are offered within the BA (Internet Communications) at Curtin University. All academic staff in the department were already engaged in a curriculum review and redevelopment (commenced in 2008) and, during 2009 and 2010, as they developed and taught these reshaped units, they implemented innovations drawn from the program. All staff discussed together the approaches taken, learned from each other's experiences and insights, and then trialled and redeveloped the approaches each study period. In most cases, surveys were conducted of the student experience to elicit data that, en masse, will serve as the basis for a detailed



investigation into the effectiveness and general operation of these innovations. The final data was collected in March 2011 for the units taught in the final study period for 2010 (December-February).

A key part of the approach was also to treat seriously the link between educational development and research. Thus, while focused clearly on producing usable and effective outcomes of immediate value to the students and teachers within Internet Studies at Curtin, and with a clear and well-defined strategy to communicate expanded possibilities to other academics, the program emphasised that all teaching is a form of action research aimed at discovering what works and why, and then re-implementing the innovations to repeat the 'experiment'. Reflection on the fit between expectations and outcomes, as well as polling of student views via surveys and close attention to the natural feedback provided by students as they completed tasks and assignments was critical for gathering the data necessary to conduct teaching-as-research.

Underpinning all of the work was a close focus on assessment. LINK began by emphasising the notions of online knowledge production and 'participation' in the Internet as the place to look for online learning innovation, drawing on knowledge that is common within scholarship of the Internet and new media research. The critical educational complement to this emphasis comes by focusing on assessment. There are two key elements to this focus. First, assessment is a powerful mechanism for developing new approaches to teaching since students normatively pay greater attention to, learn more from, and devote most time to assessment, for various reasons. Assessment thus is not just about testing knowledge, but about developing it in the first place; assessment drives student learning and so should be the main focus for pedagogic innovation. Second, there is a general higher educational push for 'authentic assessment' in which assignments mimic or closely align with the work to be done by students once they have graduated. To the extent that LINK asserted a relationship between learning and knowledge networking, and where students are engaged in the study of online communications and knowledge work, therefore authentic assessment must involve assessing real-world knowledge production. Put simply, LINK proposed that students will learn best when at least some, and perhaps the majority, of their assessment is based on tasks which contribute to the stores of knowledge online. During the Fellowship, it also became clear that, with amendment and development, the concept of authenticity could be expanded to cover all disciplines and subjects, not just those involved with online communications culture and technology.



Activities

Public workshop and presentation

The principal activities conducted for the fellowship involved a mix of dissemination and information gathering via a workshop and presentation. The first key activity for the fellowship was a workshop *Innovative education online: Ideas for the future of learning and the Internet (Using Web 2.0 Technologies for Online Teaching)*. This workshop was held at several universities in Australia in 2009. Hosting and participation was arranged through relevant university teaching and learning centres and, while not limited only to attendees from the host university, most participants tended to come from those institutions. A mix of academic developers, academics and teaching and learning researchers attended. The workshop was also held at an international online learning conference later that year. In all, around 250 participants attended in Sydney, Brisbane, Melbourne, Canberra, Perth (twice), and Vancouver. A full report of the workshop outcomes is presented on the Fellowship website, including the notes and handouts from the activity.

The workshop was designed to provide a space for participants to exchange ideas about, and develop new frameworks for understanding, the use of the Internet and related network media technologies to achieve innovative, high-quality learning by university students. The emphasis in the workshop was to move beyond reliance upon, or default acceptance of, learning management systems (such as Blackboard) into a place where students might engage directly with the public, 'real-world' Internet, through online knowledge production and their membership of knowledge networks which exist through the Internet. Participants discussed pedagogic techniques and underpinning concepts, but also were encouraged to share experiences and knowledge of specific technologies which might be used to move beyond the learning management system. The workshop did not discriminate between online, on-campus or blended learning situations.

The results of the workshop were enlightening and had significant implications for the Fellowship. Attendees – despite signing up for a workshop that specifically targeted leading users of online learning technologies – were not especially advanced in their understanding of Web 2.0, nor of the very diverse array of applications which might benefit learning innovation. Many were, in fact, quite new to online learning – being drawn in to this field by personal motivation as they became more aware of the power of the Internet, or responding to institutional pressures to 'go online'. Moreover, many of these participants were unaware of the extent and scope of online learning developments in the past and exhibited attitudes and responses common to academics in the mid-1990s, the first period of mass online learning development. Of course, several participants were already highly skilled and knowledgeable in online learning, as the workshop demonstrated. However, the general message communicated to me through these workshops was that, when it came to the application of Web 2.0 technologies to learning, there was both a dearth of knowledge about these technologies and, moreover, an explicit desire for expert guidance about which of thousands of possible specific technologies might be useful. In short, while the workshop had been designed to elicit 'best of breed' applications, backed by experience, which would then be more closely evaluated in the Fellowship, in fact it showed that the program needed itself to engage more directly with finding, evaluating and promoting those applications.

