

The teleological reason why ICTs limit choice for university learners and learning



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The application of information and communication technologies (ICTs) to support and enhance learning and teaching (e-learning) provides the potential to significantly increase the flexibility and choice for university learners and learning. The evidence, however, seems to indicate that these advantages are not evident in the majority of e-learning practice. This paper argues that the teleological design process which underpins almost all e-learning within higher education significantly limits the flexibility and choice ICTs can provide. The contribution of this paper is to illustrate how organisational implementation of e-learning has become imprisoned by a dominant and unquestioned epistemological foundation that is limiting understanding. It seeks to improve the understanding that informs e-learning implementation, in order to increase the level of flexibility and choice provided by the institutional implementation of e-learning for learners and learning.

Keywords: e-learning, learning management system, teleological, ateleological

Introduction

It has been suggested that the application of information and communication technologies (ICTs) to support and enhance learning and teaching (e-learning) is a major force for change in higher education institutions, which will potentially have a profound effect on the structure of higher education (Green & Hayward, 1997). The ASCILITE 2007 call for papers suggests that "informed use of ICT by institutions and their teachers supports flexibility and choice in what is to be learned, how it is learned, when it is learned and how it will be assessed". There appears to be evidence in the literature, however, that the adoption of e-learning is limited in terms of level of adoption, diversity and the level of flexibility and choice it provides to the majority of students.

The almost universal approach to the adoption of e-learning at universities has been the implementation of Learning Management Systems (LMS) such as Blackboard, WebCT, Moodle or Sakai. If not already adopted, Salmon (2005) suggests that almost every university is planning to make use of an LMS. Indeed, the speed with which the LMS strategy has spread through universities is surprising (West, Waddoups, & Graham, 2006). Particularly more surprising is the almost universal adoption within the Australian higher education sector of just two commercial LMSs, which are now owned by the same company. Interestingly this sector has traditionally aimed for diversity and innovation (Coates, James, & Baldwin, 2005). Conversely, the mindset in recent times has focused on the adoption of the one-size-fits-all LMS (Feldstein, 2006).

While the majority of perceived drivers are arguably contestable, the need for an LMS remains entrenched in the university sector (Wise & Quealy, 2006). It is important to note, however, that even with the universal implementation of the LMSs, the level of adoption of those systems within many institutions has been limited. Vodanovich and Piotrowski (2005) for example report that of the 74% of faculty surveyed as being positive to use the Internet for education, 70% viewed it as effective but only 47% actually used it for education. Other best practice implementations, recommended by LMS vendors, report no more than 55% staff adoption rates (Sausner, 2005). Most universities are struggling to engage a significant percentage of students and staff in e-learning (Salmon, 2005). Drawing from the experience of Central Queensland University (CQU), only 56.7% of courses offered during the second half of 2006 had course websites (Gonch, 2007), even after almost six years of adopting centralised learning management systems. The limitations inherent in standardised products like the LMS (Black et al, 2007), coupled with the less than encouraging views amongst the academic community about the value of e-learning, explain some of the impediments to widespread institutional adoption. As Allen and Seaman (2005) suggest, only a small minority of academic leaders agree that their faculty accept the value and legitimacy of online education.

The growth of e-learning has evidently been incremental but it has not fundamentally challenged the face-to-face classroom (OECD, 2005, p. 68). Amongst those who have made use of LMS, most have adopted an approach where existing pedagogy is retained and simply transferred to the new medium, the LMS (Salmon, 2005). Evidence suggests that universities are primarily using the LMS for administrative purposes with only a limited impact on pedagogy (OECD, 2005). Most notably, a range of research has found that these systems are used predominantly to transmit course documents to students (Dutton, Cheong, & Park, 2004; Malikowski, Thompson, & Theis, 2006; Morgan, 2003). Data at CQU support these findings, i.e. in the second half of 2006 courses with course websites contained, on average, 23.7 course documents, with a maximum of 165 (Gonch, 2007). Benson and Palaskas (2006) report a similar observation, stating that the majority of usage for LMS involves fairly unsophisticated application of the available tools. Such practices serve to validate other commentators' view that to date the outcomes for the adoption of LMSs and e-learning have not quite measured up to the hype (Reeves, Herrington & Oliver, 2004; Twigg, 2001; Zemsky & Massey, 2005 cited in Wise & Quely, 2006).

