Incommensurate practices: Sociomaterial entanglements of learning technology implementation

John Hannon

Full reference:

Abstract

The framing of “implementation” of learning technologies in universities can have profound effects on approaches to teaching and learning that may be insufficiently acknowledged by practitioners. This paper investigates a case that demonstrated the formation of strong connections between technology and pedagogy, in which a learning content management system (LCMS) called for a series of accommodations between technology work and academic work. The site for this study was the meso-level: those practitioners working in-between academics and institutional learning technologies, and draws on the accounts of practice by learning technologists during this implementation. The discussion of practice that emerges from these accounts draws on sociomaterial perspectives (Fenwick, 2010) to draw attention to the contingencies of particular connections during the implementation process. This study does not assume that the work of implementation follows naturally from plans and intentions of human actors, rather, it investigates actual arrangements and the entangled practices that bring significant unintended consequences. The findings suggest the need to attend to the potential for conflicting practices when system technologies become a key component of e-learning, and I argue for implementation to be scoped early to encompass pedagogical goals, and for interventions by learning technologists and teaching academics over all the social, material and discursive factors that are critical to e-learning practice.

Keywords

e-learning, implementation, sociomaterial, academic development, learning technologists, content management systems

Introduction

The deployment of learning management technologies in the institutional strategies for e-learning is now pervasive in universities, yet it has not been clear that their use has been accompanied by much insight into their effectiveness. The concerns of early researchers about the trajectory of online education and its still unfinished shape (Cuban 2003; Romiszowski 2004; Hamilton & Feenberg 2005) continue to be
discussed in the literature on technological change in higher education: despite the widespread acceptance of the transformative effects of learning technologies in higher education, less seems to be understood in a consistent way about how they are taken up by their users and how they are integrated throughout institutions (Selwyn 2007; Oliver et al. 2007; Riley 2007; Goodyear & Ellis 2008; Marshall 2010).

The emergence of e-learning in universities have been accompanied by increasing economic pressures and significant investment in institutional managed learning systems (Conole & Oliver 2007; Gosper et al. 2010). Not surprisingly, this investment tends to be framed on a business model that entails orthodox, hierarchical and normative approaches to management and organisational change (Lewis et al. 2005; Schapper & Mayson 2005). This model is described as “the planning approach” by Alvesson and Sveningsson (2008), aimed at "accomplishing managerially planned organizational change programmes" (p. 19). Moreover, organisational and technological change projects are reported to have a failure rate up to 70% (p. 27). A similar low rate of success is reported in the implementation of institutional learning technologies in universities (Hedberg 2006; Price & Oliver 2007; Malikowski et al. 2007), with reports of “little evidence of significant impact on teaching practices” (Blin & Munro 2008, p. 475), and scepticism for top-down e-learning initiatives (Paulsen 2009).

Research into institutional learning technologies tends to reflect this top-down perspective as “impact” or “effects” studies (Conole, White & Oliver, 2007; Bethel & Bernard, 2010). An e-learning area such as distance learning research, for instance, is dominated by quantitative measures and experimental designs (Zawacki-Richter et al., 2009). Measures of impact, however, condense a series of determinants and consequences into one convenient notion that requires disambiguation and clarification (Price & Oliver 2007). Effects studies are described by Orlikowski & Scott (2008) as viewing technologies as independent, “discrete entities” (p. 439) that impact on an organisation. In separating out technologies, they risk masking the drivers and decisions that precede the technology, and distort the context of study by constructing a fiction of a (normative) entity being impacted upon by a technology. Goodyear & Ellis (2008) reviewed research into educational technology and cautioned against a reliance on evidence-based “simplistic comparisons” (p. 141) between technology use and educational practices, since reductive evaluations of impact oversimplify and overlook the interconnected relations and the effort required in the deployment of a technology. A factor contributing to the apparent lack of useful insights in e-learning research may be a lack of attention to what happens in practice, that is, what practitioners do, and how. As learning technologies are implemented and some form of e-learning is put into place, the practices that accompany them tend to “become invisible” (Price & Oliver 2007, p. 24).

In this paper, I investigate the less visible practices that occur between strategies for
e-learning and the resulting outcomes, but that nevertheless are significantly constitutive of e-learning. Taking a case study of learning technology implementation, my interest is on the material practices that proceed from the institutional plans and strategies that warrant a project, with a view to gaining insight into how an implementation may bring unintended outcomes. This study does not analyse the agents of implementation, whether technologies, people or change processes, as separate from and impacting on a state of affairs to which they are brought to bear. A more useful approach, I argue, is to attend to what Selwyn (2007) calls the “nontechnological issues” (p. 93) of information technologies, whether identified as social or organisational, and study implementation through its enactments in practices, in the sociomaterial arrangements of people, technologies and objects.

