

Using Students' Experiences to Derive Quality in an e-Learning System: An Institution's Perspective

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ABSTRACT

Higher education institutions undertake a range of approaches to evaluating and making judgments about the quality of their e-learning provision. This paper begins by exploring benchmarking as one current strategy in common use in universities to identify and implement quality practices: from the use of checklists (for example, of best practices and standards) to a more contemporary dynamic systems approach involving continuous cycles of feedback and improvement centred around the learners' experiences of e-learning. These practices are influenced by the teachers' design of e-learning and emerging technologies as well as by the institutional and societal contexts in which both learners and teachers operate. We give an account of two major evaluation studies at the University of Technology, Sydney (UTS), utilising a systems approach to investigate the consequences of e-learning, and we inquire into the value of this particular institutional approach for deriving e-learning quality. We use selections from the large dataset to describe and analyse students' and teaching staff's experiences of an e-learning system (LMS) over a two-year period. Our findings reveal that learners' experiences warrant consideration in shaping future e-learning developments at UTS, and that students value e-learning in facilitating their access to education for making choices about their learning and for enabling engagement in collaborative and interactive learning activities, while they also recognise the current constraints on e-learning imposed by the developers of LMS technologies.

Keywords

E-learning quality, Benchmarking, Complex dynamic systems, Learning Management Systems (LMS)

Introduction

Many governments and organisations in various countries are developing ways of measuring and producing guidelines for e-learning quality in higher education. For example:

- UNESCO/OECD (2005) recognise e-learning in their guidelines on quality provision in cross-border higher education;
- Lee, Thurab-Nkhosi, and Giannini-Gachago (2005) worked collaboratively across two countries to develop a quality assurance tool for e-learning;
- KeKang, Hai, Chun, and Bin (2005) developed an authoritative index system of quality assurance for web-based curricula, teaching processes, and the supporting service system;
- Weir, Kulski, and Wright (2005) explore the extent to which Australian frameworks and strategies for quality assurance ensure online provision of high-quality transnational educational programs.

Other educational institutions are adopting approaches that entail checklists (for example, of best practices and standards), self-assessment kits, matrices, and benchmarks to evaluate the quality of courses offered in an online mode and the state of e-learning in higher education (for example, ACODE Benchmarking Project in Australia). So, to explore such approaches (as well as emerging ones) and in response to the current wide use of "benchmarking" as a way of assessing quality in higher education (Bridgland & Goodacre, 2005; Ellis & Moore, 2006), we begin by probing into what might constitute benchmarking and describe some recent institutional applications of these variations on benchmarking for making judgments about the quality of e-learning in higher education.

A selective review of the literature describes benchmarking as:

- **A process that uses "a permanent reference point against which levels can be compared and measured"** (Buss, 2001). In the United Kingdom, the National Learning Network (NLN) makes available a self-assessment kit to facilitate classification of universities according to the extent to which information and learning technologies (ILT) have impacted upon them. In order to measure the degree to which ILT has been embedded into teaching and learning, and to identify priorities for development, institutions review their current state of maturation on 14 indicators, including strategic management, learning resources management, learner IT skills, and record keeping.
- **A process through which "practices are analysed to provide a standard measurement ('benchmark') of effective performance within an organisation (e.g., a university)"** (Higher Education Academy, 2006).

The most notable work in the United States appears to be the *Quality on the Line* report (IHEP, 2000) prepared by The Institute for Higher Education Policy in collaboration with National Education Association and Blackboard. From a review of the distance education literature, the report identifies 45 initial areas of best practices from which 24 benchmarks deemed essential to ensuring high-quality distance learning are assembled. These benchmarks are categorised under seven headings: Institutional Support, Course Development, Teaching/Learning Process, Course Structure, Student Support, Faculty Support, Evaluation, and Assessment.

- **A process of “identifying, learning, adapting, and measuring outstanding practices and processes from any organisation/public entity to improve performance”** (European Institute for E-Learning, 2004). In another example taken from the UK context, the Higher Education Academy and the Joint Information Systems Committee (JISC) are collaborating to lead a UK-wide higher education e-learning benchmarking exercise with a pilot that commenced in January 2006. Though not limited to “outstanding practices and processes,” the current focus of the exercise appears to be on learning about how different universities are embedding different aspects of e-learning into institutional policy and practice, and to provide institutions with quantitative metrics and qualitative descriptors on which to reflect, share experiences, and make informed plans for future development.
- **A process of “self-evaluation and self-improvement”** (Jackson, 2001), **of “improving ourselves by learning from others”** (Public Sector Benchmarking Service, 2005), **and as a way to “learn how to adapt and improve as conditions change”** (Camp, 1989, cited in Jackson, 2001, p. 218). Here, a benchmark is only a starting point from which research is generated, is context-bound, and is also a way of testing practices and processes to see if they measure up: that is, whether they are successful, will be adapted and developed further, or discontinued. This paper describes an Australian longitudinal example at the University of Technology, Sydney (UTS) that involves cycles of continuous institutional improvement of e-learning provision through eliciting the learners’ experiences of e-learning, which are influenced by the teachers’ design of e-learning in a particular discipline and the dynamic institutional and societal contexts in which both learners and teachers operate.

According to these views, benchmarking could be conceived both as a process of quality recognition, such as matching or testing against inherited, already established criteria on which some judgment of worth is made (hence, a form of quality assurance); and as a process of quality development, such as creating new criteria that are generated from emerging practices and innovations in response to new needs, or contextual conditions or pressures (a form of quality enhancement). In some cases, such as our research-led investigations at UTS, benchmarking is a continuous iterative process of quality recognition and quality development.