Cradler (2003), however, points out that whether or not e-learning is an effective intervention and resource depends on how it is used and the context in which it was used. This paper argues that many of the limitations of university e-learning implementations are due to the adoption of a design process for the institutional implementation of e-learning that is arguably unsuitable for the context of higher education and especially for the implementation of e-learning. By understanding the characteristics and implications of this dominant design process, this paper seeks to generate insight which can help improve the use of e-learning and increase the level of flexibility and choice available to university learners and learning.

The paper starts with a characterisation of the dominant design process (i.e. teleological design) universities commonly use to implement e-learning. This is done by briefly describing the nine attributes of a teleological design process developed by Introna (1996). The paper then offers brief descriptions and examples of how each of these nine attributes of teleological design work restricts and limits flexibility and choice in e-learning. The paper draws on the authors' experiences and observations within a single organisation, though it is believed that these experiences will resonate with others, to illustrate some of the limitations of teleological design and their subsequent ramifications. It concludes with some discussion of the implications and suggestions for future work.

Teleological design

Many, if not most, universities follow, or at least profess to follow, a purpose driven approach to setting strategic directions (McConachie, Danaher, Luck, & Jones, 2005). Purpose driven organisational change is concerned with setting and achieving goals or objectives. In such a teleological process or organisation, the essence of success is in the setting and achievement of goals (Introna, 1996). Strategic goals, operational plans, working parties, benchmarking and quality assurance are all common examples of concepts and processes from a teleological design perspective.

In attempting to identify the shortcomings of the teleological approach to design and suggest an alternative, Introna (1996) identifies nine attributes of a design process. These attributes are summarised in Table 1. In order to provide a more concrete example of these attributes Table 1 also draws on the herding cats metaphor which is often used to characterise change management processes in universities (cf. Butler, 1997; Hort, 1997) and also used as the basis for a popular EDS commercial (<http://www.youtube.com/watch?v=Pk7yqITMvp8>).

How teleological design limits flexibility and choice

The underlying premise of this paper is that a teleological design process is inappropriate for the problem of encouraging widespread, flexible and diverse adoption of e-learning amongst academic staff within a university. This mismatch directly limits the flexibility and choice that e-learning can provide university learners and learning. In the following sections the nine attributes of a teleological design process described in Table 1 is examined in more detail. A brief description of the attribute is given and an example from a single institution is used to demonstrate how this attribute can limit flexibility and choice. While it may be argued that this approach may simply demonstrate the mistakes made at an individual institution, the literature suggests similar challenges at other institutions (e.g. see Seimens, 2006).

Table 1: Design attributes of teleological design

Attributes	Teleological	Herding Cats
Ultimate purpose	The identified goal or purpose	Getting the cats to town
Intermediate goals	Efficiency and effectiveness	Minimise cost and maximise condition of cats when they arrive
Design focus	Achieving the end result	How to get the cats to town
Designers	Explicit designer	Cat herders and support crew
Design scope	Individuals concentrate on their part of the problem	Various types of cat herders focus on different aspects of the task
Design process	Problem solving	At each step of the way need to reduce distance to goal, solve any problem to achieve that goal
Design problems	Complexity and conflict	The cats probably don't want to go to town. This creates conflict between herders and cats.
Management	Centralised	There will be a hierarchy amongst cat herders, with one in charge. The cats don't have a say.
Control	Master plan	The chief cat herder will have a plan on how to get to town.

Ultimate purpose

Teleological design is based on the idea of modernism where human rationality and methods of inquiry can achieve their ultimate purpose of discovering and identifying universal truths (Baskerville, Travis, & Truex, 1992). The very definition of a teleological design process is to set and achieve objectives, to be purpose driven (Introna, 1996). When an institution engages in selecting an LMS, the purpose is typically set by a small group, usually organisational leaders, who draw on expert knowledge to perform a diagnosis of the current situation in order to identify some ideal future state and how to get there. Such approaches often involve formal working parties, identification of user types, the development of evaluation rubrics and other rational tools and devices.