**Sociomaterial perspectives on learning technologies**

An interest in researching work and learning through “material practices” was noted by Fenwick (2010) and Orlikowski (2010), in which focus is brought to the materials associated with practice, including objects, technologies, activities, texts and discourses. Fenwick describes the sociomaterial as “among perspectives that seem to be part of this pervasive shift, the material world is treated as continuous with and in fact embedded in the immaterial and the human.” (p. 105).

Sociomateriality is one of a range of practice perspectives that offer alternatives to technologically-centred effects studies with which to address broad concerns with organisational processes and professional work. Practice perspectives, according to Schatzki (2001) tend to encompass sociality as organised and shared “arrays of human activity” (p. 11), and focus on flows of activities and interactions, an example of which is the notion of communities of practice, embodying mutual engagement and joint enterprise (Wenger 1998). Yet despite this focus on interaction, Orlikowski (2010) argues that such human-centred approaches to practice frame technology as an entity or process that is “grounded in specific historical and cultural contexts” (p. 131). They are, like effects studies, framed as distinct and separate, rather than integral, to the organisation.

The sociomaterial approach to practice rejects separations: it is not a human-centred view that privileges intentionality or culture, rather, practice is entangled in social and material activity and relations. Technologies are themselves enactments of practices, as Introna (2007) points out, “technology does not simply appear but is the outcome of a complex and socially situated development and design process” (p. 13). This focus on relationality challenges the assumption of ontological separation as being unable to adequately account for the pre-given and embedded materiality of work, learning and technology in organisations. The encounter between humans and technologies is viewed not as arising from separate realms, but as already co-constituted, reflecting relations of simultaneity and hybridity.
An enquiry into the technology-embedded practices of learning, therefore, can study practices through its activities and the connections between social and material entities, rather than on entities themselves, and in doing so, attempt to reveal significant aspects of e-learning that have been hitherto unexamined. One particular sociomaterial approach, actor network theory (Latour 1999), attempts to describe the effects of actions across networks of human and nonhumans. The metaphorical sense of the network here predates the onset of the digital, and for Latour, actions across networks mean “a series of transformations – translations” (1999, p. 15). To avoid the ambiguity of “network”, I will discuss conceptualisations of work, organisation and technology as “sociomaterial assemblages”, or arrangements of “equipment, techniques, applications, and people” (Orlikowski. 2010, p. 455). Learning technology systems offer a distinctive capacity to the organisation, they provide a nexus for the convergence of different components of the university, assembling institutional e-learning strategies, procedures, technologies, discourses, teaching staff and students. In particular, learning technologies bring practices from distinct domains of organisational work to the same space of activity.

Between the bottom-up and top-down of implementation

A paradox emerges from studies of learning technology implementation. On the one hand, there is the lack of evidence of transformation of student learning in institutional e-learning, in large part due to the persistence of traditional transmissive approaches encouraged by learning technology systems (Riley 2007; Blin & Munro 2008; Lane 2009). On the other hand, the huge investment by universities in learning technologies accompanied by organisational change has had a profound effect on practice by opening up learning to large student cohorts, enabling blended and distance education, on the control and design of curriculum, on the demand for professional and academic development, and on the way academic work is organised and conceptualised (Lewis et al. 2005; De Freitas & Oliver 2005; Price & Oliver 2007).

This incongruity emerges from the literature as an issue for institutional strategies, in particular the difficulty of integrating bottom-up innovations to strategic, top-down strategies for e-learning (De Freitas & Oliver 2005; Price & Oliver 2007; Russell 2009; Marshall 2010; Uys 2010). As a result, there are calls for more bottom-up institutional approaches to e-learning, in particular for staff development (Hannon 2008; Ooms et al. 2008; Tynan & Barnes 2010). However, a conception of e-learning as a bottom-up/top-down dichotomy risks overlooking a key domain of practice. Much of the work of implementation occurs in-between, at the meso-level, described in relation to e-learning by Jones et al. (2006) as: “a level that was intermediate between small scale, local interaction and large-scale policy and institutional processes” (p. 37)\(^1\). Yet despite the investment of resources, staff and system

\(^1\) This sense of the term meso-level distinguishes types of activity in an organisation: it is a means to analyse interactions within an institution rather than asserting structural divisions at
technologies into activities that occur at the meso-level, the focus of studies of organisational change with learning technologies has tended to be concerned with institutional strategies or with investigations of teaching staff and students. A review of 695 articles from 5 “prominent” journals on distance education by Zawacki-Richter et al. (2009) concluded that research at the meso level was “dreadfully neglected” (p. 44). The meso-level offers a key site for investigating the activity of technology embedded pedagogical practices.

