Chapter 21
Managing the Challenges of Technology to Support Learning: Some Lessons from Experience

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Abstract In this paper I identify challenges I have faced as an academic leader working to improve and sustain quality learning and teaching in an information-rich environment. If the possibilities provided through ICT are overestimated in the short term and underestimated in the long term, then considerable expenditure may well be spent on resources that have surface appeal of being innovative but do not add much value to the quality of student learning.

Keywords Technology • Management • Organisational change • Learning

21.1 Introduction

At a Hong Kong press conference in the late 1980s, Alan Kay claimed that 'Technology is anything that wasn't around when you were born'. If we take this as our starting point, it becomes clear that there are generational differences in universities between academics and academics and academics and students. This becomes particularly clear when looking at the tools used to support teaching and student learning over the past 10–15 years. Oblinger and Oblinger (2005) maintain that different generations vary in their expectations of the teaching and learning environment held and this has particular implications learning. Late baby boomers, many who are still employed as academics, will have used blackboards and chalk, Xerox machines, overhead projectors, slides, film and video. The X and Y generation among us will have been introduced to ICTs through the use early versions of PowerPoint, Learning Management Systems (LMS) either self-developed or commercially produced tools such as Blackboard or WebCT, web-based lecture

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recordings and interactive whiteboards. The new generation of academics are on the cusp of generation Y being members of the NetGen or millennial, born after 1982. Their experience of technology will be fundamentally different from earlier users. For these digital natives, the use of wikis, blogs, vlogs, podcasting, virtual reality and gaming technologies are the tools they will use, and their students expect, to enhance teaching and learning. Most of our students who are recent school leavers have mobile phones, iPods, MP3 players and access to computers. They expect their learning experiences at university to reflect their technological experience, expertise and understanding (Gabriel, Campbell, Wiebe, MacDonald, & McAuley, 2012; Gosper, Malfroy, McKenzie, & Rankine, 2011).

And those from financially well-resourced schools will be disappointed at the lack of up-to-date resources in some institutions of higher education. Unfortunately, all too often there is a yawning gap between what we are able to offer our students and what they use outside of the classroom. It could be said that there are two distinct cultures: the high-tech culture outside of the university comprising many *millennium gen* students and the lower tech one on the inside of many academics and mature age students!

In response to the changing IT environment, many universities have invested considerable funds to create wireless spaces, both within and outside of classrooms. For many institutions it is a challenge to find resources just to catch up on deferred infrastructure let alone putting in place cutting edge technology.

Arthur C. Clarke made the astute observation: "When it comes to technology, most people over-estimate it in the short term and under-estimate it in the longer term". In this paper I question whether the possibilities provided through ICT as a tool to enhance student learning and the delivery of teaching are overestimated in the short term and underestimated in the long term. If this is the case, then considerable expenditure may well be spent on resources that have surface appeal of being innovative but do not add much value to a student's overall learning experience and learning outcomes. In trying to ascertain what is overestimated and underestimated, I attempt to take into account student, academic and institutional needs and aspirations.

I write this paper from the position of someone who has had management and leadership responsibility for eLearning, among other things, in two large Australian, comprehensive, research intensive universities. In 2005 while at the University of Sydney, I was concerned with the lack of progress regarding online learning at the University and commissioned a review of eLearning across the University. At the same time I established a cross-university governance committee, incorporating academic and infrastructure portfolios to oversee the development and implementation of an eLearning strategy across the University. I am now charged with a similar task at Macquarie University. In both of these instances, my dual challenges were which LMS was the most effective to deliver the university's aspirations regarding quality learning and teaching and what other investments needed to be made to improve pedagogy.

I am not a "techie" but I have had a long-standing interest in flexible learning and pedagogy and how ICT can be used to improve access to learning of various equity

groups. My paper is based on lessons learnt and insights gained in what should be seen as a significant period in two universities of organisational transformation, characterised by efforts to enhance student learning and improve the quality of teaching through the use of ICTs.