However, we now turn to a more fundamental question: what is the nature of quality itself? In his book written as an inquiry into values, Pirsig (1974) asks: “Why does everybody see Quality differently?” (p. 252), and similarly Harvey and Green (1993), in their paper entitled “Defining Quality,” note that “quality is relative to the user of the term and the circumstances in which it is invoked. It means different things to different people.” However, when Pirsig states that “quality is a response of an organism to its environment” (p. 253), he also opens out for questioning and investigation how the exact same conditions do not exist between environments and how unique individuals might interact and operate within such context-bound conditions. The second feature Harvey and Green describe about the nature of quality is that “in some views, quality is seen in terms of absolutes ... [as] an ideal ... in other views, quality is judged in terms of absolute thresholds that have to be exceeded to obtain a quality rating.” Lastly, they observe that “quality is ... a value-laden term: it is subjectively associated with that which is good and worthwhile.” Furthermore, Pirsig (1974) suggests that in any context or environment, people make choices based on quality, on value: “we preselect on the basis of Quality ... or ... the track of Quality preselects what data we’re going to be conscious of, and it makes the selection in such a way as to best harmonize what we are with what we are becoming” (p. 315). Harvey and Green (1993) conclude with a recommendation of “looking at the criteria different interest groups use in judging quality rather than starting with a single definition of quality.” So, the nature of quality can be characterized as follows: relates to values; entails criteria that are used and developed to make value judgments; and is derived and shaped over time by the subjective experiences of individuals or collective groups as they operate in changing environments with particular conditions and pressures.

Furthermore, through a sharper analysis of the benchmarking mentioned in this introduction and enacted to deduce the quality of e-learning in higher education, we propose that these approaches can be perceived and categorised as top-down and systems approaches. Subsequently, we raise aspects of the literature that critically examine such approaches.

Top-down approaches

Riley, Selden, and Caldwell (2004) explore the Big Change Question, “Do current efforts to initiate top-down changes fail to support the moral purpose of education?”, and question whether a top-down approach is the preferred or desirable way for bringing about improvements and reform in Education. In response to another top-down approach (UK government’s White Paper, 2003), Gibbs and Iacovidou (2004) argue against such quality criteria that may fail to capture the essences of an educated person and create a pedagogy of confinement of student and academic potentialities through its external measurement of control, and instead suggest trusting the academic community of scholars as an academic community of responsibility. Similarly, Bentley and Wilsdon (2003) state that “public value is created, not delivered ... solutions rely, at least in part, on the users themselves and their capacity to take shared responsibility for positive outcomes” (p. 20), and they put forward an agenda: “We need systems capable of continuously reconfiguring themselves to create new sources of public value. This means interactively linking the different layers and functions of governance, not searching for a static blueprint that predefines their relative weight ... we need to ask: How can the system as a whole become more than the sum of its parts?” (p. 16).

Systems approaches

Complexity and interrelatedness are inherent to understanding how systems such as learning organizations, with their many parts and feedback loops, operate (Senge, 1992; Axelrod & Cohen, 2000). Though Jacobson and Wilensky (2006) state that “it does not appear that there is a general ‘theory of complex systems’ at this time” (p. 26), they do anticipate the implications of such system-thinking perspectives: “Complex systems approaches ... enable researchers to study aspects of the real world for which events and actions have multiple causes and consequences, and where order and structure coexist at many different scales of time, space, and organization” (p. 12). A contemporary shift in thinking about systems and how understandings of such systems might be gained are explored by Frenay (2006). Moreover, in his commentary, Caldwell concludes that “a response to the earlier ‘Big Change Question’ is thus a call for an adaptive balance of ‘top-down’ and ‘bottom-up’ approaches to change” (Riley et al., 2004, p. 427), signalling the relevance for considering multiple influences in any system, both internal and external.

In this paper, we seek to gain insight into the quality of an e-learning system and to investigate one particular institutional approach (or methodology) for doing so. The paper asks the question: “In a higher education institution, what is the value of a systems approach to e-learning provision driven by students’ experiences?” We begin by briefly discussing an e-learning system that is used widely in Australian universities. Then, we describe and analyse the approach one university has taken to understanding the quality of its e-learning system in operation. To gain a detailed understanding of students’ and staff’s experiences with this e-learning system, we give an account of the UTS’s approach to introducing a Learning Management System, and its subsequent attempts to improve the quality of e-learning through large-scale evaluation studies. We discuss how these findings are used to shape the institution’s e-learning developments over time and the value of this systems approach at UTS.

Learning management systems (LMS) in higher education

Learning management systems (LMS) such as Blackboard and WebCT integrate a range of online tools, including discussion boards, announcements, email, assessment quizzes, group facilities, and online content areas. Since the wide-scale proliferation and adoption of LMS in the UK, Europe, US, and Australia (Observatory on Borderless Higher Education, 2002; Paulsen, 2002), much has been written about the ways in which such e-learning technologies may afford enhanced experiences for students in terms of improved quality of learning, enhanced productivity of learning (access to education, for example), and/or improved attitudes to learning (see Alexander and McKenzie, 1998; Martin & Webb, 2001). In another study, Coates, James, and Baldwin (2005) note that behind the rapid adoption of these particular systems there have been six drivers, namely:

1. a means of increasing the efficiency of teaching
2. the promise of enriched student learning
3. new student expectations for advanced technologies
4. competitive pressures between institutions
5. a key means of responding to massive and increasing demands for greater access to higher education
6. part of an important culture shift taking place in teaching and learning in higher education (p. 23–5)

Regarding the sixth driver, Coates et al. (2005) argue that:

LMS offer universities a hitherto undreamt-of capacity to control and regulate teaching. From a managerial perspective, the disorder associated with academic independence and autonomy in the teaching and learning process can appear chaotic and anarchic ... LMS may appear to offer a means of regulating and packaging pedagogical activities by offering templates that assure order and neatness, and facilitate the control of quality (p. 25).