The case study context: controversies of practice

In this study I aim to trace large effects in an institutional e-learning implementation to small actions and contingencies of practice. My focus is on work that occurs at the meso-level, through “minute sociomaterial connections” (Fenwick 2009, p. 1) that assemble a learning technology implementation. The methodology is case study analysis, attending to Stake’s (2008) criterion of relevance of a particular case and its “potential for learning” (p, 121).

The setting is a university’s pilot implementation of a learning content management system (LCMS). This project attempted to integrate existing institutional e-learning arrangements with a content repository, where content became identified and codified as “learning objects”. This instance of implementation was one of many ventures that arose in higher education during the early to late-2000s, in which universities investigated such systems for generating reusable learning objects through a process of “automated assembly” (Wiley 2011, p. 54), and was accompanied by debates concerning the efficacy of standardising learning content into modular objects for use in actual learning contexts. This issue was phrased by Wiley’s (2011, 2004) as the “reusability paradox”, which can be paraphrased as: a learning object is pedagogically effective in a meaningful context, however, learning objects are more reusable when modularised with minimal context. While these early efforts for content management have receded from the e-learning landscape (Hedberg 2006; Friesen 2009), the institutional push for strongly integrated managed learning technologies driven by corporate systems persists (Selwyn 2007), reproducing the potentially troublesome outcomes arising from the emphasis on top-down strategies for e-learning.

The case study draws on a broader research project across three Australian universities for a PhD thesis completed in 2010, in which 28 practitioners were interviewed about their e-learning practice, with situated observations and recordings. The participants comprised 17 teaching academics and 11 institutional insiders at the meso-level, consisting of academic managers and “learning technologists” (Conole, White, & Oliver 2007, p. 79). The whole corpus of data was analysed using a grounded theory approach (Strauss & Corbin, 1998) in which interview transcripts, associated objects and documents were organised through a method of systematic comparison into a set of categories representing emergent issues of concern for macro, meso and micro-levels.
practitioners, or “controversies”. Table 1 summarises the controversies that arose from practitioners’ accounts of their engagement with e-learning across the three universities.

**Table 1: Controversies of e-learning expressed by practitioners**

The controversies listed in Table 1 capture how practitioners accounted for their practice in their day to day work, as they negotiated competing demands and were faced with uncomfortable choices. The meso-level practitioners (learning technologists, academic managers), who are the focus of this case study, were not usually involved first-hand in teaching or with students, but encountered e-learning as they moved between two distinct organisational domains: (i) academic work settings that involved curriculum and teaching; and (ii) technology work that derived from implementation processes and information technology traditions. Each domain can be identified by a set of shared terms, expectations, and procedures, or, in sociomaterial terms, “material and discursive practices through which entities and their interactions are enacted into being” (Fenwick, 2010, p. 107). Learning technologists particularly exemplified this “in-between” locus: they were not necessarily tied to any one domain, but responded to a controversy by justifying or accounting for their actions, or describing mediations or work-arounds to reconcile technology and pedagogy (Hannon 2008).

**Controversies for learning technologists**

For this study, I have constructed a narrative of implementation from the accounts of selected institutional insiders at the meso-level engaged in the university’s LCMS pilot project, and selected three specific dilemmas raised by learning technologists. I sought to investigate the everyday work that becomes visible as controversies emerge in particular sociomaterial practices.

I have drawn interview accounts primarily from two learning technologists, with comparison with their peers from other contexts. In this instance, the learning technologists discussed the implementation of the LCMS with a unit of study from an eBusiness program. Dilemmas arose for each: for the project manager of the implementation, Tom, as he endeavoured to render curriculum into reusable learning content; and for Rachel, a multimedia developer in Tom’s team, as she implemented the new “workflow” process.

