

Networked, Integrated, Augmented: towards a future when all learning is e-learning

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Introduction

This presentation is, in some senses, the culmination of the [Learning in Networks of Knowledge](#) (or LINK) project that I undertook in 2009-2010 as an ALTC Teaching fellow (see also <http://knowledgenetworklearning.net> for the applied tools and concepts explored during the fellowship). While a detailed analysis of the extensive data generated through this project is now underway, I will do today provide a preliminary attempt to think beyond the detail of that research and consider what it might tell me about the future directions of e-learning.¹

In that future the 'e' will become moot: all learning will be e-learning (even though, sometimes, it will still not directly involve the technologies of digital computer-mediated networks). However, the change will occur because the underpinning circumstances of study will be relentlessly *networked*; various technological mediations will be always *integral* to study; and realities will be routinely *augmented* by connected media. The traditional boundaries between e and not-e (boundaries that have productively aided e-learning development in the past) will disappear. The period of e-learning as distinctive and different will eventually come to an end. Fortunately, for those of us who research, lead and work in 'e-learning', this disappearance is some way into the future

Before turning to discuss the triptych of networked, integrated and augmented, I will briefly lay out an essential precondition on which my arguments for this kind of future are based. Then, once I have discussed the future of e-learning in the main part of my paper, I will then outline a few key implications for staff, students and universities as a whole. To conclude, I will provide a research agenda that places those implications – which are as yet

1 In simple terms, LINK is about developing, trialling and assessing 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 – what we might call (or used to call) the shift to Web 2.0. Critical to achieving this aim, was a focus on the way the Internet now hosts and sustains networks of knowledge, easily and with sophistication. *This* capability, I hypothesised, was the Internet's foundation for making learning more effective. To successfully exploit the Internet's capacity for enhanced student learning, the project focused on the pedagogic challenges of creating a student experience that is centred on knowledge production in a networked environment, emphasising creativity and cooperation.

only partially understood – at the centre of a program of investigation that will help ensure we successfully manage the transition education must make in its thinking *and* doing about learning and technology.

Knowledge networking:

the paradigmatic state of contemporary knowledge work in society

Knowledge work, being that form of human endeavour that creates and distributes, applies and amplifies knowledge, has been changed utterly by a series of technological advances over the past fifty years or more. The development since the Second World War of powerful digital computers, running increasingly sophisticated and effective code, and linked together through telecommunications infrastructure has, in the past decade, achieved a tipping point of change.² At that point, we have seen the decline and disappearance of previous conventions and expectations about how knowledge work is best performed and their replacement by new ways of working (an argument explored previously in [Allen and Long, 2009](#)). These technologies, born from the accumulating, advancing capability of humans to know their world and to use that knowledge to adapt it to various needs and desires, have two central features: digitisation of information rendering it capable of novel and highly efficient forms of creation and application; and networking of both humans and their computing devices producing new forms of collaboration and communication that distributes and circulates knowledge in new ways. These technological changes, while not determining the ways in which we know, or how we work with knowledge, nevertheless have influenced dramatically the social, economic and political organisation of knowledge work.

Knowledge work is, in contemporary society, now best thought of as knowledge *networking*, a state that has (as Castells has argued e.g. 2001) always been inherent within the social production of knowledge but which now has been realised through the technologies of communication and collaboration based on digital, processable information. Knowledge networking is “the emerging dominant paradigm for knowledge work in contemporary society.” As a result, knowledge work becomes:

fragmented, distributed and collaborative, involving considerable separation of its distinct components – inputs, processes, and outputs – which are then shared in time and space, between human and non-human actors, in ways that de-centre ‘knowledge’. In some sense, knowledge is no longer an object that is produced, circulated and received, and reinvented: it is instead a state of being, with which people are involved. One does not know, anymore: one is part of knowledge, experienced and enacted through networking (Allen and Long, 2009).

