

## Minimum Indicators to Assure Quality of LMS-supported Blended Learning

**Robert A. Ellis**

Institute of Teaching and Learning, Carlslaw F07, University of Sydney, Sydney, NSW 2006, Australia  
r.ellis@vcc.usyd.edu.au // Fax: +61 2 9351 4331

**Rafael A. Calvo**

Dept of Electrical and Information Engineering, J13, University of Sydney, Sydney, NSW 2006, Australia  
rafa@ee.usyd.edu.au

### ABSTRACT

This study describes a set of institutional indicators that suggest minimum standards for the quality assurance of learning supported by learning management systems in blended contexts. The indicators are evaluated by comparing seven universities that use a common learning management system to support student learning experiences. The responses to a qualitative questionnaire provide evidence of how the participating universities approach leadership, policy making, development, and evaluation as they relate to the quality assurance of learning management systems. A comparison among the universities reveals that they tend to have a better understanding of technical rather than educational issues related to quality assurance. A case is made for the need for universities to address key areas in order to reliably assure the quality of learning supported by learning management systems.

### Keywords

Quality assurance, Learning management system, Leadership, Policy, Staff development, Evaluation

### Introduction

University student learning experiences continue to be influenced by the way teachers integrate information and communication technologies (ICTs) into course design. No longer is the use of ICTs that facilitate distance learning restricted to universities that have a mission to educate at a distance. The affordances provided by technologies are encouraging even campus-based universities to systematically invest in ICTs to enhance the student experience. The implications of this for ensuring the quality of the student learning experience are serious and complex. How can we assess the relationship of ICTs and the student learning experience? This is a difficult question, particularly because ICTs are often used to complement learning experiences in which a significant amount of face-to-face learning occurs.

One of the first difficulties in trying to improve student learning through the use of ICTs is agreeing upon how to talk about the subject. What is meant by the term “ICTs”? What is the focus of research on learning when ICTs are used to support part of the experience? How can we assess the relationship between face-to-face learning and learning supported by ICTs? This last question includes an increasingly common realisation of ICTs in the student experience of learning at university. The use of an online learning management system such as WebCT, Blackboard, or dotLRN to support campus-based learning experiences is an increasingly widespread international phenomenon in higher education. A brief search of leading journals on research in higher education and national websites responsible for teaching and learning, such as the Higher Education Academy in Great Britain and Educause in America, offers evidence of the frequency of this type of learning situation.

Over the last five years, a significant number of universities across Germany, Spain, Central America, and Australia have begun to use dotLRN as to complement the face-to-face experiences of students. DotLRN is an open-source learning management system containing number of ICTs (Calvo, Ghiglione, & Ellis, 2003). These include presentation tools (WimpyPoint, Wiki, blog), assessment tools (a QTI-compliant environment), communication tools (forums, chatrooms, video conferencing), and management tools such as Curriculum Central (Turani, 2006).

In this study, we consider the use of dotLRN to support the blended learning experiences of thousands of students across seven universities. Similar concerns for the quality assurance of student learning supported by dotLRN among the participating universities motivated intra-institutional discussions. The discussions led to an agreement to investigate the minimum set of indicators for assuring the quality of learning supported by a learning management system (LMS).

The structure of the study is as follows: The background introduces terminology and the prior research that supports the model and research methodology. The next section discusses six necessary but insufficient indicators for the quality assurance of learning supported by LMSs in blended learning contexts. Then the study's participants and the methods and questionnaires used are described. The article concludes with a discussion of the limitations, findings, and implications of the study.

## Background

The use of ICTs in universities often requires the use of a range of terminologies, the meanings of which are often dependent on the context in which they are used. The following definitions are adopted in this study to try to reduce ambiguity.

- *Learning management systems* are software systems designed to support student learning. They contain a number of presentation, assessment, communication, and management tools, for example, dotLRN, WebCT, and Blackboard.
- *E-learning* is defined as the use of ICTs to help students learn (HEFCE, 2005).
- *Blended learning* in this study is defined as a systematic mix of e-learning and learning in face-to-face contexts, in which coherence across the two contexts from a student perspective is achieved by focusing on the same intended learning outcomes.
- *Enterprise level issues* are those issues that concern most faculties. They are addressed at the university level.

The definitions of some terms require more explanation. One such term is *quality assurance* (QA). Quality assurance in higher education is a complex issue. In industrially orientated models of quality assurance, QA outcomes can be relatively straightforward, such as the quantity or fitness for purpose of a particular product produced in a certain way. In contrast, many of the outcomes of a higher education experience are often ephemeral, or at least not realised for many years, and are difficult to measure.