**Implementing learning objects**

Tom was a learning technologist and a team leader of the Learning and Teaching Services unit of the university. As project manager for the LCMS implementation, he offered a succinct goal for the project, which was to “have just one object but lots of references to that object, so that, like badge subjects, all use the same Powerpoint
presentation”, where “badge” subject referred to units of study that could be used across different programs, both local and internationally. He described the project rationale in terms of “reuse and shareability”, enhancing the use of the existing Blackboard learning management system (LMS):  

The potential is very high to share amongst colleagues. .. and the pilot will show how well [the LCMS] can demonstrate reuse and shareability. The current LMS is well entrenched, and content is unmanaged. Only individual authors know their content. With the embracing of online learning, the potential for online volume to escalate is huge. The purpose of the pilot is, in part, content management. Outcomes are version control, shareability, reusability. Some digital content is exported to provide an ROI [return on investment]. (Tom)

Tom described the “outcomes” of the LCMS that reflect the business goals of sharing and reuse of content. The LCMS produced new procedures and terminology for e-learning: content objects, metadata, version control, interoperability, workflow, and so on. One consequence was a discursive effect: existing content in the a unit of study was described as “unmanaged”, to become managed when modularised into content objects and connected to the LCMS. The transformative implications for e-learning and working with content were articulated by Tom:

Tom: [The LCMS] is about content. Its very controlling. With learning objects and managing content, the big push is to make things to certain standards so that it can be interoperable.

John: But what about context versus chunking?

Tom: To disaggregate and repurpose more chunks and assets is said to remove contexts. I am not in a position to debate it, I’m not married to either proposition, I am not an educationalist, but you need to embrace it. I consult them. [The LCMS] is the key thing, how it integrates with the LMS.

Discussing these new standards for content revealed tensions, one of which expressed Wiley’s paradox of the inverse relationship between contextual learning and reusability of learning objects. In disavowing the role of educator, Tom bracketed out the pedagogical issues that arose from the separation of content from context. As project manager, he was aware of the context-content paradox, he declared himself as “not in a position” to debate it.

In contrast, Robert, also a learning technologist team leader from another university in the study, emphasised his team’s role as proactive support to enable academics to become self-sufficient with technologies, but not to offer advice on pedagogy. However, he identified a crossover between areas:

There is a grey area that you cannot avoid ... you can’t avoid talking about pedagogy, or thinking about the appropriate pedagogy, and having that sort of discussion with the academic. (Robert)

---

2 The LMS is equivalent to a VLE, or virtual learning environment
In Tom’s instance, the LCMS presented him with a dilemma in his roles as learning technologist and project manager: how to reconcile competing technological and pedagogical goals when the new standards for learning content seemed to allow no grey area. In doing so, Tom aligned his roles with the practices inherent in the LCMS.

**Ordering content through metadata**

As the work of implementation progressed, a critical point in the process of establishing manageable content arose with the requirement for metadata. Tom discussed the ramifications of configuring this process:

Tom: A lot of work has happened with key stakeholders: us as implementers, with responsibility for identifying a metadata schema, building the metadata profile, publishing the metadata to the system.

John: What do you mean ‘publishing the metadata’?

Tom: Physical entry [of metadata].

The production of metadata, Tom explained, “aids discoverability”, and was the key means to producing shareable content. Entry of metadata, however, required effort.

Rachel, a member of Tom’s team, confirmed the utility of the LCMS from the results of testing, and the implications for changing work processes, “to put something up, there’s a lot of processes you have to go through, it’s simple to share an object across subjects, and functionality was good”. However, entering metadata for objects was onerous, requiring “a lot (of work) to write it in”.

The amount of work can be appreciated from a template for metadata entry. For each content object, there are entry fields: **Title, Language, Description, Keywords, Date Created, School, Discipline, Contributors, Rights, Audience, Subject code and Learning objective**. Other requirements are more technical: **Identifier, mime types, file size, IEEE equivalent, Description, Author, Type, Optional/Mandatory**.

Metadata entry was a critical contingency for the LCMS project, essential for content sharing and interoperability. In a follow-up communication one year post-interview, Tom described the university’s rejection of the LCMS for reasons of “learnability”: while the project was successful in terms of functionality when applied to the eBusiness units, the task of allocating and resourcing this new e-learning role encountered institutional obstacles, and an impasse ensued.