Learning is a special case in the general category of knowledge work. It is the activity where the rules and practices for effective knowledge work of all kinds are practiced and

² The importance of the Second World War, initiating a radical transformation in Western management, science and organisation cannot be underestimated: it is well established that the computer as a technology owes its specific and rapid development to the exigencies of war-fighting, for example. It should also be clear, as in the work of Bush, on the Memex, and Weiner, on cybernetics, that the war gave rise, within certain sections of Western elites, to the cultural conditions that demanded scientific advances in communication and information as solutions to moral and political problems.

developed so as to prepare learners for knowledge working. Educational institutions both enable such learning and, through certification of the outcomes of learning, play a vital social role in authorising graduates as having achieved appropriate standards in their ability to perform highly specialised forms of knowledge work. If knowledge work is changing in our society towards the paradigmatic form of knowledge networking, then so too must learning undergo change.

E-learning can be understood as the development of innovative, technologically enabled forms of education that exploit the advantages of digital, networked information and communication. At the same time, e-learning must also be understood by paying attention to the fact that digitisation and networking have already and will only continue to exert a more general change in the state of knowledge in our society. In other words, the pursuit of e-learning within institutions of education must both respond to broader changes while also finding the specific forms of digital networked activity that best suit the realities and needs of education. Therefore, while motivated by the fact knowledge work itself is changing (or indeed it could be argued has already changed), e-learning development and practice is never simply about 'solving' the questions of how to utilize online technologies for education but must continually to engage with these technologies as the interface between how the practices of knowledge occur, and how those practices can be learned and taught.

In other words, universities now have no choice – they must make all learning e-learning – but they still have significant agency in determining how that should occur. In doing so, universities have a critical mission to play in pioneering, through applied research and active development, the best ways in which to create learning approaches which prepare students best for the technologically mediated knowledge networks in which they will live their professional and personal lives in future.

A key challenge that universities face, after some 30 years of experimentation, wider adoption and now systematisation of e-learning within more traditional paradigms, is how to adjust their current conventional practices with e-learning to take account of these wider shifts. As I have argued elsewhere ([Allen, 2009](#); also Allen and Long, 2009), universities were quick to adopt the Internet as a way of extending access to learning to those unable to attend campus in person (whether for all or part of their studies). This quick adoption has meant that, to a considerable extent, universities thereby became wedded to approaches that reflect a time when the Internet was an optional extra – something attractive because it ameliorated other concerns or difficulties and not because it was the wellspring of a fundamental change in social organisation affecting everyone and everything. While many exceptions exist, generally speaking, e-learning is, at the moment, systematically about convenience or efficiency, accessibility or recruitment as much as about enhanced learning.

The future will be different and the most effective and successful universities will lead the change. In doing so universities shall need to exploit three interrelated possibilities for the uses of digital networked computer technology in the provision of high-quality education. These possibilities can be summed up as:

1. learning in knowledge networks in ways that expand well beyond simple online communications;
2. learning in which the technology enhancements we think of as 'e-learning' are integral to the study experience; and

3. learning which exploits the opportunities of augmented realities, creating technology-enabled layers of information input and cognitive engagement.

Three possibilities for the future of e-learning

At this stage, I am not analysing and arguing for each of the contentions I am about to make in detail. Also, I must simply state upfront (rather than argue) that, in each case, the technology itself does not create the beneficial outcomes for learning: rather, technology and pedagogy, influenced at all times by the socio-economic contexts which give rise to 'education' (and the specific form of 'higher education' with which I am concerned), are engaged in a dialogue or interaction through which potential advances in one area become actualised through the astute reorganisation or application of the other. Put simply: better learning does not occur because we have a new gadget, or clever code. However, technology is not merely the dependent partner. Indeed, in the current era, technology is increasingly the language *through which* educators articulate their knowledge about the processes and goals of teaching and learning. This interweaving of the language of technology and pedagogy remains implicit in what is to follow.