Though Coates et al. (2005) view these systems as essentially devices for teaching, they state that attention has been most often focussed on their technical, financial, and administrative aspects. In contrast, our institutional approach seeks primarily to understand the use of LMS as technological environments for learning.

The UTS approach to an e-learning system

As an inner-city university with over 32,000 students and the largest number of part-time students in the state, UTS recognised that in order to meet the needs of these students the university would embark on “flexible learning” as a major strategic initiative in 1996. Flexible learning was defined as, “the name given to a variety of teaching, learning, and administrative practices which meet the needs of a diverse student population in the contemporary social context” (Professor Tony Blake, President of UTS, 1997).

In their longitudinal study, Krause, Hartley, James, and McInnes (2004) provide some insights into what these diverse needs of students in a contemporary Australian social context might be. Their research was first conducted in 1994, then again in 1999 and 2004, and identified a number of important characteristics of students in Australian universities. In 1994, for example, 40% of full-time students reported working 11 hours or more per week. By 2004, this percentage had increased to 49%.

In 1996, the UTS initiative was managed as a top-down and bottom-up project. The top-down aspect involved the setting of a vision for flexible learning and the formation of six Flexible Learning Action Groups (FLAG), each of which was given a small amount of funding and directed to use that funding in a way that would benefit the university as a whole. The FLAG on Internet use met initially on a monthly basis, with the number of academics who attended rising from the inaugural 10 members to around 50 by the end of the first year. The group subsequently evolved to become a very successful community of practice, where academics across discipline areas and faculties tried out various ways of using e-learning for teaching, undertook evaluation of those practices, and shared their successes (and failures), ideas, and practices, thus facilitating the building of knowledge about the practice of using e-learning for learning and designing subjects. The activities of this FLAG group and the introduction of LMS have been described elsewhere (Sawers & Alexander, 2000; Alexander, 1999; Sawers & Alexander, 1998). As well as having a focus around collaborative learning and designing and teaching activities to provide peer support for academics, the group was also instrumental in shaping the nature of technological and learning support to be provided by the institution to academics and students. Some of the early recommendations of this group, for example, included:

- recommendation of a particular learning management system, Blackboard (known at UTS as UTSONline), to be managed centrally with appropriate backup and software upgrades
- recommendations for centralised support for students and academics in the form of a telephone help-desk and batch enrolment of students
- changes to university policies on promotion and tenure to recognise and reward outstanding e-learning innovations

Now, in 2006, more than 1200 subjects make some use of e-learning, although only a very small minority of subjects have no face-to-face component.

From its inception, the institutional approach to e-learning at UTS has been underpinned by a view that understanding students’ experiences is critical to improving the quality of e-learning. The approach to promoting quality of e-learning has as its key driver that no e-learning environment can be guaranteed to generate high quality learning, independent of learners’ own experiences (after Boud & Prosser, 2002). Hence, the learning interests, needs, and experiences of students directly inform the institutional decisions relating to e-learning development, and support, through a process of continual evaluation and enactment. We turn now to an account of the large-scale institutional studies (2002, 2004), which set out to gain insights into and understand what students and teaching staff do (and want to be able to do) with LMS, what students and staff value about these

uses and why, and students' and staff's experiences in using such technologies as part of their studies and for teaching their subjects.

Evaluation plan (2002 and 2004)

The number of units with some online component had risen from the initial pilot project of one unit in 1997 to approximately 500 units by 2002. The FLAG meetings, once held regularly and attended by some 60–70 academics, now attracted smaller numbers. The authors felt it was an opportune time to evaluate the e-learning initiative to determine its consequences, as well as to provide an opportunity for academics to conduct a more detailed investigation of their students' learning. Use of the term “consequences” was deliberate, and the term was chosen to be broader than “outcomes” so that unintended outcomes might also be included. Volunteers for the project were sought, resulting in the formation of a small committee of academics to provide feedback to the evaluation. The group agreed to the following evaluation plan, which was conceived as an attempt to gain a broad snapshot view of e-learning at the university.

Purpose of the evaluation

One purpose of the evaluation was to gain an enhanced understanding of ways in which academics were using UTSONline (Blackboard LMS) in conjunction with wider e-learning strategies to increase flexibility of subjects and course offerings.

Other purposes of the evaluation include developing an enhanced understanding of:

- the consequences (outcomes) of the range of online learning strategies used at UTS;
- the student experiences and expectations of a range of uses of UTSONline (including equity and access);
- the support needs of academics, including technical, administrative, and pedagogical issues.

The evaluation questions

The questions designed to provide a *description* of the use of UTSONline were:

- What are the various ways in which academics are using UTSONline (including other uses such as for research, communication)?
- What are the experiences of students using UTSONline?
- How is the UTSONline experience integrated within the total student learning experience of a subject?
- What is the level of experience of new academics using UTSONline (i.e., new to teaching, to UTS, or to the use of Blackboard as a learning management tool)?

The issues related to the *impact* of the use of UTSONline were:

- What does the use of UTSONline enable for academics, students and the community?
 - What are the affordances of the range of uses (i.e., flexibility or limitations that have resulted from the use of UTSONline)?
 - How does UTSONline use affect flexibility of time, location, and pace of study for students (i.e., usage patterns)?
 - What are the demands on academics and students (e.g., increased/decreased workload)?
- What are the consequences of a range of e-learning strategies?