**Aligning practices**: A further instance of the mismatch of practices was described by Rachel, a member of Tom’s implementation team, and Barb, a learning technologist who worked with the Faculty academics. Rachel’s work on the LCMS included a sub-project called “workflow”, where version tracking was applied to content objects, in this instance, a unit learning guide in which more than one author was involved:
One person would write up the learning guide and the convenor would have to check it and see that it’s correct. And then sometimes more than one person works on that learning guide. That’s kind of the collaborative work that they wanted and you couldn’t really do that very well using the workflows [process in the LCMS]. (Rachel)

Version tracking involved “publishing” a version to the LCMS, after which an automated email would be sent to the document owner for approval. The dilemma for Rachel arose when the Faculty team wanted to continue this process collaboratively. The learning guide, “gets passed between different people. They want to have collaborative work as well during the workflow.” The extant practice of collaboration during the workflow process could not be met by the hierarchical standards of the LCMS. This controversy was also identified by Barb, a learning technologist colleague of Tom and Rachel that Faculty academics, who observed:

> Academic staff feel very stretched and need to develop their teaching techniques alongside these new technologies, so they do not feel ‘controlled’ by them, they need to be in control. (Barb)

The concern with “control” arose from the requirement of the LCMS to adopt new practices that may supplant prior ones. Rachel offered her multimedia developer perspective on the academic team’s rejection of the workflow she helped set up:

> The resolution was we’re not going to have a workflow … when its finished they go, send it, give it to the convenor, and the convenor checks it just normally without any technology at all. (Rachel)

The unit coordinator and teaching team refused to engage with the new sociomaterial arrangements prescribed by the workflow process. Instead the learning guide, no longer a content object, was managed through the traditional, collegial academic practice.

**Implementing the incommensurable**

In the accounts of practice in this study, the learning technologists related controversies in which they made “minute sociomaterial connections”, to use Fenwick’s (2009) phrase, that foregrounded mismatches between parts of the university, leading ultimately to the failure of the project. The everyday activity of implementation described by learning technologists enacted a broader controversy, that of negotiating competing technology/pedagogy demands (Table 1). These activities demonstrated the convergence of these domains of practice – from information technology and higher education pedagogy – that became entangled and at some point became incommensurable, that is, they had no common standards.

In the preceding section, dilemmas arose as new arrangements for practice were put
into place. These can be distinguished in two moments: the first is discursive, as new conceptions and standards for e-learning were established; the second procedural, as new connections for practice were made with existing arrangements.

1. Adopting new standards and conceptions of learning

Implementation brought a set of discursive practices that set new conceptions of institutional e-learning: The LCMS introduced new “outcomes”, including “version control, shareability, reusability”, and new standards for learning content to meet the requirements for interoperability, such as “discoverability” (Tom). These discourses were enacted in procedures and activities that established these outcomes: curriculum shifted to the new standard for learning content delineated by the terms “managed” and “unmanaged”. The unit learning guide (mentioned by Rachel) was one example of curriculum that was re-identified as a bounded learning object, tagged with metadata, and subject to new procedures for document approval and “publishing” of content outputs.

While the new standards for e-learning arose from the LCMS, they also drew on broader discursive practices from information technology that shifted the terminology of software functionality to learning contexts. Functional attributes such as reusability, workflow, interoperability, and learning objects circulate in a global network of IT industry standards and attendant practices, to be enacted in local instantiations. These entities are identified by Latour (1992) as “immutable mobiles”, entities that are mobile, yet remain in a constant shape as they bring powerful network effects. A new assemblage of discourses, technologies and practices was enacted alongside prior forms and procedures for teaching and learning, with traditional notions of curriculum and content that tend to be defined broadly and constructed around standards and goals that are oriented to program objectives and discipline contexts. Implementation translated curriculum into a content object, a form that could achieve the LCMS goal of interoperability. With two assemblages of e-learning practice in place, each with distinct goals, connections between them were established.

2. Making new connections to align practices

Implementation brought new sociomaterial relations to e-learning. As Tom and his team made connections between the curriculum and the LCMS technology, a different set of activities was now required by the Faculty team.

The activity of metadata entry materialised the new standards. However, this apparently administrative/technical process also embedded decisions about the dimensions and attributes of learning objects. The learning guide exemplified these new relations in a shift for the Faculty team to the unfamiliar domain of information technology processes. This was more than procedural, it shifted learning content from a participatory to a technological practice, and was marked by the anxiety expressed
in Barb’s comment (above) about academic autonomy and control, echoing Wiley’s warnings about loss of context and meaning with modularisation. The resulting impasse, in which the Faculty teaching team refused the workflow conditions of the LCMS, reflected the encounter between the practice domains of academic disciplines and technological standards, a clash identified by Lewis et al. (2005):

> Technological systems are not simply forced on organisations in a preordained, top-down fashion. Instead, this process is characterised by an ongoing struggle between various groups over the uses and meanings of technology, a struggle that is manifested most clearly in the university setting between forces of centralisation and standardisation, and disciplinary and departmental narratives of specificity and autonomy. (p. 69)

With the implementation, the new standards and activities were established concurrently with existing practices, with both sets of practices embedded in materials: the LCMS through metadata entry, version control and tracking; the collegial process through collaborative writing of a curriculum document. The upshot of this “struggle”, however, was incompatibility: only one set of materials and activities could be performed in an actual setting.