This purpose driven approach can only work if the system's behaviour is stable and predictable (Introna, 1996). If the context of the problem to be solved is neither stable nor predictable, then the most appropriate purpose will likely change along with changes in the context. Universities, however, are currently in an environment of intense change (McNaught 2003). The accelerating tempo of digital technology poses great challenges to institutions including disruptions to conventional planning processes (Duderstadt, Atkins et al. 2002). Higher education's characteristic continuing change, combined with diverse nature of its students and the range of courses offered compound the complexity inherent in higher education (Jones & O'Shea 2004).

The teleological approach to the analysis and selection of a solution to e-learning is a representation of the dominant, traditional approach to information systems development (ISD). Such an approach relies on a long period of stable information systems maintenance to recoup the costs of the upfront analysis, design and implementation phases (Truex, Baskerville, & Klein, 1999). This approach to ISD leads to stable systems drag, a situation where the information system actually inhibits the organisation's ability to adapt (Truex et al., 1999). Drawing once again from the experience at CQU, in the mid-1990s CQU had significant organisational structures, processes, expertise and infrastructure set up to support print-based distance education. All of this created inertia which slowed down CQU's capabilities to adapt to e-learning. A similar inertia can be observed with the widespread adoption of learning management systems slowing down likely adoption of Web 2.0, Personal Learning Environments (PLEs) and other technologies.

Intermediate goals

Once the ultimate purpose is chosen the intermediate goal of a teleological design process is to achieve that purpose with efficiency and effectiveness. By definition, any activity or idea that does not move the organisation closer to achieving its stated purpose is seen as inefficient. The best return on investment on a learning management system comes when the cost is diluted to favourable levels when nearly all courses and students are served by it (Warger, 2003). The importance of achieving the stated purpose becomes

enshrined with institutional policies and practice which constrain practice within accepted bounds. Individual educators embracing more innovative uses of e-learning faced constraints put in place through institutional structures, policies as well as copyright and intellectual property rights (Dutton & Loader, 2002).

For example, with the 2001 implementation of Peoplesoft at CQU, the task of generating a list of all students in a course became a 20 minute, 26 step process requiring the use of three different applications on a computer running a specific version of Windows located on the CQU network. A significantly simpler web-based alternative was developed and made available to staff, and was widely adopted. Since this system was not implemented as part of Peoplesoft, neither was it developed by the organisational unit responsible for Peoplesoft, it was seen as inefficient, i.e. duplicating functionality (Jones, Behrens, Jamieson, & Tansley, 2004).

The resulting restrictions on experimentation, or activities which are not directly seen to achieve the stated purpose in an efficient manner, limits the capability of the system to learn, to expand its scope of actions (Introna, 1996). The focus on efficiency leads to systems that users perceive to be not sufficiently dynamic and often completely inappropriate for their needs.

Design focus

The focus of teleological design becomes how to achieve the stated ends, how to reduce the distance between the current state and the stated purpose. Such a system can fall into an on-going process of "problem solving" and does not engage in systemic thinking and reflection (Introna, 1996). Pondering whether or not the continual march towards the stated end continues to be sensible is considered to be inefficient and not contributing to the stated end.

Some examples of this limitation from current institutional e-learning practice associated with LMSs include:

- *Job positions and required skills*
Position descriptions are often written and people selected based on their experience with the specific LMS employed at the institution. It is argued that while the value of skills with the existing system is important, the knowledge is confined to a specific system and can limit considerations of other approaches, which may be more coherent and practical.
- *Focus on workarounds to problems*
The version of Blackboard (6.3) used at CQU has a grade book which performs poorly for large classes. After much problem solving, the identified solution is to develop workarounds. In this case, splitting students into smaller, artificial groups to work within the limitations of the software. This workaround is deemed acceptable even though it creates additional workload for academic staff. The question of whether or not an alternative grade book is possible cannot even be considered or is simply rejected.
- *Influencing long-term strategy*
In 2002, for various reasons, it was decided that WebCT was no longer a viable solution for e-learning at CQU (Danaher, Luck, & McConachie, 2005; Sturges & Nouwens, 2004). The name given to the working group set up to decide on the future direction of CQU was the "Learning Management Systems Working Party". The idea that e-learning equals learning management system had become unquestioned at some levels within the organisation. Within these levels of the organisation there was extremely limited awareness or recognition that there were alternative approaches.