While labels like "eLearning", "mLearning" or blended learning come and go, the use of ICT in teaching and learning is here to stay. It is now the core business of higher education and needs continuing strategic management and investment (Goodyear, Reimann, & Mahony, 2006). Learning in the twenty-first century will be personalised and be inextricably linked to the use of technology. Web 2.0 will help facilitate this. Doug Brown, an English education consultant, argues that for greatest effectiveness and value add for students and institutions, "the technology should be transparent—and often is—to the learner; but we are not yet to the point where the use of technology is assumed by the teacher—and thus we still have not achieved the ability of our institutional learning to match the personalised learning that happens in the 'real' world" (Brown, 2006:6). But 6 years on from this observation, there are still issues for academics about the integration of technologies into their practice.

Hanson (2009) observes there is an inherent tension between the readiness of academics to take up the potential benefits of ICT to support student learning. For her it is academic identity that stands in the way. She argues:

> The concerns of these mainstream academics about e-learning arise from a strong desire to protect what has become established as a very powerful feature of their academic identity, their close and successful face-to-face relationship with students. (p. 11)

Zealots and politicians alike make claims about the efficiencies gained through technology, how access to education and training can be improved, how the quality of student learning is improved, how costs of education are reduced and how technology can improve the cost-effectiveness of education. And from where I sit that looks and sounds good. But … do we have the evidence to support such claims?

21.2 The Context of Higher Education for Today's Learners

At the level of policy and practice, the social, economic and political context of higher education plays a significant role in the provision of higher education. The Australian government like other western democracies acknowledges the importance and potential of higher education as an economic resource. Higher education is the third highest generator of income behind coal and tourism. In Australia alone $6 billion is generated through education. Two interrelated forces are at play here, that of globalisation and the lifelong learning requirements of professions for their members to be engaged in continuing education for accreditation and registration purposes. New technologies have contributed to what Cunningham, Tapsall, Ryan, Stedman, Bagdon and Flew (1998) call "borderless higher education". Borderlessness includes the removal of the impact of geographic borders as learners and knowledge

become mobile. It also refers to borders of time and space, as lifelong learners choose to experience their learning while still employed and therefore need access to information in more flexible modes (Bjarnason, 2006).

In lectures many of our students have their laptops, mobile phones or MP3 players operating in front of them—but what are they doing? Michael Bugeja reflected on the distractions in the wireless classroom. He observed students instant messaging friends, emailing fellow classmates, while others were on MySpace, Facebook or eBay or some other type of social networking tool (Chronicle of Higher Education January 26, 2007). What then does this mean for our own practices? Bugeja went on to indicate that some universities have developed policies to limit technology use in classrooms, where inappropriate use of technology would not be tolerated. So while wireless cannot be shut off, students can be required to comply with a code of practice regarding appropriate use of technology in classrooms.

The current situation brings a number of challenges for administrators. Among others these include:

- Acknowledging and utilising students' experience of technologies
- Providing virtual and physical infrastructure
- Meeting students' expectations about how, when and where they can access courses and resources
- Responding to high prestige international providers like MIT and Harvard, Coursera or the Khan Academy

Many students, especially the NetGen, come to university digitally literate in both computing and network technology, and with expectations that a university campus will be wired, subjects will be online and that resources will be immediately accessible and available. These students are always connected, they are able to multitask, expect immediate feedback, learn experientially and are very social—they like to interact, email or SMS messaging is their preferred form of communication (Berk, 2010; Oblinger & Oblinger, 2005). MP3 players, iPads and iPhones and other handheld devices are now part of a student's academic and social tool kit.

Interestingly, Morgan and Bullen (2011) in their research in a Canadian institution found that there were no meaningful differences between net generation or non-net generation students in terms of their use of technology or in their behavioural characteristics and learning preferences. Paradoxically recent research (Gosper et al., 2011; Jones, Blackey, Fitzgibbon, & Chew, 2010; Madge, Meek, Wellens, & Hooley, 2009) has indicated that while social networking technologies are popular for everyday use, students did not see these tools as particularly useful tools for learning.

Hilton (2006:60) observes that "Today's students want to be able to take content from other people. They want to mix it, in new creative ways—to produce it, publish it, and to distribute it". Quite some challenge for some academics socialised in pre-technological contexts. It is also a challenge to copyright IP and universities regarding plagiarism.