The second key activity I conducted during my fellowship was the 90-minute presentation, *Using Web 2.0 in your teaching: ideas, applications and affordances for enhanced educational outcomes*. The presentation focused on the way that a wide array of Web 2.0 / social media applications can be used in higher education, whether in distance or on-campus learning. The presentation summarised the key features of Web 2.0, based on an extensive analysis of many different publicly available, mostly free applications. It then demonstrated the 'top 10' innovative applications which exemplify the different ways in which Web 2.0 can make a



difference for university learning. Designed to provide practical, usable ideas, the presentation emphasised how the technologies which might be chosen must be understood in terms of their relationship to the content, assessment, outcomes of learning, and the particular context provided by students and the subjects they are studying.

This presentation was given in 2010 at 17 universities around Australia to more than 750 attendees. The presentation was also recorded at several universities and made available to staff unable to attend. A fully produced high-quality audio-visual recording was made at The University of New South Wales and has been made available on that university's website. Slides and other materials, including direct links to the video, form the centrepiece of the LINK website making the presentation widely available in an ongoing form. Feedback from participants in the presentation was uniformly positive, and emphasised that the 'top 10 tools' approach – developed in response to the need for such practical guidance emerging from the 2009 workshop discussed above – was the correct one. The presentation was particularly designed to engage academics with the idea that, while we can learn from these key examples, the most important step in developing innovative online learning is for them to explore and analyse individual tools, such as the ones presented, for their specific needs and requirements. Developing out of the presentation is a fully detailed website that is discussed below under Outcomes.

Four additional workshops were held, in response to invitations by universities at which I had presented. One of these, in particular, is of specific relevance to the use of Web 2.0 applications in online learning innovation because it involved hands-on work, with Web 2.0 applications, to allow staff to experience both the challenges and opportunities of moving beyond the safety, but rather constraining boundaries of a learning management system. The whole workshop was delivered in a blended fashion – instructions, activities and tasks were presented via one of the blogging applications discussed in the 'top 10' presentation, and utilised an array of other technologies including email for the creation of specific learning identity accounts and a backchannel for discussions online, as well as *Slideshare* for on-the-fly publication of presentations. This workshop can be found online at <http://knl.posterous.com> and is also discussed on the website.

Innovation in online learning

As well as these public activities, developments and trials occurred within the BA (Internet Communications) course at Curtin University. This course is offered, on campus and online, both through Curtin and Open Universities Australia. Units from the course are also taught within the BA (Mass Communication) at Curtin and its offshore partner campuses. Related units are part of a Master of Internet Communications. In all, some 250 equivalent full-time students study these units each year, with around 1000 unique individual students taking one or more units.

Each of the main units in this course for which I am responsible as Head of Department was the locus for an innovation in online teaching and learning, designed to implement and test the aims and assumptions of the Fellowship. In brief, the following activities were undertaken, listed by the unit name with a brief indication of the innovation used. The academic working with me and responsible for the unit, playing a major role in the innovative development, is also identified. The details of these developments and more analysis are provided on the Fellowship website; in time research findings based on extensive surveys of students will be published. Two of the units are still in development at the time of reporting and are omitted.



Internet and Everyday Life 102

Collaborative mindmap (using the application *MindMeister*, <http://mindmeister.com>) shared by all students in unit as the basis for reflecting on and developing a conceptual grasp of the changes to everyday life that the Internet is causing. (Elaine Tay)

Web Communications 101

Individual web presence development, including creation of a central node via a blog (*Wordpress*, <http://wordpress.com>) plus extensions to include additional Web 2.0 applications such as *Flickr*, <http://flickr.com>; *Delicious*, <http://delicious.com>; and *Twitter*, <http://twitter.com> All blogs public. (Tama Leaver)

Internet Communities and Social Networks 204

Online asynchronous conference, over three weeks, in which each student presented a conference paper (2000 words) and all students responded and discussed. Conference hosted via bespoke Wordpress installation at <http://networkconference.netstudies.org/>; students used alternative group software, such as *Ning* <http://ning.com> as place to discuss and organise the conference in advance. Conference open to anyone to join discussion. (Mike Kent)

Internet Commerce and Consumers 205

Students wrote individual wiki entries reviewing collaborative online software (using the *Wikidot* <http://wikidot.com> platform) and then, working in groups, developed a public report on the way Internet economics function, presented in a variety of formats including use of wikis, but also *Youtube* <http://youtube.com> published videos and screencasts. (Elaine Tay)

Internet Politics and Power 303

Students required to produce a public-oriented presentation of the key issues involved in various websites' 'terms and services' to show analysis of the way power is corporatised online. Presentations made via *Slideshare*, <http://slideshare.net>, and fully public. (Tama Leaver)

