

The conceptualisation of e-learning: Lessons and implications

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Abstract

The implementation of e-learning within an institution of higher learning can be seen as a design problem. A first step in a design problem is the generation of an appropriate representation of the initial state. The nature of this representation has significant influence over the characteristics and suitability of any solution derived from it. This paper uses the work systems framework to present a shortened conceptualisation of this initial state. This conceptualisation reveals lessons and implications to improve future institutional approaches to e-learning.

Introduction

There is no question that institutions of higher education will make some use of e-learning¹. The questions about e-learning have become how, why and with what outcomes (Hitt & Hartman, 2002). There is evidence that existing answers are not particularly innovative, demonstrate limited quality, tend to limit future possibilities and have a high likelihood of failure (Alexander, 2001; Jones, 2000).

Implementing an e-learning approach is a design problem. Design is the core of all professional training (Simon, 1996). There is growing interest in design research in fields such as management (Boland, 2002), information systems (Hevner, March, Park & Ram, in press) and education (Collective, 2003). Design can be seen as a transformation from some known situation, deemed to be problematic by some interested parties, to a more desirable target state (Jarvinen, 2001).

The formulation of the initial state into an effective representation is crucial to finding an effective design solution (Weber, 2003). Representation has a profound impact on design work (Hevner *et al.*, 2004), particularly on the way in which tasks and problems are conceived (Boland, 2002). How an organisation conceptualises the e-learning problem will significantly influence how it answers the questions of how, why and with what outcomes.

The paper starts by offering an introduction to the work systems framework (Alter, 2002). This framework and the e-learning literature are used to develop a conceptualisation of the existing state facing institutions of higher education

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adopting e-learning. This conceptualisation is then used to identify lessons and implications that could be used to improve the design of e-learning.

The aim of this paper is not to generate the best and only conceptualisation of the initial e-learning state. Instead it seeks to demonstrate that existing conceptualisations of the e-learning problem are limited, that consequently so are many of the organisational approaches to e-learning and that the work system framework provides a useful approach to generating a deeper understanding.

The work system framework

A work system is a system, not necessarily computer-based, in which human participants perform business processes using information, technologies and other resources to produce products and services for customers (Alter, 2002). The work systems method includes both a static and dynamic view of the work system. This paper focuses on the static view of the e-learning work system.

The static view of a work system, the work system framework, identifies the basic elements for understanding and evaluating a work system and is useful in describing the system, describing possible changes, identifying problems and opportunities and tracing the likely impacts of changes to the system (Alter, 2002). Figure 1 provides a representation of the structure and components of the work system framework. Table 1 offers a brief description of the components.