2002 Evaluation Survey

The student questionnaire in 2002 was developed in collaboration with the evaluation committee and drew upon the bank of questions contained in the Flashlight Student Evaluation Inventory (Ehrmann & Zúñiga, 1997). After gaining feedback on the first draft from the evaluation committee, two students from each of the nine faculties in the university were invited to complete the survey and to provide feedback on the wording and questions. This feedback was then incorporated into the survey, circulated to the committee for final comment, and posted live towards the end of October. Students were encouraged to complete the survey via a link from the LMS's login page and all academics were asked to publicise it. In order to ensure that responses to the questionnaire were confidential, students were not asked to provide any identifying information (for example, their student ID number). Hence, the survey was one in which students could choose to participate or not, and it was possible for

students to make multiple attempts to respond. A similar process was used to develop the teaching staff questionnaire, although the pilot was conducted using academic staff rather than students.

At the end of the two-week period that the student survey was available, there were 2,509 valid student responses. However, because of the limitations of the method noted above, it is not possible to provide a reliable response rate. Still, it should be noted that there were 23,682 registered student enrolments in the LMS at the time and, hence, as a general guide, approximately 10.6% of these students completed the questionnaire. It should also be noted that the questionnaire was lengthy, with some questions relating to the Blackboard tool itself and, predictably, less than half the respondents completed the questionnaire. The teaching-staff questionnaire elicited 230 responses, a number that was reduced to 199 after the data was cleaned. During the semester in which the data was collected there were 703 academics registered as users of the system, and hence the individual response rate was approximately 28.3%. For many units of study, however, more than one academic was involved in teaching and therefore, for the purposes of this survey, that data was aggregated. This meant that responses were received for 295 discrete units of study from 501 known units, which had some online component during that semester. Hence, the subject response rate was 58.9%.

2004 Evaluation Survey — Benchmarking with ATN

The 2004 survey repeated the 2002 survey (although with some modifications based on the 2002 experience), and this time in collaboration with four other universities within the Australian Technology Network (ATN). Not only was the authors' university a member of the ATN group, the similarity in course offerings made ATN an appropriate group for benchmarking.

For the 2004 student survey, the same evaluation questions were posed as in the 2002 survey (with the addition of some questions and refinement of others, as already noted) and, with the exception of offering a random prize draw for an iPod, the survey was conducted in the same way as in 2002. The inclusion of the iPod prize appears to have accounted for the increase in valid student responses from 2,509 in 2002 to 6,265 in 2004. Once again similar questions were posed in the 2004 teaching staff survey as in the 2002 survey and in 2004 there were 217 responses (slightly fewer valid responses than in 2002). We note that there were some complaints from teaching staff that, unlike the students, they were not offered the opportunity of a random prize draw for an iPod.

Consequences of e-learning: The UTS experience

It is not possible within the bounds of this paper to report on all the findings; suffice it to say that comprehensive analyses are published in the internal working papers and reports. However, we select two excerpts from the many that could have been chosen from the large dataset to shed light on a system in operation. We subsequently use this data to investigate the value of UTS's approach for gaining insights into the quality of its university-wide e-learning provision. The first data selection gives an account of what teaching staff and students are doing with a LMS technology and why they value these practices, and the second data selection describes how students are using (or wanting to use) the LMS to learn with and from other students. We start, though, with the background into student demographics and students' access to computer technology.

Background

Student demographics

The demographics of the students responding to the questionnaire in both 2002 and 2004 are reported in Table 1. It is not possible to gauge the degree to which the demographics of the survey respondents are similar to or different from the population of students using UTSOnline. The only means of making some judgment about the degree to which the survey population is representative is to compare the demographics with the overall population of students enrolled at UTS, acknowledging the limitations of such a comparison. With this caveat in mind, it would seem that for both surveys there is an over-representation of undergraduate students in the survey respondents, an under-representation of part-time students, and for the 2004 survey only, an over-representation of students who speak a language other than English at home.

Student access to computers and the Internet

In 2002, of the 1200 students who responded to this question, 90.7% reported having access to a computer and the Internet at home. By 2004, students reported higher levels of access to computers and the Internet, with 93% now reporting access from home. Of these, 57.7% had broadband access. The proportion of students reporting access from home was higher than expected when compared to the Department of Communications, Information Technology and the Arts' *Current State of Play 2004* report, which stated that 61% of all Australians aged 2 years and over had home access as of June 2004. In the 2002 survey, most students did not agree that they had trouble gaining access to a computer at university (mean = 2.5 in a Likert scale; 1 = strongly disagree, 5 = strongly agree). Similarly, in the 2004 survey, 81% of students reported having adequate access to a computer at university. Therefore, there was no evidence in either survey (2002 or 2004) that significant numbers of students had difficulty gaining access to a computer to use the LMS either at home or at university.