Internet Collaboration and Organisations 308

Students work individually, but in a collaborative space to share resources and information about the way Internet applications permit different forms of organisation and collaboration; they develop a shared bibliography using *Diigo*, <http://diigo.com> which then supports their individual assignments. (Mike Kent)

Web Publishing 206

Students create a real blog, either via *Wordpress* or an alternative service, which is the locus for their studies, publishing a series of guided entries that explore the techniques of effective online writing. Students are encouraged to make the blog entirely 'separate' from study in its appearance and appeal. (Helen Merrick)

Web Media 207

Students use various online and digital media applications to create video, still image and text remediations of old and new media concepts: results are published online before being submitted and assessed: choice of publishing mode and venue is part of the assignment task. (Tama Leaver)



Internet Studies Project 390

Students engage in individual projects to write a realistic, publishable journal article (only selected students permitted to do unit); *Wiggio*, <http://wiggio.com>, a groupware platform is used as the collaboratory where individual students can exchange ideas, be guided collectively by supervisor and provide social support as they work on their individual research. (Michele Willson)

As noted above, assessment was a key focus for all of this work. While online learning activities for knowledge networking involved several kinds of activities and tasks, only some of which were directly assessed, it was imperative in the design and delivery of these innovative learning experiences that appropriate value was attached by teachers via assessable status. As I have commented elsewhere, "it is now reasonably well recognised, at least in theory, that whatever the kind of assessment, formative or summative, students are strongly guided by the assessment regime in determining how to spend their time when engaged in actual learning activities." (Allen, 2009 paper on authentic assessment, <http://netcrit.net/content/aaceauthenticassessment2009.pdf>). It can be challenging to think about how, practically, to assess diverse, distributed and fragmented knowledge work. We used a couple of obvious techniques, with students doing networked knowledge work as part of group projects with a single, assessable outcome, thus enabling that work to be assessed indirectly, through the quality and extent of the final product. We also had students produce content for the Internet that is substantial in its own right, enabling assessment of that work, but also making clear how those assignments are more than just study, becoming part of networks of knowledge online.

But a third form of assessment was also trialled, taking the concept of 'the portfolio' (often associated with reflective practice or some kind of meta-assessment across courses of study) and refashioning it to be a more practical tool. In several of the units, students carried out small, discrete, dispersed acts of cognitive engagement and Internet content creation (finding, tagging and organising resources; utilising cognitive tools such as mind maps and word clouds; posting comments to blogs; adding to knowledge databases; rating, reviewing, and ranking content) which are completely unsuited to singular assessment. The portfolio becomes a *selected* collation of the outputs of these activities, *contextualised* by the student and presented as a single assignment. Such an approach linked the performance of distinct, small learning tasks to assessment, on the assumption that assessment motivates performance and attention to task, both communicating to the student the value of the work, and allowing them to make decisions about effort and engagement based on that communication. It makes possible the equitable, intersubjective assessment of diverse students' performance (while all do different things, they present them in a similar, constrained format), as well as creating a formal communication of task and result between student and teacher to enable feedback; at the same time this approach is pragmatic: the scant time available for assessing and providing feedback is devoted to that task, and not to a 'hunt and click' through numerous fragments of work on many websites.



Analysis

Five key points have emerged from the extensive array of activities and research conducted during the fellowship and continuing into 2011-2012. These points are preliminary broad findings that will inform ongoing developing of learning in knowledge networks, both specifically at Curtin and also more generally. They are offered here in tentative form, to be evidenced and analysed in more detail in publications arising from the Fellowship.

Students 'get' online collaborative communication – for informal learning

One of the central challenges for the development of learning in networks of knowledge is to recognise that, more and more, students are already involved in such activities regardless of what teachers do. As revealed by the uses of Twitter, and other technologies, in the units in Internet Communications, students share ideas, discuss their studies and generally support each other via the normal sorts of online communication which are now part of everyday life, principally but not only *Facebook*. This informal learning is essential for successful study and the Internet demonstrates its power and significance by becoming the home of learning networks that spring up between individuals engaged in common pursuits.

From here, the challenge is to create a learning experience that, while not 'formalising' informal learning encounters, nevertheless encourages and supports them. We have already see, in Internet Studies at Curtin, how students – once they realise that their studies are online knowledge work – become more open to sharing what they do with other students, and in actively seeking to make 'connections' thereby creating their learning network. In other words, learning networks which promote informal exchange are not the same as the formal learning encounters, but the value of such networks must be given as much prominence by teachers so as to signal the benefit to students – especially those without a rich set of independent learning skills.