Table 21.1 The shift in learning afforded by technologies

There is a move from	To
Single user/interface/medium	Knowledge communities, connectivity and networking
Students as knowledge consumers	Knowledge producers
Dependent learners	Independent learners
Formal instruction	Informal learning
Accountability shift from lecturer	Student

The above Table 21.1 indicates at the most general level the shift in learning as afforded by ICTs. This is multifaceted and complex and more than a simplistic old versus new.

There is now increasing evidence about the learning styles and interests of these students. Oblinger and Oblinger (2005), for example, claim that research on these students indicates that they are consumers rather than producers of information, are over reliant on Google, they multitask, are apt to begin tasks randomly—perhaps in the middle, are graphics oriented, thrive on change and demand quick or immediate gratification. They have broad but shallow information literacy lacking an understanding of how to find, evaluate, use, and present that information. Consequently they need to be taught information literacy and strong critical thinking skills (Oblinger & Hawkins, 2006).

Goodyear et al. (2006:15) argue that strategies for eLearning—for the effective use of ICT in learning and teaching—need firm roots in the students' experience of the University. They suggest that we should be using ICT (a) to enhance students' participation in the intellectual and cultural life of the University and (b) to help ensure that the precious time they spend on campus is used to good effect. This can mean that a good use of ICT is to allow students to have first contact with new ideas away from campus—that time on campus is used primarily for those things that can only be done face-to-face or that require access to equipment and other resources unavailable elsewhere.

Ellis (2006) identifies four areas where eLearning meets the needs of students: (1) students expect eLearning as part of their tertiary education and they have already experienced the benefits of social and knowledge networks for their personal and educational lives, (2) students expect flexibility in their tertiary education to allow them to combine study with work and family commitments, (3) disciplinary bodies are increasingly providing eLearning resources (data bases, multimedia resources, e-texts) that offer activities difficult to replicate without ICTs, and (4) society has embraced information technology and communication technologies as a way of life and business and employers expect graduates to know how to exploit their affordances across a range of attributes (Business Council of Australia, 2011).

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Given how these students learn and their expectations what then should higher education institutions do to be receptive of their needs and skills? Reimann (2005) suggests the following: (1) maintain our core business of knowledge creation, human capital building and social capability building while developing relevance for this new generation, (2) align student's personal IT with that of the University (this will have significant implications in terms of infrastructure investment, especially bandwidth, security and intellectual property), and (3) provide multiple options and types of learning spaces—both formal and informal.

Having given some contextual information, I now return to Arthur C. Clark and elaborate what has been overestimated about technology in the short term and underestimated in the long term. I present what I believe are a common set of issues around technology.

21.3 What Is Overestimated in the Short Term?

21.3.1 Student Readiness and Access

There is the assumption that all our students are of the NetGen, however, in many universities, school leavers are a minority. Many students are postgraduate or retraining in another field. Organising programmes and modes of delivery to suit a diversity of student expectations, needs and abilities is important. Flexibility then is critical as is the recognition that there are differing levels of ICT literacy and capability.

Students' lives are complex, no longer are they just studying full time; for many of them they are having to balance outside employment (sometimes nearing 30 hours a week just to survive) with study, family commitments and at the same time have a social life (Anderson, 2006). They want to have access to libraries, learning commons, help desks, learning resources and terminals outside of usual office hours. There is certainly considerable pressure for university resources to be available 24/7. The provision of wide coverage wireless has significant resource implications. Like most universities, Macquarie has spent considerable resources improving the student experience of ICT, and with limited resources this has meant a redistribution of funds away from other areas. In response to student input, the University has improved wireless coverage and provided charging points for students to charge their computers.