Table 1. Survey Respondents and UTS students' personal characteristics and enrolment type (2002 & 2004)

		2002				2004			
		Survey Respondents		UTS Student Enrolments		Survey Respondents		UTS Student Enrolments	
		N	%	N	%	N	%	N	%
Level of study	Under-graduate	957	78.8	17,318	67.9	4,403	75.7	17,559	64.7
	Post-graduate	257	21.2	8,186	32.1	1,414	24.3	9,567	35.3
	Total	1,214	100.0	25,504	100.0	5,817	100.0	27,126	100.0
Enrolment	Part time	317	26.2	8,481	33.3	1,166	20.1	8,172	30.1
	Full time	895	73.8	17,023	66.7	4,644	79.9	18,954	69.9
	Total	1,212	100.0	25,504	100.0	5,810	100.0	27,126	100.0
Gender	Male	614	50.7	12,418	48.7	3,025	52.2	13,834	50.9
	Female	597	49.3	13,086	51.3	2,775	47.8	13,292	49.1
	Total	1,211	100.0	25,504	100.0	5,800	100.0	27,126	100.0
Language other than English	Yes	533	44.1	10,189	40.1	2,910	50.2	10,373	38.2
	No	676	55.9	15,189	59.9	2,888	49.8	16,753	61.8
	Total	1,209	100.0	25,378	100.0	5,798	100.0	27,126	100.0

Data selection 1: What teaching staff and students are doing with a LMS technology and why they value these practices

In both the 2002 and 2004 surveys, the staff questionnaire listed a variety of ways in which the LMS could be used, including the making of announcements, and providing for group discussions, online debates, and formative assessment. The top five ways in which teachers reported using the LMS are listed in Table 2.

Table 2. Uses of UTSONline (2002 & 2004)

Purpose	2002	2004
	%	%
Make subject announcements	95.2	97.6
Provide access to materials	91.1	93.7
Provide links to web resources	54.9	73.8
Send emails	51.5	72.6
Use discussion board*	57.7	48.4

* Note. There was a variation in wording of this question in each survey so the results are not as comparable from 2002 to 2004 as they might otherwise be.

In the 2002 survey, teachers were asked to provide answers to the open-ended question: “What would you describe as your primary reasons for using UTSONline in the teaching of these subjects?” (Table 3). There were, however, significant differences among faculties in these responses. Teaching staff from the Faculty of Information Technology, for example, were more likely than other teaching staff to use UTSONline for primarily administrative reasons, while those from the Faculties of Business and Science tended to use the system primarily as an information tool. The most common reason for using UTSONline in the Faculty of Education (80% of responses) was to communicate with and between students.

Table 3. Reasons for using UTSONline (2002)

	<i>n</i>	%
Providing information to students	84	54.2
Communication with and between students	75	48.4
Administrative reasons	45	29.0
Assessment purposes	17	11.0
To improve learning	18	11.6
Supplement f2f classes	29	18.7
Access (flexibility, intern/interstate students)	20	12.9

Base: respondents (*N* = 155)

This question was then refined for the 2004 survey, with respondents asked about their experience of a number of potential advantages of e-learning (Table 4). Also, 60.1% of respondents agreed or strongly agreed that use of the LMS reduced the need to answer student questions by telephone or email, and 55% thought it had facilitated student preparation for class.

Table 4. Teachers’ experience of aspects of e-learning (2004)

	Average Rating
Can give timely information	4.4
Efficient in making information available	4.3
LMS available and efficiently administered	4.1
Effective for important communication	4.0
Provides common form of communication	4.0
I can work off-campus	3.7

(Based on a five-point Likert-type scale with 1 = strongly disagree, 5 = strongly agree)

Similarly, students also were asked in both surveys whether they had used particular aspects of the LMS. Again, the wording of questions varied slightly between the 2002 and 2004 surveys (Table 5). In 2004, with the inclusion of new questions, 95.6% respondents said they used UTSONline to send emails to other students or teaching staff, and 86.6% reported having done self-assessment quizzes.

Table 5. Percentage of students who have used UTSONline features (2002 & 2004)

Feature	2002	2004
Access course/subject materials	97.6	99.5
Read announcements	97.5	99.7
Use open discussion board	88.5	92.8
Read community messages	87.6	95.4
Access external links/resources	80.3	98.2
Check grades	79.8	95.6
Participate in assessable discussions	76.5	87.7
Graded quizzes	61.8	79.5
Submit assignments electronically	54.0	85.6

Although the wording of the questions varied slightly between the 2002 and 2004 surveys, students were asked to rate the value of various features that were common to both surveys for UTSONline (Table 6). In 2004,

students also seemed to value sending emails through UTSONline to other students and teaching staff (3.7) and using self-assessment quizzes (3.7).

Table 6. Average rating of features of UTSONline (2002 & 2004)

<i>This feature has been valuable to me</i>	2002	2004
Access course/subject materials	4.3	4.5
Read announcements	4.1	4.4
Check grades	3.9	4.2
Read community messages	3.6	3.8
Graded quizzes	3.6	3.7
Submit assignments electronically	3.5	3.8
Participate in assessable discussions	3.3	3.6
Access external links & resources	3.3	3.9

(Based on a five-point Likert-type scale with 1 = strongly disagree, 5 = strongly agree)

In 2002, students were asked to respond to two open-ended questions, the first being: “Are there particular occasions when UTSONline was particularly useful to you? Indicate when and how it was useful.” In the analysis of responses, the following is a sample that came under the category of “access to learning”:

- *When studying away in the country during an industrial experience block I was able to continue my studies.*
- *I work in a suburban law firm, so it provided me flexibility to access lectures, instead of leaving in the middle of my work for classes.*
- *I was overseas during the semester . . . but this was transparent.*
- *I am a single mother. . . . It is fantastic if my son is sick and I can't make it to a lecture.*
- *I suffer bad arthritis in my legs so it was invaluable to enable me to keep up with class announcements and some course materials.*

The second open-ended question asked: “What other comments would you like to make about your experiences in UTSONline or questions you would like addressed about the use of UTSONline?” Students identified many issues that were of concern to them, with the most common being the reported differences of experience in teaching staff’s responses to students’ questions posted on the discussion board. While some students’ questions were answered immediately, other students reported not receiving responses from teaching staff at all. It was not clear to students how teaching staff intended to use UTSONline in a particular subject that the students were studying.