These assumptions are intrinsically teleological, subscribing to the belief that there is a truly right way to do things or achieve goals and thus the focus is on discovering that right way and converge to it (Introna, 1996). Such thinking limits flexibility and choice

Design scope

Large-scale teleological design, such as the evaluation, selection and implementation of a learning management system within a university, is an incredibly complex process. The traditional solution to this complexity is logical decomposition, i.e. the recursive reduction of the large and complex problem into smaller and more manageable problems that can be solved separately. Logical decomposition artificially separates groups of workers into formally segmented elements of a linear and rationalist process (Jones, Luck, McConachie, & Danaher, 2005). Such decomposition is problematic because the division, and subsequent isolation, of the resulting organisational components do not reflect the rich interdependencies

of organisational reality (Truex, Baskerville, & Travis, 2000). This decomposition contributes to the tendency of a teleological design process to lose sight of the whole as each decomposed entity focuses on its much smaller design scope.

For example, in late 2006 a faculty (one entity) at CQU decided to award a collection of supplementary exams, to be sat at a much later date, and that the Blackboard sites for effected courses should be retained until after that date to assist students' preparations for the exams. When students began to study for the supplementary exam reports trickled in about students having problems accessing the course sites. The Blackboard user support team (another entity) could see no reason within Blackboard why the students could not access the courses. The Blackboard technical support team (another entity) initially could not identify the problem. Indeed, a significant proportion of the students sitting supplementary exams could successfully login. Eventually it was identified that the problem being experienced by about 40 students was because student administration (another entity) had made a decision, many years ago, that once a student is no longer enrolled in courses, even if they have an outstanding supplementary exam, those students become "inactive". This changes an entry in the student enrolments database which in turn changes the CQU student authentication and authorisation system which they must use to access Blackboard courses.

The division of the entities and the resulting emphasis on their part of the puzzle makes communication difficult contributing to the organisation losing sight of the whole. Increasing use of enterprise technologies is creating highly interdependent relationships between organisational entities and, consequently, the traditional stove-piped organisational structures are inadequate to manage the information-based institution (Hawkins, 2006). The vertical structures created by logical decomposition prevent broader conversations which are important for the quality of a university and its learning. This is particularly true if one subscribes to Laurillard's (2002) view that the definition of a university is the quality of its academic conversations and not the technologies that service them.

Design process

The design process adopted during teleological design is that of problem solving, i.e. the removal of problems to ensure the organisation is moving closer to the stated ultimate purpose. The traditional problem solving process separates the analysis of needs from the actual act of intervention. It assumes that the designers can fully analyse the situation, determine appropriate goals and then manipulate the system to achieve those goals. It places emphasis on rationality, linearity and clarity of purpose.

However, information systems development (and other interventions in human organisations) are not rational, purposive or goal-driven processes, they are instead subject to human whims, talents and the personal goals of those involved (Truex et al., 2000). Technology is not, of itself, liberating or empowering but serves the goals of those who guide its design and use (Lian, 2000). The tools themselves are never value-neutral but are replete with values and potentialities which may cause unexpected responses (Westera, 2004). Learning management systems can potentially affect teaching and learning in unanticipated ways (Coates et al., 2005). Social systems cannot be "designed" in the same way as technical systems, at best they can be indirectly influenced (Introna, 1996). The emphasis on rationality, linearity and clarity of purpose embodied within planned change models means that they are unlikely to be successful within higher education (Kezar, 2001).