In part, the answer could be to identify technologies (such as the simple forms of asynchronous and synchronous communication which abound online, for example a new service called *Convore*, <http://convore.com> which combines the two) that create a distinctive experience for online exchange. Such exchange would not be so closely associated with formal exchanges (classrooms or their virtual equivalent) nor so embedded in everyday life (like *Facebook*) that the 'specific-to-study' context required for effective informal learning conversations is lost. Equally, we need social affordances built into units of study: explicit requirements or arrangements which bring students together for informal interactions, especially with students in first-year units who may otherwise expect or assume that everything revolves around their individual interactions with teachers.

Technology adoption is less of a challenge than judgments of relevance

People cautious about utilising online learning innovations outside of a learning management system are usually concerned that the technologies involved will be too difficult, or not the same as, what students are used to in an LMS (learning management system). All of the evidence gathered during this Fellowship suggests this fear is misplaced. Students adapt easily to varying kinds of online experiences and, for those who are regularly using an LMS, they actually enjoy the difference which a tool like *Wiggio* brings with it. Most online applications and services relevant to learning are, indeed, designed specifically to be easy to use and attractive and appealing in their screen design. The same cannot be said for many institutional systems.

However, students will not accept excessive and variable applications of different technologies for their own sake. The key, always, to gaining student acceptance and



enthusiasm is relevance to the subject matter, coherence and value of the assessments to which the technologies are linked, and – perhaps more than anything – a clear communication of why this site or service matters. Part of the work of innovative online learning development is for teachers to become excellent users of the technologies themselves, not just so that they can explain them easily but so that students instinctively ‘get’ that the authority of the teacher is well-placed.

Indeed, technological innovation is likely to succeed only where it is conducted with specific emphasis on the way Web 2.0 can empower users to be more ‘in charge’ of their own knowledge work behaviours. In one unit of study in Internet Studies, our insistence on using a particular web platform for publication was routinely subverted by students who comfortably adopted things which were, perhaps, more difficult to use but felt more ‘natural’ to them.

The audience for online work is more complex than just ‘the public’

Central to the knowledge-networking paradigm is that publicly presented work, generated by students, is more likely to be done to a higher standard and with more attention and active learning because it is formally addressed communication. While this assumption was in most cases supported by the research data, our surveys and reflections have also revealed that most students understand that audience as ‘other students like them’. Consistently, what we found is that encouraging and requiring students to post their work into online publications (of many kinds) utilised the ‘ideal’ of the general Internet-connected audience, creating a network of knowledge around the topic, but that students internalised and acted upon this audience in more concrete terms, based on the reality that other students would learn from them, see their work and of course judge it. Almost no student we encountered had any problems with this: in fact many were relieved to be able to make connections with what others were doing. However, we suspect that if students were simply asked to exchange their assignments with other students, they would be much more reluctant: the ‘online audience’ is a necessary fiction that authorises students to think differently about assessable work. While it might end up being assessed, its initial location within a public domain, empowers students to be more open about their work with colleagues.

A further lesson would appear to be that online communication between students, to sustain the learning networks referred to above and even build a learning community, is not just a matter of conversations, but also of publication. Too often, students have been expected to spend a lot of time reading each other’s informal discussion posts, chatting via electronic forums and the like, but never then ‘close the circle’ and see what others have done in their assessments. Therefore the knowledge-networking effect becomes visible not just in explicit conversational requirements but in the very act of working primarily within a public domain that puts the focus on the work and its communication / reception rather than on the student-teacher power dynamic.

Assessment via portfolios is less relevant than expected

The Fellowship had started with a strong focus on the need to use portfolios as a key element in the assessment process, on the basis that busy teachers are often not able to look in detail at the work online of many students. It had been expected that all units would involve significant use of portfolios. Early on, and based on initial feedback from students that the concept of the portfolio was confusing and complex and therefore distracted them from actually achieving the learning outcomes, it was decided that only in specific instances would a portfolio be used. Initially, portfolios were implemented to enable us to divide up the work of students into many more precise, smaller and manageable tasks. To ensure these tasks were valued and students motivated to complete them, they had to be assessed in some manner, but we did not wish to impose the significant burden on all concerned of assessing each one, time and again. Thus a portfolio was the pragmatic solution: while conceptually sustainable, the decision to use portfolios simply allowed us to take several small



tasks, below the threshold for direct assessment, and turn them into a single assessable item. Second, learning involving diverse evidence and activities – often located in many places on the Internet or presented originally in forms that would not easily link to the student who produced it – would be far too complex to assess directly, if it were not first collated and presented in a manner and form that could be easily uploaded to the learning management system, accessed and assessed simply by one of several tutors, and then returned promptly to the student with feedback. In other words, while the Internet makes much distributed learning more visible and retrievable, it still does not (and will not) make that easily assessable by hard-pressed, short-term tutors.