Implementation projects raise the question: what is the “learning” with which learning management systems, LCMS, and learning objects are concerned? Susan Leigh Star (1991) argued that standardisation processes, such as those which view learning as information, exclude practices that cannot be mapped to the new configuration, “annihilating our personal experience” (p. 48), such that social processes of learning are translated to operational processes. An institutional technology implementation is enacted through many material agents: people, technologies, curriculum, project briefs, policies, discourses. This is not a neutral process, but brings transformative effects that go beyond new activities, and can be characterised by Edwards’ (2003) remark concerning “new technologies and practices through which the conduct of conduct is fashioned and ordered” (p. 58). Nevertheless, Lewis et al., noted the co-existence of distinct organisational cultures in universities, and the resilience of collegial practices (p. 72). In this instance, the new standards did not prevail. Despite the day to day effort of implementation, the connections made between pedagogical practices and the functional practices of the new technology failed to reconcile competing goals and standards.

**Conclusion**

This case of a learning content management implementation exemplifies the controversies or disruptions that arise when centralised technologies are applied to teaching and learning, in which the much discussed gap between technology and pedagogy falls primarily to its meso-level practitioners – teaching academics, learning technologists, and academic developers – as they negotiate their practice with the ambiguous demands of technological change. The descriptions of technology work at
the institutional meso-level in this study confirm other discussions concerning implementation of systems for e-learning (Malikowski et al. 2007; Marshall 2010; Mott 2010; Tynan & Barnes 2010): e-learning implementation framed as a technology project risks achieving technical goals accompanied by social breakdowns or failure, and with minimal effect on teaching and learning practices.

The potential usefulness in this case study lies in the sociomaterial perspective that traces how specific contingencies of practice can contribute to larger unintended consequences. It points to the hidden effort of making minute connections in attempts to align technology and pedagogical practices, and in this case, the subsequent entanglements that led to an impasse or breakdown. This perspective rejects the separation that is commonplace in institutional approaches to technology implementation. It also invites meso-level practitioners and academics to challenge the discourses of technology systems transposed intact to learning contexts, to distinguish the resulting conflicting standards, and to enquire into the values of implementation: of system, of management, and of learning.

Selwyn (2007) remarked on the lack of connection, or “concern” of “managerial application of ICTs” (p. 88) for the quality of higher education. The lessons of top-down, technological change systems and their poor record point to a different scoping of implementation for e-learning: one that insists on foregrounding pedagogical goals, and that is open to opportunities arising from the sociality of the Internet. Emerging practices now encompass adoptions of Web 2.0 and learner-generated content that take e-learning in directions far removed from institutional learning technology implementations (McLoughlin & Lee, 2010). Learning technology systems are now such a mainstream presence in higher education that it is easy to overlook the terms of reference for their implementation. The pressures leading to implementation remain unchanged, perhaps intensified: with the potential for competing managerial and pedagogical goals played out through conflicting demands on practice.

References


Table 1: Controversies of e-learning expressed by practitioners

<table>
<thead>
<tr>
<th>Practitioners</th>
<th>Controversies - concerns about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching academics (17)</td>
<td>• pressure on teaching practices arising from mass learning environments</td>
</tr>
<tr>
<td></td>
<td>• conflicting forms of online interaction by students</td>
</tr>
<tr>
<td></td>
<td>• e-learning systems jeopardising academic autonomy and control over teaching and learning</td>
</tr>
<tr>
<td>Learning technologists (7)</td>
<td>• competing demands of technology systems and teaching and learning needs</td>
</tr>
<tr>
<td></td>
<td>• competing strategies for staff adoption of learning technologies (top-down and bottom-up)</td>
</tr>
<tr>
<td>Academic managers (4)</td>
<td>• balancing organisational change imperatives with teaching and learning needs</td>
</tr>
<tr>
<td></td>
<td>• mismatch between institutional policy and practices</td>
</tr>
</tbody>
</table>

Fig 1 A metadata template for the pilot learning content management system.