In the 2004 survey, the first open-ended question of 2002 was refined, and rather than being asked about the benefits, students were asked, “What does UTSONline enable you to do that you couldn’t do otherwise (if anything)?” The qualitative responses were categorised (Table 7).

Table 7. Affordances of use of UTSONline (2004)

Benefit	<i>n</i>	%
Enhanced access to learning opportunities and resources	2,713	52.5
Interactions with others on the discussion board	1,167	22.6
Time and place flexibility	917	17.8
Qualitatively different learning opportunities	209	4.0
Other	161	3.1
Total (<i>N</i>)	5,167	100.0

In the category **enhanced access to learning opportunities and resources**, respondents typically focused on the learning benefits of having access to learning resources such as PowerPoint slides of lectures and up-to-date information. A number of students also commented on the value of having access to all course or subject information in one location:

- *In past/current semester/s it has enable you to listen more in class and collect lecture notes after or before - so you obtain more knowledge.*

- *keep up to date with the development of the course, i.e. changed lecture slides, additional material and altered rooms/times*
- *It enables me to find all the information in one place. I no longer need to use diaries etc to organise my subjects*

A large number of responses related to **interactions with others on the discussion board**, and included comments such as the following:

- *email many classmates at once- people that you don't know but need to contact*
- *engage in group discussions that would otherwise be difficult to do as thoroughly owing to not enough time in class and it makes it easier when everyone has different availability.*
- *get answers to simple questions without wasting the teacher's time- either by getting the answer from another student, or having the question simply asked once, with the answer displayed for all to see.*
- *to be able to discuss issues and raise questions with lectures, tutors, other staff and students. To be able to read and learn from problems other students post. To learn from the answers that get posted in discussion threads. Its all a lot easier to do this online than in person.*

The **time and place flexibility** afforded through the use of the LMS was also clearly evident in responses:

- *Study from a distance. I had to move during my studies and UTS Online enabled [me] to transfer my study mode.*
- *Access lecture notes and subject material when i cant make classes. This was GREAT especially when i was overseas!*
- *Spend less time collating information and wasting time submitting material - it allows me to do this remotely, without driving, parking, walking and finding resources are unavailable or inconvenient to use.*
- *It enables me to access information at hours that a suitable to me - a mother of two young children. It is convenient for me to do a lot of my work at home at odd hours, and UTS online allows me to pick up information whenever I want.*

Finally, the responses labelled **qualitatively different learning opportunities** refer to learning affordances that would simply not be possible without the use of a Learning Management System (LMS). While the above-mentioned response categories appear, on the surface, to meet this criterion, they could also be seen as an automation of existing practices, albeit in a form that provides a higher degree of flexibility for students. Some comments included:

- *I have a hearing impairment so I was never good at sharing and obtaining information in university classes. UTSONline ensures that I do not miss out on information because it is all posted online.*
- *Discussing with my classmates. This wouldn't happen without UTSONline, since most of the postgraduate students are working besides their studies, meaning they don't spend so much time in Uni*
- *Post "stupid questions" anonymously that I normally wouldn't ask...*
- *I am writing a thesis. It allows me to get critical feedback and ideas from other students and supervisors, even though we rarely see each other face-to-face. It allows us to be familiar with each other's work.*

Data selection 2: How students are using (or wanting to use) the LMS to learn with and from other students

In 2004, feedback from students in the qualitative questions about what UTSONline enables them to do that they couldn't do otherwise also revealed how students are learning with and from their peers in these e-learning contexts, as well as what they find useful about such interactions. For example, students responded that UTSONline enables them to:

- *make connections and stay connected to other students;*
- *have discussions with a larger group of people (outside their friendship groups or tutorial class and across all students in the subject or course);*
- *converse with students outside of class times and continue conversations that start in tutorials;*
- *have access to a diverse range of ideas and opinions;*
- *get feedback from many people;*
- *ask questions and get answers from students with whom they would not otherwise have a chance to interact with;*
- *view the kinds of problems other students are having;*
- *use other students' postings as a source of information and to benchmark their own progress or development of ideas; and*
- *find fellow students and form a group for group assignments when they don't know anyone in the class.*

UTSOnline appears to offer qualitatively different or greater opportunities for how students can operate and learn with other students in their studies. UTS students' comments include:

- *It's also good to get feedback from students who are far more knowledgeable in one particular area. It makes it interesting when determining who is a valid source of information and not. I've never had to do this before to such a great extent with other students.*
- *See what other students are finding difficult and learn from their experiences and questions*
- *Discuss issues with the entire group of students. Learn difficult things to do from other students by them explaining how they learnt to do it*
- *Our course requires that we attend Uni on most Thursdays. If something happens at work which relates to the subjects we are studying one would have to wait until the following Thursday to discuss it with other students. Online access means you can debrief more immediately when the event is fresh in your mind and one can share those often intense feelings at a crucial moment.*

Students made comments about how they value the choice and flexibility that comes with having different UTSOnline technologies, which they can select to use depending on their group needs and the task they are undertaking:

- *It makes it much easier for group work! Group meetings are essentially ongoing as opposed to once a week face to face. We can ask each other questions or provide documents and links for each other without the expense of phone calls etc or through group emails. And as everything is left online we can track our conversations and ideas and leave all of our documents online so nothing is lost. It makes life a lot easier.*
- *Its great to have discussion threads so that past discussions are completely traceable, but even more valuable is the ability to attach files to discussions – this allows for storage - and it's a great thing that UTS Online is backed up every day so if our group ever loses anything we know who to turn to :)*
- *Accomplish group work more readily. I am doing [name of subject] this semester; a major group work subject. Through UTSOnline I am able to have my own section allocated to my group in the groups section which allows me and all my team mates to collaborate files, discuss work, and keep everyone up to date on the project through a central position on UTSOnline. This would have been much harder if we had had to setup these facilities ourselves.*
- *Most importantly it enables me to participate in group work without having to be on campus. This is extremely important for me as I work full-time and I only have a very limited amount of time that can be spent on campus.*