However, in more advanced units, it became clear that students were capable of engaging in online tasks and activities which benefited them without necessarily needing the spur of assessment. More importantly, the array of online sites and services available which automatically aggregated or otherwise collated activities was such that it was easier than imagined to design assessments where all of the online work formed a coherent whole, assessable as a single assignment. Furthermore, as we look to expand the use of these services to include more intensive, student-centred discussions and analysis of the knowledge work being done, the portfolio seemed overly ‘teacher centred’ – a too-stark reminder of the artificiality of study compared to authentic, realistic knowledge networking.

The portfolio is becoming a complex and contested space. Several models are being used concurrently in higher education, and often with limited discussion of the need to educate students into their effective use, especially for reflection. As a result, a key finding of this Fellowship is that, at least for Internet Communications, the concept of web presence – a distributed, public online knowledge network in action – is more useful as a guide for how we want students to see the sum total of all knowledge networking across our units of study.

Web 2.0 applications form a digital ecology – a network underpinning networking

One of the initial goals of the Fellowship was to provide a richer, more educationally oriented taxonomy of the many types of Web 2.0 applications available to educators free and easily online. There are numerous existing lists of such applications but few have a useable system for categorising their contents, especially for educators and with consciousness of their role in knowledge networking. However, as I attempted to develop such a taxonomy, it became clear that the power and sophistication of these rich social media / social networking services for user-generated and shared content is that they often contain many different affordances which can lead to different categorisations depending on how they are used. In other words, Web 2.0 is too diverse, and yet too overlapping for traditional knowledge work approaches.

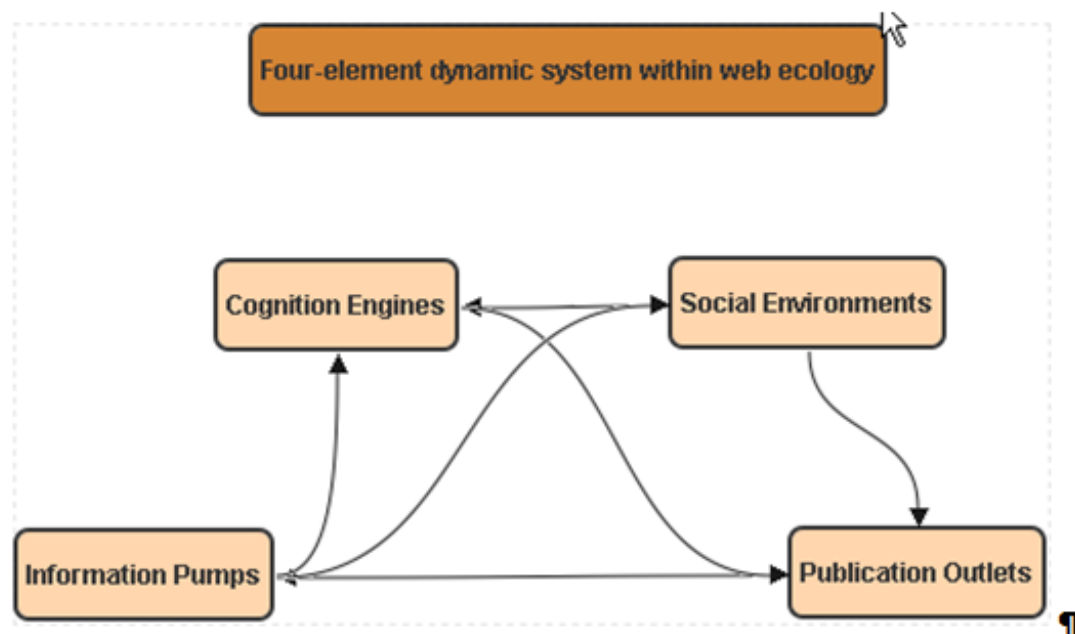
As a result, I developed a more conceptual schema which attempts to describe the whole field of Web 2.0 development and implementation and enables academics to grasp what purposes can be performed within it, by a tool or service, which they might need in an educational setting. I found that Web 2.0 forms a digital ecology within which information flows and communication occurs, both in individual and collective ways, more or less dependent on a synergistic relationship between humans and computers. This conceptualisation was presented at Networked Learning conference (2010) and focused on the following diagrammatic representation:



Knowledge Networking Dynamics ¶

What might we learn from Web 2.0 applications about the way knowledge networking occurs using such tools in the contemporary web? ¶

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Grounded theory developed from playing, testing and analysing several hundred Web 2.0 sites and services. This model does *not* categorise these applications: it identifies the distributed nodes of knowledge work enabled by, and distributed across, the Web; some applications cover all 'nodalities'; some tend towards one in particular. (Drawn with <http://glinkr.net>). ¶

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The web distributes knowledge work (people, places, devices) ¶
Distributed knowledge work is networked through the web ¶



Dissemination

In the long-term, the primary dissemination will be via the Learning in Networks of Knowledge website. However, this fellowship was designed from the outset to involve immediate and rapid dissemination of the work in progress via conference papers, seminars, workshops and similar. This goal was achieved, with more than 1500 people engaging with the Fellowship and parts of its outcomes / dissemination during 2009 and 2010 at 10 conferences, several university workshops and seminars, and through online contributions and distribution. These conference papers and workshops are listed below. It should also be noted that one university in Australia engaged the author as a consultant to assist in revising and developing online learning based on his role as a Teaching Fellow of the ALTC.