Decision making about the implementation of information systems is not a techno-rational process with many decision makers relying on intuitions or instincts and simple heuristics to simplify decision making (Jamieson & Hyland, 2006). People are not rational in that their decision-making is influenced by a range of cognitive and other biases. For example, the sub-group of CQU's LMS Working Party which was responsible for performing the technical evaluation of potential learning management systems recommended Blackboard, and came to the following conclusion:

...[The Working Party] strongly feels that the Blackboard product has the best overall technical fit and provides the best opportunity available to meet our tactical needs while minimising support problems and costs (Central Queensland University, 2003).

This was in spite of the observation that a locally grown "system" had been working on existing CQU technical infrastructure for at least six years with significant success (Danaher et al., 2005). Blackboard on the other hand had never been used at CQU. Referring to Ausband, Introna (1996, p. 34) contends that myth "is an active force for ordering reality", which could explain the conflict of the above assertion with the implementation outcomes. In 2004, another working party was set up to report on problems being

experienced with the implementation of Blackboard at CQU. The report of this working party concluded that Blackboard turned out to be a less reliable product than expected, became less stable and had a range of persistent problems to which CQU, as an organisation, was unable to respond (Central Queensland University, 2004). Eventually, CQU expended significant funds in order to purchase a new server platform, from a different vendor than previously used at CQU, to manage the increasing requirements inherent in running Blackboard.

Designers

In teleological design the act of designing a solution is typically separated from the actual use of the solution. Design is typically the responsibility of a small group of individuals selected for their understanding and seniority, for the ability to apply rational analysis to the problem and move closer to the stated ultimate purpose. Problems associated with this include the limited diversity represented by a small group of designers and the potential for bounded rationality to limit outcomes.

Even when a concerted effort is made to include broad representation from different organisational entities, it is typically those who have been successful within the current systems and approaches to be selected. For example, academic staff participating in the evaluation of a new LMS are commonly selected from the academic power users of the current LMS. Consequently the successful experiences of the past can play a role in limiting future possibilities.

In the late 1990s when the CQU Online project was tasked with identifying what CQU was doing in terms of online learning and with identifying where it should head, it was a teleological design process. Of the 35 people involved in the formulation of the report, no more than four had any significant experience of online delivery; only 20% of the participants were teaching regularly; there were no students involved; and more than 60% of the participants were senior management or technical support staff (Jones et al., 2005). All could be considered successful within the current organisational practice. The level of understanding and rationality this group could bring to the question of the future of online learning was limited, especially given the relative novelty of online learning in the late 1990s. Incidentally, evidence from the literature suggests a number of institutions have experienced similar dilemmas in terms of limitations of LMS selection models used, e.g. placing emphasis on “what works for me” versus “how does this align with larger organisational learning objectives” (Siemens 2006, p. 11).

A further example of the problems created by a limited set of designers and the subsequent limitation of rationality is demonstrated by the “faddish” adoption of LMSs within universities. Surprise has been expressed at how quickly university learning and teaching, commonly known for its reluctance towards change, has been modified to incorporate the use of learning management systems (West et al., 2006). Pratt (2005) finds connections between the Australian university sector's adoption of e-learning during the 1990s and the concept of management fashions, fads and bandwagons where a relatively transitory collection of beliefs can legitimise the exercise of mindlessness with respect to innovation with information technology (Swanson & Ramiller, 2004). In particular, given conditions of uncertainty about prevailing technologies organisations may rely on imitation to guide decision making (Pratt, 2005). Is the current trend amongst universities to move towards open source learning management systems (e.g. Moodle) the most recent e-learning fashion? Will an open source learning management system, especially one that is supported within an institution in the same way as a commercial product, really make a significantly different impact than use of a commercial product?

Design management and control

In a teleological design process, a centralised group through direct intervention in line with a master plan fulfils the necessary management and control requirements. These are typically encapsulated in the traditional institutional policies and governance structures. What can be done is typically limited by what is outlined in the policies or recognised, understood and allowed by the participants in the governance structure. Such structures take considerable time to respond to local contextual requirements, if they become aware of them at all, especially if they are a poor fit for the local requirements.