“Networked”

If nothing else, my discussion of the paradigmatic shifts in knowledge work should tell us that the likely state of learning in future will be networked, with the specific meaning that learning will occur *within* knowledge networks utilising knowledge networks in ways that expand well beyond simple online communications. To be clear, when learning is networked, I do not mean simply that something which happens in a specific place and time suddenly, in translated forms, becomes available via the networks elsewhere and when. Rather, networked learning involves a transformation of the way in which learning occurs by finding multiple ways in which cultural and cognitive connectivity can emerge *out of*, or as a consequence of, the increasingly ubiquitous technical architecture of the Internet and its widespread social adoption. Three examples should demonstrate the diversity and potential of this form of 'networking'.

First, it is now commonplace for students – even without prompting, though often less effectively because of a lack of direction – to utilise connectivity for much expanded informal learning encounters, outside of the formal interactions (typically classes, assignments, and set tasks) which are the substance of education. It is not that informal has suddenly become more important or more possible: as is commonly understood, the conversations between students in the coffee shop, the formation of 'study buddy' relations, and the like have always been critical to successful learning. However digital media connectivity effectively changes the binary distinction between the formal and the informal learning setting such that learning now occurs more properly on a continuum from mostly informal to mostly formal. Informal learning is more visible (think of the comments about academics and their courses on Facebook pages of students) and also more accessible for all students. Students, whether across a course or within an individual unit, can (and should) form multiply interacting socio-educational networks in which – with all respect to the quality of teachers and their curriculum – probably do as much for the effective achievement of learning as the formal interactions between teachers and students.

Second, when learning is networked, it can create connections between students (as individuals or their learning networks) and the existing knowledge networks which, more and more, form the basis for the practice of a particular discipline or profession. In the course for which I am responsible at Curtin, a task set for students was to ‘remediate’ scholarly work on new media and convergence within the forms and conventions of new media: one student took the work of Henry Jenkins (noted theorist of new media literacy at MIT – see <http://newmedialiteracies.org/>) and presented it within the forms of Twitter. The student was delighted to see that Jenkins himself commented on and retweeted the work, connecting this student to the legion of followers that Jenkins has.

Perhaps more significantly networked learning solves problems of time and space that have, until now, inhibited what are known to be effective learning practices in which students more closely approximate the behaviour of the professionals and scholars they are to become. We know that study is artificial, in many respects, because of the critical requirements of mass education. Massification, while productive and profitable, reduces the opportunities of what can be achieved at a particular time and place when all students gather. When networked, students and their learning is distributed. Thus, in another example from the Internet Communications course at Curtin, we are able to run an online scholarly conference at which students present and comment on papers – a simulacrum of a real form of knowledge work with which are all familiar – with more than 100 students each writing a 2000 word paper with each attracting as much attention as the next. Over three weeks, more than 2500 responses were received to these papers, some as extensive as the original paper itself. The simple logistics of time and place would prevent this event (which was roundly approved by 96% of participants) from occurring if it were *not* networked (see <http://www.netcrit.net/ideas/examples-of-authentic-learning-in-internet-communications-iii-net204/>).

“Integrated”

Another key direction in which we are or should be moving with e-learning is towards a state where technology enhancements for learning, whether in the classroom or not, are integral to the study experience: there will be no division between learning online and not online. There are three primary ways in which to establish this integration.

First, e-learning should be integral to the expectations and assumptions of students about what they will experience at university. Based on extensive experience, across a wide range of student cohorts, it appears to me that most students have traditional notions of the educational experience which they seek or feel compelled to have at university. These notions revolve around the primacy of the face-to-face encounter, in a classroom, even if supplemented by many other technology enabled activities. In future, students will need to come to higher education fully expecting that technology enabled learning will be part of their studies. Such learning must not be assumed by students to compensate for a deficit (for example, their inability to attend campus at certain times, or at all); nor must it be assumed by students that the university is using it to create efficiencies. Rather, e-learning will be integral to the positive expectations of what students will encounter.