Website

The primary, ongoing channel for dissemination will be <http://knowledgenetworklearning.net>, a fully hosted and maintained website dedicated to exploring and developing learning in knowledge networks.

The site has five main sections:

- **Concepts**, in which I explore key ideas relating to networks and pedagogy (such as authentic assessment, agile teaching, web presence and so on).
- **Practicalities**, covering the key things which educators planning to work in this way need to know to get started in a simple and effective fashion.
- **Tools**, in which I present 50 Web 2.0 applications, services and sites with guidance on their use, descriptions, and pedagogic challenges.
- **Examples**, which lists in more detail the material relating to Internet Studies' uses of this approach.
- **Resources**, providing links to key articles, including publications from the LINK program, and online learning resources.

An updates page will be used to maintain an ongoing assessment of new applications and provide new material. The site will be comment-enabled to engage users in dialogue about key ideas and build a knowledge network about knowledge-network learning. In time, additional authors and contributors will be able to contribute to the site. There will also be appropriate details concerning the origins and scope of the Fellowship and its funding by the ALTC.

The site makes use of the very technologies that it is promoting, as well as demonstrating the interlinked, yet distributed nature of contemporary knowledge work. For example, it uses a feed from *Delicious* to present references; the updates page is organised as a blog; a mindmap of concepts will be included, developed in *Mind42*; and many pages include embedded content from media and document sharing sites such as *YouTube* and *Slideshare*

The website will be widely publicised via both formal and informal channels within Australian and international higher education. During 2011, as appropriate, further workshops and seminars will be arranged, based on and further promoting the site.

Articles and Chapters

Quinton, Stephen and Matthew Allen (in press). Open Technologies and Social Media as Enablers of Collaborative Learning. In by Alexandra Okada, Teresa Connolly and Peter Scott (eds) *Collaborative Learning 2.0: Open Educational Resources*, Knowledge Media Institute - The Open University UK.

Tay, Elaine and Matthew Allen (forthcoming, 2012). Designing social media into university learning: technology of collaboration or collaboration for technology? *Educational Media International*.



Conference publications and presentation

- Allen, Matthew (2010). Risks and Opportunities in Authentic Learning via the Internet. *The National Curriculum Innovation and Quality Forum 2010*, Melbourne, December 2010 (invited keynote).
- Allen, Matthew (2010). Web 2.0 for networked learning: from collaboration to shared cognition and knowledge networking. In L. Dirckinck–Holmfeld, V. Hodgson, C.Jones, M. de Laat, D.McConnell & T.Ryberg (eds), *Proceedings of the 7th International Conference on Networked Learning 2010*, Aalborg: University of Aalborg: pp.964–966.
- Allen, Matthew (2010). Going Public with Learning: Online education and the real world. *Diegetic life forms II: creative arts practice and new media scholarship*, Perth (invited presentation).
- Allen, Matthew and Elaine Tay (2010). The pragmatic portfolio: an assessment approach for distributed learning. *Teaching and Learning Forum 2010: educating for sustainability*, Perth, January 2010.
- Tay, Elaine and Matthew Allen (2010). The social side of social media: technology or collaboration? *Teaching and Learning Forum 2010: educating for sustainability*, Perth, January 2010.
- Allen, Matthew. (2009). De–tooling Technology: networked computing as an environment, purpose and medium for social action, *Making Links Conference 2009*, Melbourne (invited keynote)
- Allen, Matthew. (2009). Learning in Networks of Knowledge, Poster, *ATN Assessment Conference*, RMIT, Melbourne.
- Allen, Matthew (2009). Learning in Networks of Knowledge (Poster) *ALTC West Australian Networking and Dissemination Forum*, Perth, October 2009.
- Allen, Matthew. (2009). Authentic Assessment and the Internet: Contributions within Knowledge Networks. In Jon Dron, Theo Bastiaens, and Cindy Xin (eds), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009*, Chesapeake, VA: Association for the Advancement of Computing in Education, pp.1501-1510.
- Allen, Matthew and Jane Long. (2009). Learning as knowledge networking: conceptual foundations for revised uses of the Internet in higher education. In S.I.Ao, Craig Douglas, W.S.Grundfest and Jon Burgstone (eds), *Proceedings of the World Congress on Engineering and Computer Science 2009*, Hong Kong: Newswood, pp.652-657.
- Tay, Elaine and Matthew Allen. (2009). Re–invigorating the use of the Internet in higher education: preliminary findings from the ALTC Fellowship project “Learning in Networks of Knowledge”, *Communication, Creativity and Global Citizenship: Australia and New Zealand Communications Association Annual Conference*, Brisbane, July 2009.
- Allen, Matthew. (2009). Web Presence: Understanding persistent and interlinked content as the basis of identity formation and promotion through the contemporary Internet, *Communication, Creativity and Global Citizenship: Australia and New Zealand Communications Association Annual Conference*, Brisbane, July 2009.
- Allen, Matthew. (2009). Education and the Internet: Web 2.0 and renewed innovation in online learning, *Teaching and Learning Forum 2009: teaching and learning for global graduates*, Perth, January 2009 (invited presentation).