While NetGen students may have a strong affinity with technology, as administrators we need to be careful about the assumptions we make in relation to their preference for online and face-to-face experiences. For NetGen students technology is a ubiquitous tool, however, they come to university to interact with academics and peers. Research by Kennedy, Judd, Churchward, Gray and Krause (2008) on a

cohort of 2,000 Australian university students showed that while many first year students are highly tech-savvy, the patterns of access and use of technologies beyond the entrenched technologies and tools (e.g. computers, mobile phones, email) show considerable variation. For educators and university administrators the challenge is how to cater for the broad range in students' levels of access and experience. More mature students are much more likely to be satisfied with fully web-based courses than are traditional-age students, because they are less interested in the social aspects of learning; convenience and flexibility are much more important (Oblinger & Oblinger, 2005).

Lesson: While recognising that it is unlikely that any ICT initiative will meet the expectations and requirements of all students, in planning and prioritising the allocation resources the rule of thumb should be to serve the interests of the majority of students.

21.3.2 Ability of Institutions to Cope with Cultural Change

ICTs by their very nature provoke change in organisations and individual's behaviour. Historically, universities have been characterised by silos of activity and influence; this has been seen in the divide between the academic and infrastructure side of the organisation. How many times have we seen decisions made about the use of ICTs without input from academic users? More often than not decisions about academic priorities and infrastructure development run parallel to each other.

Clearly both sides need to talk to each other, and opportunities for cross-functional teams to work together will help to bridge the infrastructure and academic divide. At the University of Sydney and now at Macquarie, solving the issue of governance, through the establishment of a high-level committee with senior representatives from the academic portfolio and infrastructure, helped significantly to improve communication and establish a shared vision. As a result, there were robust debates around priorities and resource allocation; the outcomes were improved and strategically aligned investment.

Cultural change also needs to occur at the faculty and departmental level. The implementation of new policies and practices require buy in at these levels to ensure organisational alignment with the institutional strategic goals and existing policies. Workload, reward practices, recruitment and so on are challenged by the implementation of ICTs in the workplace. Accordingly identifying and resolving the impact of these areas on productivity and academic engagement should be a priority.

While regulatory requirements of ICTs in the areas of IP and copyright have been addressed, other areas such as assessment, privacy, equity and access policy and practice cannot be neglected. In many cases the impact of ICTs on these practices is often left silent, and from the position of a senior administrator become an area of risk to the institution's reputation with respect to their policies and practices regarding equity and access.

Lesson: Universities are complex and diverse organisations, and sometimes a one-size-fits-all imperative for policies and procedures may need to be modified in order to meet the diversity of needs and expectations of various stakeholders.

21.3.3 Capacity of the Technologies Themselves

For many of us experience would have it that when it comes to technology, Murphy's law comes in to play—"if something is going to go wrong it will happen in my lecture"—the technology won't work, access to the web won't be available, wireless connections will suddenly dissipate and so on. We need to ask how flexible and robust is the hardware and software and, more importantly, how flexible is the pedagogy that supports learning.

I foreshadowed earlier some of the new technologies that are on the horizon. Technological forecasters (e.g. NMC Horizon Reports http://www.nmc.org/horizon-project/horizon-reports) are making claims about what is on the horizon. The use of simulations, virtual worlds and gaming technologies certainly do look exciting. However, these technologies have not been well tested in the academic context and will need to be adapted to ensure suitable use in classrooms. Their appropriateness and robustness is still untried. It could be said that "they are nearly there but not there yet". The use of blogs is a good example. These are good for logging a personal journey, developing social networking capabilities and so on, but there are some significant limitations if you try to use them for other learning activities. Issues of privacy and gaining permission for making these blogs public emerge when they become items for assessment.

Lesson: Not all technologies will meet the full expectations of users; they will promise a great deal but perhaps not deliver as hoped.

21.3.4 The Quality of Learning Resources and Activities

If improved learning outcomes are to be achieved, then it is imperative that students have access to high-quality learning materials. All too often the use of ICT in classrooms can be described as a technological book where print material has been transcribed into the LMS, or worse still students are lulled into a near catatonic state through presentations that can be described as "powerpointlessness". In such situations teaching itself becomes a performance piece, where students are entertained by being taken through a PowerPoint presentation with all of its bells and whistles (if the academic has those skills in the first place) or bored by simple duplication of PowerPoint into LMSs. Moreover, at its worst, the activities that students are asked to engage in are not challenging and do not extend the learning experiences nor the intellectual capacity of students. Teaching here is about transmission of information, not about developing skills of critical thinking or analysis.