Second, e-learning becomes integral when it is part and parcel of the everyday practices of university education, as students undertake their studies. Any individual unit of study will contain a range of activities and events, requirements and opportunities which –

depending on the purpose and best means of achieving it – will be more or less mediated by technology. There will be no distinction between ‘in class’ and ‘online’ except insofar as these forms of learning activity are fit for purpose. Crucially, units of study will require effective narratives and explanations for the mix of activities, taking seriously students’ desire to understand better how they are asked to study and not simply assuming they will participate in a variety of activities simply because they are told to. In this respect, assessment will be a key tool used by teachers to create integrity: as has been proven repeatedly, students astutely focus mainly on tasks and learning opportunities that are assessed. Thus, integration will occur by designing units in which the range of activities, whatever role digital networks play in them, make sense as a whole and whose value for learning is reflected in their place within the overall assessment structure.

Third, and perhaps most importantly, e-learning must be integrated in the sense that it looks beyond the university to the disciplines, professions and subjects which are being learned. Technological enhancements and innovations should draw as much on the field of practice for which graduates are being prepared, especially in professional and postgraduate education, so that the developing digital knowledge networking activities common in a particular discipline or profession should be central to, integrated with, its study.

“Augmented”

The final point I wish to make about the future of e-learning is that, more and more e-learning will involve technologies that augment the immediate reality of the learning encounter creating multiple layers of data, analysis and reflection at the same time. Augmented reality, as it is often termed, emerged as a key concept in the late 1990s (especially [Azuma](#), 1997; also [Azuma et al.](#), 2001) to describe what happens when there is a fusion between simulations and virtuality and the real, rather than (as had been common in the 1970s and 1980s) assuming that the virtual would somehow stand apart from the real. It’s most obvious expression in current life is the capacity of geo-location enabled smart phones to provide on their screens information about real-world objects and places simply by ‘viewing’ that object through the smart phone and seeing an overlay of data. However, augmentation should not be seen in narrow terms: at base, such augmentations occur whenever we combine mediated and unmediated interactions at the same time and place. There are three examples I would like to give, highlighting both the immediate opportunity for educators and some of the longer-term possibilities.

First, right now, learning events and interactions can be (and increasingly are) augmented when students can access multiple sources of information, and tools for creative cognitive work, at the same time. For example, while listening to a lecture, students can – via their connected computing devices – look up additional information either as explicitly prompted or simply on their own initiative. Rather than just receiving information students can also immediately process and work on that information, even in collaborative forms. Utilising a group mind-mapping utility (and several are freely available online, for use in a web browser), students can make something from each lecture, collectively, by sketching out the concepts and other information provided into a summary form: such activity augments what is traditionally occurring.

Increasingly, however, augmentation will enable everyday realities – outside of the artificiality of the learning environment – to *become* learning opportunities. Students, using various computing devices will be able to engage with the world at large and have, at the same time, an overlay of scholarly, study-oriented information. Imagine urban planning students conducting fieldwork within a city area: at locations, they observe the built environment and, through their devices, are able to see the questions and challenges posed by the lecturer specific to those locations which prompt them to learn, as well as observe.

Augmentation also enables us to exploit the particular power of computers (regardless of their networked status) as symbiotic aids to cognition. Computer code is particularly adept at taking one kind of data input and expressing it in novel and revealing ways, as can be found in text analysis programs, or virtual models of physical processes. Augmentation will involve learning where humans and machines work together to solve problems and present the results of that investigation. That such augmentation is also networked enables further dissemination, analysis and consideration as well.

The examples are, to some extent, obvious. More important is the underlying principle. Augmentation of this kind enriches any given moment of learning interaction making the time on task more valuable and productive. It takes the widespread phenomenon of multi-tasking – often assumed to be the bane of scholarly concentration by lecturers critical of their students’ tendency to attempt to engage with many things at once – and makes a virtue of it. A lecture can be both receptive *and* productive; a class discussion can be both collective *and* individual; the environment can be both real *and* a classroom; and the computer can be both a medium for expression and a partner in investigation.

Implications for universities

In all cases, the direction and motivation for these developments comes not from within universities: knowledge networking as a primary means for innovation and success, the deep integration of networked digital technologies within everyday life, and the emergence of augmented reality possibilities come from outside of education. Life itself is becoming networked, with such networks integral to our professional and personal existence, and producing augmentations of our senses and cognitive capacities. It is no longer possible to think of the technologies which underpin them as ‘educational’ except insofar as educational institutions adapt *to* these changes and thereby find the novel ways in which education can and must now proceed in the contemporary era. What then are the implications for universities of the directions I have outlined?