Seminars

Allen, Matthew. (2010). *Authentic Assessment in the era of Social Media: ideas and applications from Internet Communications*, Oxford Internet Institute (also presented at the Open University and the London Knowledge Lab).

Workshops and events

Allen, Matthew. (2011 - forthcoming). *The Edgeless University*. A workshop on the future of technology and learning. Oxford Internet Institute.

Allen, Matthew. (2010). *Five Steps Towards New-fashioned Online Learning*, Online Teaching and Learning Showcase, University of Newcastle.

Allen, Matthew. (2010). *Using Web 2.0 for Learning and Teaching: beyond blogs, wikis and social networking*, Murdoch University.

Allen, Matthew. (2010). *Using Web 2.0 in your teaching: ideas, applications and affordances for enhanced educational outcomes* (presentation at 17 Australian universities).

Allen, Matthew. (2010). *A Web 2.0 Workshop for Educators*, Centre for Learning and Development, University of Adelaide.

Allen, Matthew. (2009). *Innovative Education Online: Ideas for the Future of Learning and the Internet*, *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009*, Vancouver (refereed). (Also held at seven universities in Australia during 2009)

Several more papers are in preparation, and additional work will be done during 2011 to analyse and report on the data that has been collected in the past two years. The nature of academic research, production and publishing means that this work will most likely appear in 2012-2013.

Conclusion

Learning in networks of knowledge (LINK) was an ambitious program. In some senses it is not yet complete and can never be complete because it is engaged closely with the rapidly changing world of network mediated information and communications technologies and their associated social formations. The rapidity of change is quite at odds with the systematised world of university education, a system that increasingly privileges centrally managed, whole of institution approaches, and which tends to enforce a necessary, but at times frustrating, bureaucratic oversight of the everyday world of academic labour. The rapidity of change, which can be observed often only after its effects are already being felt, does indeed destabilise traditional authority structures and expectations in the way that the evangelists of 'Web 2.0' have long asserted. At the same time, exploitation of these changes can become tied down by the inertia with which those structures are most likely to defend their traditions. Yet, because higher education is indubitably a world of communication and information, the kind of 'weightless' world so centrally affected by changes in networked digital media in the past 25 years, it is unable to evade the consequences of its underpinning circumstances. To that extent, LINK was probably always 'work in progress' even if, in its original formation, I did not realise it. Now, at its formal end, I have learned insistently that we will never 'solve' the questions of how to utilise online technologies for education but must continue to engage with them as the interface between how the practices of knowledge occur, and how those practices can be learned and taught.

Yet LINK was never solely concerned with technology. LINK assumed that technologies of networked communication and information really do have a kind of agency in our world: they make things change, but never in the way which their authors and proponents might necessarily expect. Equally, LINK assumed that there is no such thing as 'educational technology' outside of a society's current, potential



and past uses of technology. Informed by the emerging interdisciplinary research paradigms and discourses of Internet research, within which I work, LINK cautions us to remember that universities are part of the world we seek to prepare people for.

The initial expectation was that the Fellowship would primarily involve the discovery of leading-edge techniques and approaches and deploy them within the BA (Internet Communications) and associated graduate courses within my department, Internet Studies, at Curtin University. These expectations were, to some extent, realised. However other significant developments have shaped a revised version of the Fellowship. Further, the overall emphasis shifted away from some of the concerns which, when I first conceived the program of activities in 2008, seemed crucial towards others that emerged in the early stages of actually doing the work. And, to be blunt, the program was too ambitious in its scope and expectations of what could be achieved as within a short Fellowship..

The ambition of the Fellowship intersected with the surrounding context. Critical to the program of activities was the link between its investigations and their immediate application in the courses of study for which I am responsible. Of course, what that meant in practice is that the requirements of the Fellowship became subordinate to the needs of the program of study with which it was associated. Combined with a more than doubling of student numbers in the degree in 2009-2010, the extensive, whole-of-university curriculum reform project, and the collaborative nature of the work (involving all staff in my department), the timeline for the program extended and, as a result, opened the way for even more influence from the rapid changes to which I have just referred.