Lesson: For ICTs to have the greatest benefit to the greatest number of students the quality of learning objects and materials in terms of content and purpose is of fundamental importance.

21.3.5 Academic Ability to Integrate Technology into Teaching

Academic capability is fundamental to ensure that the pedagogical possibilities and opportunities of ICT are achieved. At its most basic this requires that teachers resocialise themselves as learners and learn how best to use the technology and to engage in some critical reflection about what kind of content can best be delivered through technology, what value does the use of technology add to a learning experience and, finally, what the role of the lecture or tutorial in an information-rich environment is. The issue here is as Ellis and Goodyear (2010:104) claim is:

> When teachers do not focus on the development of student understanding and have poor conceptions of learning technologies, they tend to use e-learning as a way of delivering information bolting it on to course design in an unreflective way.
>
> Teachers, who focus on the development of student understanding and have richer conceptions of learning technologies, not only integrate e-learning into their approach to teaching, but also stress the importance of the integration of learning across physical and virtual spaces.

Most significantly it demands that teachers are able to be flexible in how they work and in their ability to change their practices and to fundamentally rethink how they design the content of the curriculum, how it is assessed and how it is evaluated. Put quite simply it requires that teachers make judgments based on their experience and expertise about how students learn and how technology can be used to facilitate that learning. And while this sounds "easy" getting some teachers to fundamentally rethink what and how they teach can be challenging. Importantly in terms of strategy, ICTs can be used to change institutional teaching cultures and the power relationships inherent in these cultures to the extent that the focus moves away from the teacher to a focus on learners and student engagement.

In practice it becomes evident when technology is used as a solution to the delivery of large first year classes by adopting flipped classroom strategies. For example, a lecturer records the lecture as a podcast which students listen to before the lecture time. Time is then freed up for face-to-face work with groups of students on areas of difficulty or interest (Prober, 2012).

Lesson: Ensure that there is alignment between the technology and the skills (both technical and pedagogical) staff have to use that technology.

21.4 What Is Underestimated in the Long Term?

Having indicated the areas where technology is overestimated in the short term, I now indicate several areas where it has been underestimated in the long term.

21.4.1 Workload

As ICT becomes ubiquitous in everyday life and academic life pressure is being felt by academics and students learning in an information-rich environment. For academics putting learning materials and activities online, promoting learning through electronic discussion groups or blogs creates expectations that academic will always be available, accessible and responsive to students at anytime. There is certainly a body of anecdotal evidence emerging of students becoming abusive when academics are not responding immediately to student questions or providing instant feedback to student work.

Lesson: The use of ICTs may not necessarily reduce the workload of teachers, and in many cases it intensifies it. Accordingly, workload policies and practices need to recognise the difference between face-to-face and online teaching.

21.4.2 Sustainability

Implementing change and new initiatives is relatively straight forward, sustaining them and keeping the momentum going is much more difficult. Sustaining the effort and interest of staff, when there are competing demands, especially in a research intensive environment effort needs to be considered at the individual and corporate level. Goodyear et al. (2006:16) capture the essence of the broader strategic challenge. It is worth quoting them in detail:

"To mainstream eLearning in the organisation, it must be profitable for the individual academic to engage in related activities. For this to happen, at least the following requirements need to be met:

- Clear workload policies in place, acknowledging the efforts invested for developing materials as well as running the single unit of study, stream of units of study or the course.
- Sufficient support. This comprises human resources (technical and instructional/web design support), a set of tools, and opportunities for training and knowledge exchange.
- Long-term perspective and strategic alignment with organisational objectives: technology and support must not disappear suddenly (or be perceived that it might), thus rendering previous investments meaningless. Staff will not invest effort into an area with uncertain institutional commitment.

In addition to these minimal requirements, we think that academics will be more motivated to "get their feet wet" and maintain a high level of effort when they see these additional benefits occurring:

- Teaching accomplished more efficiently; in particular, when time-consuming and repetitive activities such as receiving, marking and giving feedback on assignments can be performed with the use of ICT.