Students

I am going to start by briefly commenting on the implications for these directions for students. Ultimately, it *is* students that drive universities’ adaption to the networked digital world and their adoption of certain features from it to serve their educational goals. Students are key actors in the process – their expectations, assumptions, behaviours create the technologically mediated learning environment as much as university strategies and academic teachers’ innovations. I think we can identify two key implications for students as they come into a world of learning where technological mediation is ubiquitous.

First, students will increasingly *need* a degree of sophisticated cultural connectivity or, perhaps to say it better, a culture *of* connectivity. We can, soon enough or even now,

take for granted technical connectivity and, mostly, some level of skill in utilising that connection. What is needed for further advances, for really effective learning, is for students to have an affective affinity with the possibilities of digital networks for creativity and expression, embracing directions in the public production and circulation of knowledgeable content and doing so in a reflexive manner.

Second, and building on the theme of reflexivity, students will – already do – need to be capable of transferring skills from their everyday digital network / social media use to the learning environment; while it may be true that an increasing proportion of students are digitally savvy (though not in any empirically valid sense is this a digital generation), often they do not see the relevance of abilities they freely use in some online activities outside of study. Research from the United Kingdom (e.g. [Eynon](#), 2010) suggests that attempts to explore and exploit digital creativity at school tend to fail to produce the kind of astute creative networked students on which many visions for e-learning rely.

The engagement of students therefore cannot be left to chance, or some assumption that they are ‘already connected’. Nor can it be assumed they reject or don’t want online learning (when it is based on assumptions generated by the deficit model noted above). Ultimately, e-learning requires students to be active and effective adopters, not according to the assumptions they have but through knowing acceptance of the benefits and possibilities. And, as has been demonstrated already in many ways, students will fit university e-learning developments into their ways of living in a manner that might still subvert the expectations of the ‘proper’ student. In some ways the implication for students in e-learning development remains as it has always been: how to negotiate productively and effectively the changing nature of their power relations with the expert and the expert institution with whom they are studying.

Staff

Clearly, academic staff play a critical role in these developments too. They are, as they have been in so much of the development of a more consistent and attentive approach to good teaching and learning in universities in the past 30 years, the focal point. The first implication for staff (and by extension their recruitment, training and management) is that academics must become inherently capable of exploiting and utilising digital network technologies not as ‘educational technology’ but as extant components of their own scholarly knowledge networking. In doing so, we should remember that the value of a particular technological affordance which motivates its consistent, effective application is in the efficiency it brings: solving a problem not easily resolved, or bringing some new capability.

To avoid any temptation to over emphasise technologies, I also think the implication for staff is that they must actively focus on how their teaching works to promote learning, regardless of technologies. In fact, one benefit from realising a shift from e-learning to all learning is that we can re-emphasise that the value of any technology (and that includes classrooms, lectures and so on, as much as the latest iPhone app) is only in its capacity to creatively inspire and guide student learning. In circumstances of rapid change, such as we have, academics could do worse than to approach their teaching as research in action – not seeking to perfect each innovation ahead of time but to always work towards more knowledge, cognizant and valuing the necessary failures which innovation brings.

Ultimately, the implication for academics is that best practice in technologically mediated learning can only be achieved when they work between the legitimate broad-scale plans of their institutions, and the diffuse and often contradictory expectations of students, to bring into teaching authentic and personally satisfying uses of technologies which resonate with their core identity as researchers and scholars.