Furthermore, one of the early tasks I set myself – to use a series of workshops around Australia to gather the raw material from which I would then construct the particular activities to be trialled – turned out to change quite significantly the way in which I imagined the relationship between the Fellowship as conducted and the work as communicated to the higher education community in Australia and elsewhere. I was influenced by Ron Oliver's comment, at an early ALTC Fellows' forum, that we have too much 'supply' of exciting ideas about e-learning, and not perhaps enough demand: this insight gave me pause for thought in understanding what I'd learned at the workshops. The workshops revealed to me a clear demand I had not imagined when first formulating the program: a simple, practical exposition of what 'Web 2.0' could do and what tools or applications should be used to achieve innovative approaches to university learning. And, underlying this demand, was the need by academics, as expressed at the workshops, to reframe the debate away from 'going beyond' the learning management system via Web 2.0 (a common mistake, perhaps signaled by the obsession with versions). It became clear there was a need also for a way to assist academics to discover the way network technologies can enable learning innovation without first having to go through the LMS process, especially if those innovations are linked closely to on-campus learning.

I have had to change my original conception and adopt a more agile, distributed and fragmented approach to the work conducted and presented. In no small measure, this outcome is a consequence of the way the Internet works now: there is an insistent drive away from centralised, closely coordinated 'sites' and towards dispersed, circumstantial and temporary social media uses. It also reflects the ongoing challenges, in everyday teaching and learning, of working with IT infrastructures that are still coming to terms with the power which the Internet can provide to users for the production of knowledge, rather than just its consumption in pre-arranged formats. This coming to terms is, at the moment, influenced more by fear of consequences, than by embrace of opportunity. Yet, at the same time, this shift (which took me towards what could be achieved with tools at hand, rather than what could be built) not only made the Fellowship more sensible in the broader context of demand just outlined, but also in terms of the emerging theorisations of social media and the web that are at the heart of our curriculum.



I always intended the Fellowship to involve research, in two ways. First and with considerable recognition of the need to comply with the demanding regime within which academics work as researchers as well as educators, I sought a synergy between my ongoing research into the meaning, consequence and cultural impact of Web 2.0 and the more teaching-oriented work of this Fellowship. Second, recognising one of the common challenges of all teaching and learning projects, I sought to conduct a detailed research program into the consequences of the changes which I and colleagues were making to our teaching, as part of the program of work. In both cases the overriding research design was based in the tenets of grounded theory and action research. As a result the questions which I had first imagined for the Fellowship changed, to reflect the developing theoretical stance to the problems to be solved. At the same time, the need for longitudinal studies meant that more time was needed.

So, ultimately, the Fellowship has changed and certainly expanded in ways I had not foreseen. In line with the original aims, I have in large measure trialled several knowledge networking approaches within the units of study at Curtin in the BA (Internet Communications): I must thank my colleagues for their significant input and leading role in many cases. However, the focus of these trials has changed, to more insistently inquire into the effects of 'learning as part of knowledge networking' rather than presumptuously imagining that I am creating this effect through my endeavours. Similarly, while an original key concern was the assessment of participation in such circumstances, we have now become deeply involved in the promotion of authentic learning experiences in which the challenge is not to assess participation but, rather, to create assessment tasks which are both authentic and 'educational' at the same time.

What has changed is my determination to provide a much greater level of basic knowledge of the diversity of Web 2.0 tools which can be adapted for educational use, to develop a coherent conceptual framework to inform that adaptation, and to understand the relationship between practical action within this new paradigm - learning in networks of knowledge - and the necessary yet also disabling dominance of the large-scale learning management system approach to e-learning.

In the process, I think I have developed the first sketch of a new approach to e-learning that does not compete with established approaches but is complementary to them. What hopefully emerges from my work is that, while a complex learning management system is essential for any comprehensive online learning experience (such as the ones I run at Curtin), such systems are not essential to the rapid uptake of digital media woven through courses and units that are delivered on campus. Indeed, the LMS can impede effective developments of this kind by prioritising ways of working that have been designed, over many years, for fully online learning. Ultimately, my Fellowship demonstrates how a 'knowledge networking' approach provides numerous opportunities for agile, creative teaching that can, in the right hands, well suit the needs of students and their educators, in creative tension with the formalisms of either the classroom or the learning management system: LINK has helped me (and I trust others) to recognise therefore that our appreciation of and practices with technologies for learning must be thoroughly grounded in our understanding of the ongoing difference between learning and education, the informal and the formal. Working with students in the sometimes uncomfortably shared and collaborative endeavours of knowledge 'produsage' is what LINK is about: such work must complement the formal technologised interactions which depend on the distance between the teacher and student, a distance that technology can reinforce as well as overcome.





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