- Significant returns in personal productivity and in quality of the learning experience for upfront investment in ICT supported learning strategies that make use of the unique qualities of the medium.
- More flexible allocation of time for teaching; an academic's work is not the same each week; research requirements, conferences, presentations, visitors and administrative demands frequently punctuate the "regular" schedule. Being able to arrange time invested in teaching more flexibly is a strong incentive for busy academics.
- Synergies with research and technology transfer.
- Higher levels of competence developed in students, along with increased student satisfaction."

For Jenkins, Browne, Walker and Hewitt (2011) upgrading staff skills was the greatest challenge that the integration of ICTs into teachers' practice created, while staff development and supportive strategies were seen as the primary remedies. Importantly though, was the perception of "lack of time" was identified as the main barrier that needed to be surmounted by teachers for them to feel confident in their classroom practice.

Lesson: All too often when developing online solutions to improve teaching, there is an expectation that the move from conception to execution or implementation is linear and straightforward. Projects can be derailed if a transitional element in not included in the planning process to ensure that the expectations and needs of all stakeholders are met.

21.4.3 Leadership

At the corporate level "the introduction of ICT into the core activities of an enterprise involves disruption, a questioning of assumptions about existing and future ways of working and the creation of opportunities for synergy between what were previously seen as separate areas of activity. Effective use of ICT in academic work must involve strategic thinking and management at high levels" (Goodyear et al., 2006:26). This stewardship of an agenda that must integrate both academic and infrastructure pressures and priorities must come from a senior level if it is to have any effectiveness. As Goodyear et al. (2006:12) observe "the cost, if this does not happen will be further fragmentation of the academic role, an intensification of the competition between teaching and research, missed opportunities for strengthening research-led teaching and the development of parallel but disconnected infrastructures for research ICT and teaching/learning ICT".

Lesson: The development of an integrated learning strategy is required to ensure that there is no fragmentation between the academic and infrastructure portfolios. Furthermore, there needs to be a seamlessness between the physical and virtual learning environments to ensure both cost-effectiveness, strategic benefit and sustainability of interest, effort and resources.

21.4.4 Harmonisation of Technology and Cost

The need for *harmonisation of technology* is more often than not underestimated. It has often been the case that early adopters use a customised LMS or technology platform to meet their specific needs. It is not possible from a technical or financial perspective for a university to be able to support a multiplicity of platforms or technologies.

Many of us have been caught out in overspends and cost spirals despite our best efforts. Moreover, many of us have spent money on what we don't need. Rather than spend money on keeping up with a mythical student expectations, perhaps we first need to collect evidence about what students do expect. Kuh (2003), in his research on student engagement, cautions against universities making judgments about policies and practices in the absence of student engagement data or comparable sources of information. Also when developing business cases, we need to ask which technologies will deliver most to student learning and improved student expectations. We should not be seduced by the new technical flavour of the month. In making our decisions on where we distribute resources and how much we spend on them, we need to develop a strategy that is both rigorous and builds capacity in terms infrastructure efficiencies as well as academic quality. Thus, user research can provide the basis upon which to make decisions about what technology to invest in and where it is best used in a beginning point. Some universities, for example, may not have invested in lecture recording and podcasting technologies if they had foreseen the consequences of their use on lecture attendance and the campus experience. Information that students did not find that this enhanced or improved their learning or campus experience may have provided the basis for effective decision making.

Lesson: There will always be more requests for the IT spend than there are resources available in the budget.

21.4.5 The Complexity of Learning and the Crudeness of the Technologies

Learning in universities is a sophisticated and complex process that is influenced by philosophical and epistemological perspectives. For example, learning based on a critical theory paradigm is far different from one that is centred on a competency-based framework.

The technologies that have been available to us in the past (LMSs like WebCT and Blackboard) have largely been of the one-size-fits-all variety. When compared to the sophistication of the learning process, they fall short of being able to facilitate the cognitive processing underpinning learning in different contexts.