In many instances, students talked about the difficulties they experienced when group areas were not set up in UTSOnline (although group work was a requirement in their subject), and their desire to have access to this functionality:

- *I would like to see more support for group meeting boards online for those of us who have group members that are a long way away. Almost all assignments in [name of faculty] are group based, often hard to meet.*
- *not all subjects provide the groups page which is disappointing because I find that function of UTSOnline really beneficial especially when nearly all subjects require group work*
- *Only one of my subjects does not have a UTS online page, and this made file sharing for projects, and contacting class mates very difficult. This has led to more time wasted going into uni for brief group meetings that could have been easier to coordinate over UTS online.*

There were students who mentioned that some things in group work were better done face to face but they also acknowledged that this was not always possible for their group because of varying schedules and the locations of different members. Furthermore, in the staff survey, teaching staff said that setting up group areas in Blackboard was very time-consuming and cumbersome:

- *Setting up groups is a real pain; it takes so long!*
- *One thing is that enrolling students into groups is very awkward.*

Students also provided advice on a redesign of the Blackboard tool. Suggested features for working and learning in groups included:

- *Stuff like editing group work documents – need another way of doing it – would love to see uts online used to track groupwork so that lecturers can see when one or two group members are propping up the rest of the group!*
- *Couldn't post pics of what I was talking about in the body of the message*
- *a group assignment on a poster, was very difficult to discuss layout without being able to see anyone's idea*
- *a group discussion facility can only be set up by a lecturer or tutor. Sometimes it's not convenient for us as we must ask the lecturer or tutor first*

Teaching staff also saw the benefit of students having greater control over setting up, managing and using group areas, for example: “It would be great if we could give students the ability to create new discussion forums in their group areas ... currently this is not possible and it is a real limitation!”

Discussion

Both evaluations (2002 and 2004) were useful in general in confirming and gauging the overall quality of e-learning opportunities for students within a particular e-learning system. From these large datasets of quantitative and qualitative responses, there was much evidence that UTSONline had met “the diverse needs of students in a contemporary social context.” Students reported being able to manage increasingly complex lives, juggling the demands of work, family, and social lives with their studies as a result of these e-learning opportunities. Thus, not only did students make explicit why they value the e-learning system (UTSONline) and the criteria on which they based their judgments of worth, the survey also provided evidence that use of UTSONline makes it possible for many students to:

- enrol in a course of study regardless of geographic location;
- access course materials prior to lectures (in some cases using these to make decisions about the value of physically attending a lecture);
- receive notification of changes or cancellation of classes before spending time traveling to university;
- receive updates on administrative and learning issues in between face-to-face classes;
- get to know fellow students via the discussion board, which would not be possible face to face;
- ask questions online that they didn’t feel comfortable asking in a face-to-face situation;
- ask questions when they arose rather than waiting for a face-to-face class;
- compare their own understanding to that of other students through the discussion board;
- track the development of ideas through the discussion board;
- locate other learning resources via links provided;
- test out their knowledge and receive feedback using the quiz facility;
- check marks and grades.

A small minority of students made mention of a preference for face-to-face learning, acknowledging, however, that this was not possible for them.

Teaching staff at UTS choose to use the LMS in specific ways, depending on various factors (including the course/subject relevance and the discipline). As a result of student feedback in the 2002 survey, a change was made to the set-up of online subjects in an effort to communicate these uses to students and to better align student and teacher expectations of teacher participation in online discussions. The following “Levels of UTSONline Use” were introduced, and all academics using the LMS were asked to notify students of the level they were adopting. These three levels are still in use:

1. Information only. Subject/course outlines, course materials, and content are available. No discussion board.
2. Information and an un-moderated discussion board. Same as 1. above, plus availability of a discussion board for student use only (no teacher presence).
3. Information and a moderated discussion board. Same as 1. above, plus a moderated discussion board with academics making an opening statement about their online involvement — for example, the time frame within which they would respond to student questions.

Then, in 2004, academics were asked which level they were using at the time of the survey (Table 8).

Table 8. Level of use (2004)

Level	<i>n</i>	%
Level 1 — information only	75	29.9
Level 2 — information and un-moderated discussions	61	24.3
Level 3 — information and moderated discussions	115	45.8
Total (<i>N</i>)	251	100.0

Thus, although the earlier data highlighted the extensive use of UTSONline for providing content or information, it became clear from this 2004 data that significant use was also being made of the discussion boards.

With the emergence of new mobile technologies and social software (Bryant, 2006), UTS students appear to be communicating across different modes and in different forms, and gauging from their responses in 2004, students want similar opportunities available for learning collectively in formal e-learning environments. In 2006, UTS introduced the Learning Objects Campus Pack building blocks into UTSONline to provide blog-like journals, wikis, and e-portfolios, so that students could have greater control over LMS technologies for learning with and from other students. For example, the e-portfolio building block (Expo) enables students to create multiples of their own blog-like journals and wikis, incorporating graphics seamlessly as part of their online discussions. Students can also choose to make these blogs and wikis available (or not) for viewing, co-developing, or commenting by everyone in the UTS community or within any of their UTSONline courses. With the introduction of these new technologies, we are also working collaboratively on numerous research projects with teaching staff across the university, investigating what these kinds of social software environments might be good for in terms of learning, and the possible design variations in different disciplines. It is too early for us to report on those developments in this paper. We have, however, not yet resolved the issue and addressed the expressed student and staff need for finding a technology that would enable students to create and manage their own closed groups to work on peer group projects (including assessments) within UTSONline.