Figure 1: The work system framework

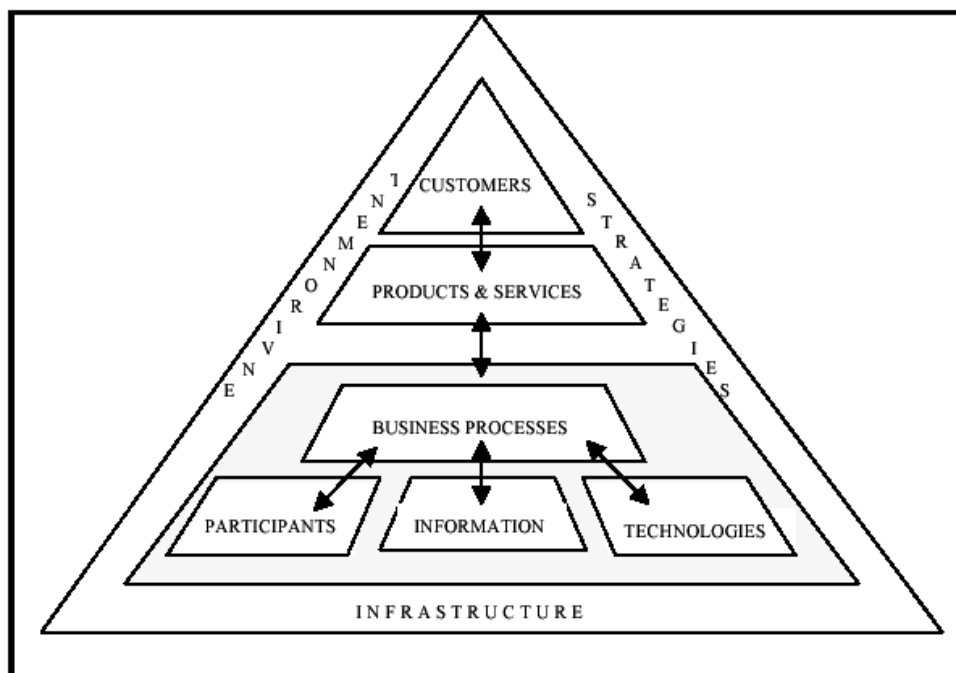


Table 1: Components of the work system framework

Component	Description
Participants	People who perform the work
Information	Created and used by the participants
Technologies	Tools and techniques
Business processes	Steps used to perform the work
Products and services	Physical objects, intangibles, and services produced
Customers	Those who receive direct benefit from the products
Environment	Organisational, cultural, competitive, technical and regulatory environment within which work takes place
Infrastructure	Resources relied upon but managed from outside the work system
Strategies	Plans used to achieve the goals

The e-learning work system

The aim here is not to generate the most complete conceptualisation of the initial e-learning state. The aim instead is to introduce the use of the work system framework and to demonstrate how this can help generate a more complex and suitable conceptualisation. It is hoped that future work might lead to the generation of a more complete conceptualisation in both general and institutionally specific forms.

Such conceptualisations, even if targeted at a specific institution, would need to draw upon multiple perspectives in order to approach completeness. Any description authored by an individual cannot hope to achieve completeness. However, in the generation of the following example conceptualisation, an attempt to include multiple perspectives has been made by drawing on a broad range of literature. While it is recognised that this is still somewhat limited, owing to its reliance on a single author and his knowledge of the literature, it is believed that this is sufficient to achieve the aims of this paper.

Participants

Teacher-centred, classroom education is the predominant form of learning within universities (Piccoli, Ahmad & Ives, 2000). Teachers' conceptions of learning are a major influence on the planning of courses and on the development of teaching strategies (Alexander, 2001). Technology serves whichever goals motivate the people guiding its design and use (Lian, 2000). Teacher customisation of an online course can be vital to self-esteem and commitment (Brown, 1999).

Teaching is increasingly a team-based activity, with great diversity in the backgrounds, perspectives and roles of the team members. Course development with teams can be difficult in cultures with a different emphasis on peer review or entrenched academic hierarchies (Calder, 2000). Team members often have limited understanding or appreciation of the fields represented by other members.

Information

Academics can spend upwards of 90% of their planning and development creating information (Oliver, 1999) as the primary focus of learning. Contemporary views

of teaching require information that is authentic, provides multiple perspectives and is not seen as the focus (Oliver, 1999).

Contemporary learning environments should integrate academic and administrative support services directly into the students' environment (Segrave & Holt, 2003). Information supporting these services is generated and consumed by people, from different fields, performing different roles and belonging to different parts of the organisation, and this information is stored in a variety of computer- and non-computer-based systems. This diversity leads to problems such as information ownership, version control, limited reuse and many others.

Technologies

The selection of a Course Management System (CMS), such as WebCT, is a common institutional response to e-learning. The primary use of CMSs tends to be as an administrative tool to facilitate classroom tasks and not as a tool anchored in pedagogy (Morgan, 2003). No CMS supports student critical thinking, generation of knowledge and collaborative teamwork (Bonk & Dennen, 1999). Most CMSs support more or less the same pedagogy (Robson, 1999). CMSs provide little support for usage monitoring and reporting at an institutional level across multiple courses (Morgan, 2003). CMSs alone may not be sufficiently conducive to supporting the design, development and operation required within contemporary learning environments (Segrave & Holt, 2003). CMSs are structured with little capability for customisation (Morgan, 2003).

CMSs are claimed to encapsulate a view of 'best practice', as defined by the vendor, that may not match an institution's interests. The dominance within Australia of a small number of CMSs raises concerns that these systems are becoming embedded in the operational culture of higher education institutions and that uncompetitive pricing structures could evolve (Paulsen, 2002).

A typical university makes use of a large number of software applications, partly because creating a single application to run a complete business is virtually impossible. There is a general lack of integration amongst these systems (Paulsen, 2002). It appears, however, that maximum benefit from e-business is obtained when it is integrated throughout applications within the organisation (Marshall & Gregor, 2002). It is hypothesised that institutions implementing integrated systems will improve their chances of becoming successful, large-scale e-learning providers (Paulsen, 2002).