Institutions

The institutional implications are, then, an amalgamation of the broader concerns raised by a future in which all learning is e-learning and the specific implications for staff and students. Fundamentally, a university exists both as an environment for the productive interaction of its scholars and students, *and* as an entity in its own right, engaged with and existing because of the complex political economy of higher education. Leading universities must be at the forefront of creating new, systemic approaches to e-learning that take account of the diversity of changes and possibilities. A key implication in the vision I have outlined today is that institutions will only be successful if they embrace the participatory, innovative culture that has (and continues) to motivate the rise and rise of the content, code and conduct of the web. Such a culture is, I think, in harmony with the ideals of the university (and perhaps explains why in the 1990s some universities were so successful in creating the first versions of scholarly and educational software). It is, however, at odds with the formal requirements for system, structure and control which increasingly matter in higher education. In a networked, integrated, augmented future, however, the most successful institutions will be those that, in their creation and promotion of a particular student experience, their recruitment of staff, and their provision of spaces (both physical and virtual) for student-staff partnership can unleash the creativity of their scholarly community for innovation to achieve the future.

A Research Agenda

These implications are by no means clear, just as the specific steps to be taken and final destinations of the directions are still not known. Therefore, my comments as to implications also serve as the framework for a research agenda to support the next phase of e-learning development which is, finally, to remove the 'e'.

First, we need detailed research to establish, empirically and at a much higher level of detail, the state of 'connectivity' in Australia. By this I don't mean who has access, what the costs are, how many websites of what kind are visited – though this data itself is important. Rather, I mean research that discovers the degree to which we are or are not living 'connected' lives, with a strong emphasis on the degree to which connectivity enables life goals to be achieved and how that occurs. A subset of this research would inquire specifically into the relationship between studying and connectivity, focusing on the skills and knowledge applied to study using digital network technology and the interrelationship between networked living and networked learning. This research will go some way to address the growing realisation, as the National Broadband Network comes into being, that we simply do not know enough about the experience of connectivity to understand the lived realities of such technologies and are too wedded to traditional conceptualisations of access, the digital divide and so on.

Second, we need research that is of a much more applied variety, an overarching complement to the research in action which – perhaps idealistically – I hope academic teachers can employ routinely. Such research would focus on the small-scale, rapid repurposing of the incredible diversity of tools and applications already available for knowledge networking, drawing on notions of agile teaching (applying the term agile, as used in software development: see [Razmov and Anderson, 2006](#)). In particular this research should focus on collaborative cognitive engines in which the forms and requirements of the application (normally delivered via a web browser for free use) serve to create a distinctive transformational experience for students, as they work with computers (the computer as collaborator) in rethinking, exploring and creating new knowledge forms and representations. I believe a mainspring of this research is that these tools are not educational technologies: they are technologies that change knowledge work, social and cultural connectivity, and the production and circulation of information. Much of this work is already underway, as scholars and teachers report their experiences with such innovations (for one example, [Burden & Atkinson, 2008](#)): however it could usefully be extended by approaching these innovations and their analysis from the perspective of media, communications and Internet scholarship.

Conclusion

The future of e-learning does not depend very much on the organisations established in recent years, principally commercial companies marketing e-learning “solutions”. It probably does not depend very much on e-learning policies centrally mandated and promulgated by universities, despite the significant amount of work that is put into such policies. If anything, institutional stakes of the corporate world (in which universities are now clearly included), is to *retain* the ‘e’ in e-learning and make it something distinct, different and altogether divorced from the social changes which are seeing transformations in knowledge work, and the patterns, mores and capacities of individuals to acquire, produce and disseminate their ideas.

Of course universities will continue, and will profit from the quality of educational software which is available: my argument is not against such institutional investment per se, but against the presumption that innovation and future development can only come *from* and in the form of, such systemic and organised approaches. The future of e-learning lies where it did in the 1990s – in the hands of the academics innovators who are now able to access a vast array of tools and applications for distributed, collaborative knowledge work. It also lies with the students who, though they must never be assumed to be “digital natives” (see Jones et al. 2010), are central actors in bringing *in* to the university the presumptions and expectations of a world of everyday networked connectivity.

The future of e-learning, then, requires a similar path of development of the Internet itself, in which greater emphasis is placed on diversity, local autonomy to act and autonomous experimentation and rapid development. The real lesson of investigating Web 2.0 application for e-learning, as I have done for more than two years now, is that the participatory, ‘producerly’ *culture* of Web 2.0 is far more important as a guide to how all learning can become e-learning than any specific application.

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