The findings from the 2002 and 2004 studies enable us to speculate on the value of a systems approach to the institution-wide provision of e-learning at UTS, which centres on students' experiences. Such an approach:

- is sensitive to what is occurring across various levels and in different areas of the university, across higher education institutions, and in society as a whole, and is responsive to any changes, needs, or pressures in these various systems;
- highlights the values that may be operating in the different areas of the university or society, and seeks to interpret the influences of these values on what people (including students and staff) might want to do or which opportunities might be fruitful;
- enables the criteria on which judgments about e-learning are made to be derived or created from the values that become evident in the system. These are used to guide the decisions that are subsequently enacted;
- fuels the generation of questions that might be good for gaining ongoing insights about the quality of e-learning at different levels or in various areas of the university;
- provokes our university to continue to prioritize "learning" as the key value for influencing decisions about e-learning and for initiating particular directions of e-learning development;
- goes beyond evaluation only to research the institution-wide conditions that enable learning in a changing contemporary context;
- minimizes the risks to the university of poor decisions being made (see Diamond, 2005).

Conclusion

Other recent institution-wide survey studies have obtained students' views of LMS technologies and of e-learning, including:

- the features that students used and their perceptions of the degree to which these features improved learning, class management, or both (Kvavik, Caruso, & Morgan, 2004);
- the views of students about the use of a LMS in education (Haywood, MacLeod, Haywood, Moge, & Alexander, 2004);
- students' perceptions of the pedagogic value of the VLE (Weyers, Adamson and Murie, 2004);
- students' overall experience of a LMS (rated on a scale of "very negative" to "very positive") and how valuable certain features of the LMS were for undertaking a series of nine particular activities (Kvavik & Caruso, 2005).

Our studies sought to elicit from students and teaching staff what they did (and also what they wanted to be able to do) with a particular e-learning technology (LMS), what they valued about these uses and why, and what their experiences were of using such technologies as part of their studies and for teaching their subjects. The findings from our institution-wide studies are used to guide the ongoing development of quality e-learning for students at UTS, which includes working collaboratively with teaching staff in providing quality e-learning opportunities. The UTS systems approach recognises the ways in which each part or level of an e-learning system is interrelated to others. Rather than determining "good practice" in each part of the e-learning system independently of the learner experience, the learning experiences of students drive the continuing development of the quality of these parts and shape the relationship of the parts to the whole system.

However, our 2002 and 2004 institutional studies cannot shed light on *what* students learn and how students learn particular things in different disciplines in these LMS technological environments, or how teachers might

design opportunities for such learning in particular fields of study. Other more finely-grained investigations such as Jackson (2005) will need to be undertaken in other courses and subjects that use UTSONline in ways tuned to the field under study. Moreover, we seek to design methodologies that might enable us to probe and understand what is happening in different parts of the system (as well as the wider field of e-learning itself) and to analyse these carefully for their utility in generating knowledge of the system parts, and concurrently, for their potential interactions with and influences within the system itself (for example, Jackson & Schaverien, 2005; Alexander et al., 2006). In this way, we work towards gaining a better understanding of complex dynamic systems and the diversity inherent to such systems. Also, within our system's worldview and with reference to the technological constraints currently designed into LMS, we question whether powerful educational collaborations with developers of LMS technologies could be established, with learning as the prime driver of design, to explore the possibilities and distill the principles that might guide future technological innovations. Though Gibbs and Gosper (2006) raise a call for teacher and developer collaborations in the development of learning technologies, we extend this notion to question what stake learners might also have in such a process (see Alexander, 2004a; Gershenfeld, 2005; Alexander, 2004c).

Nevertheless, as we progress through this early phase in the generation of learning technologies and with all the constraints evident in these embryonic developments, our approach takes a broader view of technology itself — as a tool, as a practice, as a system (Alexander, 2004b), and as a natural adaptive behaviour (Jarvis & Cosgrove, 1997) — and recognises that these two large-scale studies take a coarse-grain snapshot of e-learning:

as a technological system of intertwined parts including participants (staff and students), practices, tools, and context, all interacting to result in particular consequences ... [these studies recognise and seek] to further illuminate a system in which particular e-learning practices might be effective for particular groups of learners, in particular contexts (Alexander, 2004b, p. 5).

Notwithstanding a “technocentric” focus (a term coined by Papert (1987, 1990) to express the tendency to give a centrality to a technical object and to refer all questions to the technology — for example, “Will technology have this or that effect?”) that is currently prevalent in the field of e-learning, we, like Papert, want to investigate how and why *people* use technologies, *what* learning becomes visible in technological environments, and which conditions enable ongoing progression in dynamic systems, with an understanding that “the context for human development is always a culture, never an isolated technology” (1987, p. 23). So, our systems approach to the institution-wide provision of e-learning and the pursuit of technological designs *for learning*, encompasses Castells' view (2001) that:

. . . we engage in a process of learning by producing, in a virtuous feedback between the diffusion of technology and its enhancement . . . It is a proven lesson from the history of technology that users are key producers of the technology, by adapting it to their uses and values, and ultimately transforming the technology itself (p. 28).

It is only through this kind of systems process involving continuous cycles of generating opportunities and receiving feedback that we believe we can learn and develop high quality e-learning experiences for our students.

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