E-learning technologies are undergoing a continual process of change, presenting an ongoing challenge to management (Huynh, Umesh & Valacich, 2003). Any frozen definition of 'best' technology is likely to be temporary (Haywood, 2002). Increasing consumer technological sophistication adds to demand for sustained technological and pedagogical innovations (Huynh *et al.*, 2003).

One view is that technology can help with automation and provide efficiency effects (Sproull & Kiesler, 1991) which may improve existing practices (Hannafin & Kim, 2003). Alternatively, technology is seen as a source of strategic advantage and as an enabler of previously impossible practices (Sproull & Kiesler, 1991) and of significant transformation (Hannafin & Kim, 2003). Managers tend to concentrate on the efficiency effects (Lacity & Hirschheim, 1993; Sproull & Kiesler, 1991).

It is most likely that technology will reinforce the old systems rather than the new paths (Lian, 2000). Educators are likely to use the technology to do things the way

they have always been done, but with new and more expensive equipment (Dutton & Loader, 2002). Universities have not, despite many obvious exceptions, employed technology to the same degree or effect as the business community (Piccoli *et al.*, 2000).

Business processes

Universities' teaching processes include content production, packaging content, credentialing programs, presentation to students, marketing, registration, payment, record keeping and assessment (Marshall & Gregor, 2002). Using e-learning to facilitate routine transactions and services can be critically important both to the efficiency of services and in shaping the choices of students (Dutton & Loader, 2002).

Teaching and learning are two of the most highly personalised processes (Morgan, 2003). Academics, as knowledge workers, have considerable autonomy about how they perform tasks (Jones, Gregor & Lynch, 2003), a fact that encourages diversity. Many universities seem reluctant to cease using learning processes that predate the information revolution by centuries (Piccoli *et al.*, 2000). Increasing commercialisation in higher education is leading to certain processes being enshrined in business contracts.

Products and services

The teaching products of a university include diverse products such as career counselling, athletic and social facilities, library services (Agre, 2000), credentialing, curriculum development, instructional delivery and student evaluation. Responsibility for these products is often distributed amongst the organisation without a single point of delivery and often with separate information technology (IT) systems.

Customers

Customers for the 'teaching products' of a university can be seen as including students, the general community, government, business and professional bodies. The following examines only students. The term 'customer' is used, as defined in Table 1, to mean someone who receives benefit from the product. Any deeper implications about what this term implies for the student–teacher relationship is not considered in this paper.

An essential component of facilitating learning is understanding learners, and particularly their learning styles, attitudes and approaches (Alexander, 2001; Oblinger, 2003). Students are no longer insulated from external pressures and they have to deal with real world concerns, including student loans, poor accommodation and part-time-working, yet many students still aspire to the assumed richness of campus-based education (Haywood, 2002). A large group of students, with significantly different characteristics, find asynchronous e-learning highly suited to their lifestyles and requirements (Hitt & Hartman, 2002). Variety means that there is no one student experience of e-learning (Alexander, 2001). How to deal with the variety of backgrounds and expectations of students is one of the greatest challenges facing higher education today (Oblinger, 2003).

Environment

There has been inadequate recognition of the inherent differences in organisational cultures, academic cultures, education and training philosophies, and teaching and learning values and traditions within different cultural groups (Calder, 2000). A

critical strategy for effective e-learning is to recognise the different cultures of learning among and within organizations (Lea, 2003). The many parties involved magnify traditional problems of politics, management expectations, hidden agendas, disruption to the balance of power, technical concerns and differences in cultural values (Gregor, Jones, Lynch & Plummer, 1999).

The higher education industry is subject to the same pressures as other industries, including market, technological and societal pressures (Marshall & Gregor, 2002). Ultimately, the enterprises that are able to adapt to changes in the environment, while keeping the costs under control, will be successful (Huynh *et al.*, 2003). Uncertainty about the future and other developments highlight the importance of building institutions that are responsive to change. Innovation within higher education is constrained by a lack of competition, habits, values and traditions, and institutional arrangements and policies such as incentive structures, copyright and intellectual property rights (Dutton & Loader, 2002).

Infrastructure

Existing technological infrastructure requires modification to fulfil the performance, scalability and availability requirements of e-learning (Hitt & Hartman, 2002). Institutions need to reorient their infrastructures from their existing state, designed to support departments, to a user-centric state (Moul, 2003). Information systems infrastructure that is flexible and adaptable can be a powerful enabler of innovation, but rigid, inflexible systems are serious obstacles to organisational effectiveness and success.