For example, CQU has never had a separate policy or governance framework for the use of ICTs in learning and teaching. These issues have always been dealt with as part of the wider ICT policy and governance framework, predominantly concerning administrative processes. Consequently, the manner in which ICTs are acquired and used for learning and teaching has been essentially handled by IT professionals, while at the same time considering corporate systems. An imbalance in the participation and power within the governance structure between corporate requirements and learning and teaching

requirements has led to a significant imbalance in funding. Gartner Consulting, when aiding CQU to develop an ICT strategic plan, observed:

While recognising that the investment in the People Soft ERP system is a necessary precursor to expansion of flexible learning to multiple geographies, the significant investment in this system has concentrated attention away from core teaching and learning applications. (Central Queensland University, 2001)

Behaviour such as this is intrinsic within the teleological world-view wherein the "holistic behaviour is traded for reductionist behavior, at severe cost to the system as a whole (Introna, 1996, p. 36).

Design problems

Apart from the complexity that comes from attempting to implement large-scale change, the other major design problem teleological design must face is conflict resolution. In teleological design some group selects the "right" goal. Those who disagree with the chosen goal must be convinced through various change management strategies to agree to the chosen goal. The change management strategies used to achieve this are themselves teleological and in turn create more conflict. Subsequently a great deal of organisational effort is expended trying to resolve internal conflict (Introna, 1996). Effort that is then no longer available for other, more productive activities.

For example, Sturges and Nouwens (2004) report on a comment demonstrating the differing views around change management and one destined to create conflict. One of the members of the technical group of CQU's Learning Management Systems Working Group, suggested "that we should change people's behaviour because information technology systems are difficult to change". This also illustrates problems that can arise with the design focus of different entities within an organisation being on "their" part of the problem and their common desire to simplify their own difficulties at the expense of the whole.

Discussion and conclusions

Teleological design has, to a large extent, become a single domineering and often-unquestioned concept that underpins much organisational implementation of e-learning within higher education. The adoption of such a single domineering concept imprisons not only thinking about implementation but also thinking about thinking about implementation (Truex et al., 2000). This is especially troubling given the perspective that:

The unique characteristics of higher education are in conflict with the assumptions of teleological models, which assume a clear vision, unambiguous plans, a decision-making chain of command, clear delegation of responsibility, decisions based on facts, and rationality (Kezar, 2001)

A number of authors have pointed out that there is another extreme (Baskerville et al., 1992; Introna, 1996; Kurtz & Snowden, 2007; Seely-Brown & Hagel, 2005). Introna (1996) in discussing the attributes of teleological design offers ateleological design as an alternative. Seely Brown and Hagel (2005) make the distinction between push and pull systems. Kurtz and Snowden (2007) contrast idealistic and naturalistic approaches to sense-making. These differing approaches, to some extent, all represent a similar set of divergent, even dichotomous, world-views.

This paper seeks to demonstrate the misalignment and limitations of practices in a university context from a teleological extreme and, in particular, to demonstrate how such an extreme significantly limits flexibility and choice for learners and learning. It does not, however, follow as a matter of course that the other extreme world-view is more appropriate. Such an extreme would be particularly problematic for e-learning because of the unquestioned dominance of the teleological view throughout the majority of the community. The education and training of all professionals involved with e-learning, almost without exception, is entirely teleological. There are currently significant government requirements for universities to engage in quality assurance, strategic plans and other very teleological practices. It is extremely difficult to adopt an ateleological approach within a heavily teleological context. In addition, an extreme ateleological approach might lead to organisational anarchy, with no overarching plan for bringing together localised energies and initiatives (Jones et al., 2005).

Introna suggests that perhaps “there is a continuum with complete teleological behavior on the one end and absolute ateleological behavior at the end. Moreover, the works of Baskerville and his colleagues (1992); Introna (1996); Kurtz and Snowden, (2007); and Seely-Brown and Hagel (2005) examining the alternate world views offer some insight. Another perspective is to consider the design attributes of a teleological process and when implementing e-learning seek to minimise the limitations inherent in teleological design. Space constraints in the current paper prevent any reasonably informative discussion of this view and how that might be merged into existing practice. However, some initial discussions and experience with this perspective merging within e-learning has taken place in other venues (Jones & Gregor, 2006; Jones et al., 2005) but much more consideration and empirical work is required.

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