Gibbs and Gosper (2006:48) claim that a key enabling feature of these technologies is the tools they provide for developing, organising and managing access to online content, but this strength tends to promote narrow pedagogies—the delivery

of content-centric instruction via a transmission model of learning is a common practice. They do not readily allow for the creation of learning environments and sequences that provide opportunities for multi-user collaborative activities or the co-construction of knowledge—both representative of current learning theory.

Experienced and creative teachers can manipulate these technologies to suit the needs of their students and the discipline; however, for many, they are still a crude tool when compared with the spontaneity, interactivity and dynamism that can be created in the classroom.

The emergence of Web 2.0 technologies has added new dimensions to the potential of technologies to facilitate learning. Pre-Web 2.0 technologies were about content delivery, access and management of information, interaction with content and communication between participants. Web 2.0 technologies have given students a real voice and enabled their participation in the creation and dissemination of knowledge and information. This is a good start. More needs to be done to bring educators and software developers together in order to develop specialised tools for learning that go beyond the delivery of content and the provision of basic forms of communication. The conversation between educators and software developers has to begin in earnest.

Lesson: Educators need to clearly articulate the processes involved in teaching and learning in their own discipline; software developers need to capture these processes into the design of new and better technologies for learning.

21.5 Conclusion

This paper is being written at a time when a major shift in the delivery of online learning and teaching is taking place. Rather than student target groups being local or national the focus will now become global. The arrival on the education landscape of MOOCs through the collaboration between MIT and Harvard (Martin, 2012) to deliver EdX and Coursera with its 33 and growing participating universities offering online courses for anyone to take for free is a significant disruptive moment and will be a major game changer. Courses will be available online from these elite institutions. While students will not be awarded a Harvard or MIT qualification and gain the associated prestige these qualifications bring, the content of courses will be available. There are some commentators who are already suggesting that in the next few years, a limited number of institutions will be designing and delivering the content of courses and these will be franchised or outsourced. The role of on-campus learning, student support, student experience among others will need to be rethought. Whether or not this transpires the EdX innovation will at least provoke critical conversations within universities about the nature of learning in an information-rich society. From where I sit, I will be looking at which units could best be delivered online but with the necessary learning support. Some first year statistics or accounting courses could be the first units to be outsourced. This could well be a perfect scenario for Clarke's over- and underestimations of the

possibilities and challenges facing educators and administrators alike. But in this instance it challenges the fundamental assumptions about what to teach, when to teach, delivery modes and last but not least financial models for higher education.

In this paper I have reflected on the challenges facing me as an academic manager with responsibilities for delivering quality learning and teaching in an information-rich environment. On the basis of my experience, my position demands the strategic allocation of resources through investment in people, hardware and software. Bjarnason (2006:389) captures the major challenge for universities; he observes that "without adequate investment in helping academics to learn capability of technologies, and then investing further in creating the opportunity for them to experiment and begin to embed technologies in their day to day teaching—little will change in the short to medium term". Clearly the message here is if we invest in technology, we must also invest in supporting staff to ensure its optimal use.

Upon reflection, what then have I learnt during my time as an academic manager with responsibility for the delivery on ICT to support student learning. First and foremost, much of the activity I have been responsible for has been about managing change; this change is not only about implementation of technology but also how best to ensure the mediation of student needs with the capability of technology. Second, in order for change to be enacted with the least disruption and the greatest benefit, projects need champions at the highest level to ensure alignment between strategy and activity and priorities. If asymmetries emerge then the role of the champion as sponsor is to be persuasive and redirect activities back on track. Finally, change is about bringing people along, sharing the vision, understanding the issues and creating a common set of expectations about the outcomes.

Learning technologies hold great potential for student learning, both in terms of access and learning styles. It holds great opportunities to be innovative in terms of how information is presented to students. However, one must not overestimate what technology can do—it is essentially a tool to enhance student learning! We must not be held captive to the imaginings of what might be over the horizon and be tyrannised by what may often be seen as a magic bullet by academic managers like myself. In moving ahead and taking everyone with us, Seymour Papert's idea of "hard fun" seems like an appropriate analogy to describe the challenges ahead!

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