Senior management often perceive infrastructure and IT as costs to be minimised. Users see it as a service to be customised for their idiosyncratic requirements. IT organisations are caught in the middle, since best practices associated with reducing costs are in direct conflict with best practices necessary to maximise service levels (Jones, 2000).

Strategies

The adoption of e-learning requires a revisiting of existing strategies, especially those associated with program development and instructional technology (Hitt & Hartman, 2002). An organisational culture that provides appropriate rewards is a success factor when implementing change in teaching and learning (Collis, 1998). While 74.5% of campuses have IT development programs, and 66.6% have campus support centres, only 13.4% have a formal, institutional program to recognise and reward the use of IT as part of the formal faculty review process (Green, 1999). Too much of e-learning staff development focuses on the level of teachers' strategies – how to use a particular tool – rather than on their conceptions of learning (Alexander, 2001).

Transformational change through e-learning requires institutional leaders to articulate a clear, bold vision, demonstrate a broad understanding and acceptance of that view, apply the focused use of resources and encourage widespread collaboration throughout the institution (Hitt & Hartman, 2002). Top-down planning often falters at the operational level because implementation throws up a range of messy human factors that need to be addressed with the same resolution that fuelled the initial policy enthusiasm (Haywood, 2002).

Technology projects fail because the innovators underestimate the consequences of new technologies (Sproull & Kiesler, 1991) and fail to accommodate environmental and contextual factors affecting implementation. The realities and

subtleties of a comprehensive conception of a learning environment, which integrates virtual and physical and also academic and administrative, have eluded education policy-makers and designers (Segrave & Holt, 2003). Those who support a social shaping perspective of e-learning in universities emphasise that there are many paths that can be followed by the developers of e-learning (Dutton & Loader, 2002).

Alternate conceptualisations of the world raise doubts about whether it is possible to make sensible strategic and policy decisions in the traditional sense. This is particularly true when the world is seen as non-deterministic, evolutionary and highly complex – a world where the most desirable outcomes are unknown but there may be many possible acceptable outcomes, where change is characterised by both path dependence and unpredictability and where there are many diverse components, interaction and feedback among components, and multiple dimensions of each problem (Carlsson, 2002).

Lessons and implications

Great diversity and continual change are common characteristics across most of the nine components of the e-learning work system. As such, any response should be designed to cope with diversity and ongoing change. This has not always been the case. The most important policy objective is to remove obstacles to creativity and to foster entrepreneurship, rather than to take new initiatives: systematic planning should not replace the imaginative spark that creates innovation (Carlsson, 2002).

Diversity without integration creates problems. Integration across diverse systems, processes and organisational units is important in generating a customer-focused approach and an efficient operation. No one single system can integrate all requirements and existing attempts to do so sacrifice contextual capabilities that contribute to strategic advantage. An approach that enables diversity but achieves a customer-focused interface should provide greater strategic advantage.

The penalty for not catering for future change and diversity can be seen in the examples provided of how existing conceptions, infrastructure and organisational structures are limiting innovation, transformation and the adoption of new approaches. Some of this is due to simplistic top-down approaches that don't effectively harness bottom-up potential.

IT has been taken for granted or assumed to be unproblematic. This results in a narrow conceptualisation of what technology is, how it has effects and how and why it is implicated in social change (Orlikowski & Iacono, 2001). Such limited conceptualisations often view IT as fixed, neutral and independent of context. Alternatively, IT is one of a number of components of an emergent process of change where the outcomes are indeterminate because they are situationally and dynamically contingent (Markus & Robey, 1988). Ongoing change is not solely "technology led" or solely "organisational/agency driven", instead change arises from a complex interaction among technology, people and the organization (Marshall & Gregor, 2002).

Conclusion

This paper has generated a shortened representation of the initial state within universities wishing to adopt e-learning. Even this limited representation has helped identify a number of lessons and implications that could be used to improve

the future design of e-learning. A deeper, broader and more institutionally specific representation could enable even greater improvements.

Notes

- 1 'e-learning' is one of many terms currently used to describe the use of information technology to support teaching and learning. Rather than argue about the ambiguities and differences among the various terms, this paper will use 'e-learning'.

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