Quality assurance in higher education cannot simply focus on the *what*, such as the quality of graduates (however measured), or the quantity of employed graduates at a point in time. For one thing, there is no single measure of the quality of a graduate. A focus on quantitative measures, such as the number of employed graduates, is insufficiently descriptive to indicate *how* they developed their attributes sufficiently to make them employable. One of the shortcomings of using only outcomes-based indicators for quality assurance is that they are often not very useful for improving the (often complex) processes that lead to desirable outcomes. In a sense, if we do not understand the educational processes leading to the outcomes we are looking for, then we do not have a basis for evaluating them. Without that, it is difficult, if not impossible, to improve the quality of the outcomes we seek. Consequently, a key characteristic of models for quality assurance in higher education is a focus on the process. Improvement of process is one of the key principles underpinning models of quality assurance for higher education, such as the transformative model (Harvey & Knight, 1996), the university of learning model (Bowden & Marton, 1998) and the prospective model (Biggs, 2001).

Extensive and systematic research over 30 years has identified that the quality of student learning is associated with what students think they are learning, how they approach their learning, and how they perceive their learning context. Research has also shown that this is related to how teachers perceive of student learning, how they conceive of teaching, and how they approach the learning and teaching experience. Some key outcomes from this research suggest:

- Not all students experience the intended learning outcomes that teachers prepare in the same way (Biggs, 2003; Prosser & Trigwell, 1999);
- The quality of learning is closely associated to what students think they are learning and how they approach their studies (Marton & Booth, 1997; Ramsden, 2002);
- The quality of the student experience is related to teacher-adopted variations in approaches to teaching (Prosser & Trigwell, 1999);
- The quality of learning can be assessed by closed-ended instrumentation at the end of a student's course. For example, the course-experience questionnaire and student-experience questionnaires (Ramsden, 1991; Prosser & Trigwell, 1999).

The trialing and evaluation aspects of the course development and teaching processes present a significant challenge to universities that are looking to roll out the use of ICTs across hundreds if not thousands of courses supporting tens of thousands of students. In some ways, the enterprise-level issues for universities seeking to assure the quality of learning that arises from ICTs are to determine what those QA processes look like when QA strategies at the course level are aggregated upward to the institutional level.

Another more recent body of research helps to conceptualise what happens to the quality assurance processes for ICTs when they are aggregated across thousands of courses supporting tens of thousands of students. This area of research is often referred to as benchmarking e-learning. In the New Zealand higher education context, a maturity model of e-learning use has been developed (Marshall, 2005). Drawing on earlier research (Chickering & Gamson, 1987; IHEP, 2000) we divided e-learning into key process areas: learning, development, coordination and support, and evaluation. Using descriptors for each process area, we were able to assess the maturity of a university using e-learning to support learning. In the United Kingdom, the Higher Education Academy is sponsoring an e-learning benchmarking program. One approach to benchmarking e-learning among universities involves the use of a “pick and mix” tool. This is a list of 18 factors that represent dimensions of activity related to e-learning (Bacsich, 2005a; 2005b). Universities wishing to benchmark with each other can choose some of these factors and then engage in comparative descriptions (and some metrics, where possible) of how well they are faring. Examples of the 18 factors include the stage of development of the learning management system (or virtual learning environment) in the institution, ranging from no LMS to one LMS, and the stage of recognition of the workloads involved in using e-learning, ranging from no recognition to full activity-based cost recognition of workload. Research programs in both New Zealand and the United Kingdom offered some insight into the participating universities of this study regarding high level issues for assuring the quality of learning when an LMS such as dotLRN is used.

### Improving processes: embedding ICTs in course design

This study uses course development and teaching processes as a way of thinking about how to improve the use of ICTs in the university student experience. The process described in Table 1 below has been chosen for a number of reasons:

- It identifies key stages and decision-making involved when integrating ICTs into the course design and teaching;
- The identification of the key stages allows an understanding of practical approaches to the quality assurance of the whole learning experience and the parts supported by ICTs at the course level;
- It facilitates talking about the integration of ICTs from a student perspective;
- It provides a way of focusing on the outcomes of the learning experience;
- Different theories of learning can be used to underpin the process.

When staff consider integrating ICTs into course design, it is possible, as Table 1 suggests, to conceive of the process in two broad parts: deciding/planning/developing/trialing and learning/teaching/evaluation.

Table 1 identifies a typical course development and teaching process (Ellis & Moore, 2006). If we consider this table at the level of the development of a single course, the parts of the process can be conceptualised in terms of five stages, representing the broad stages staff use when redeveloping courses with ICTs. When redeveloping courses with ICTs, not all staff go explicitly through each stage. Rather, these stages represent the scope of activities in which staff might engage. Before describing the stages, it should be noted that even though the stages have been separated for analytical purposes, in reality some are iterative and entwined. For example, designing, developing, and trialing are much more likely to be integrated and cyclical than linear, as the table suggests. In addition, the extent to which the process is student-centered is related to the learning activities chosen, the type of evaluative data collected, and the theory that underpins the evaluation instrument design.

*Table 1. Examples of issues raised by introducing ICTs into course development and teaching processes.*

No.	Stage	Related issues
5	evaluation	evaluation of the learning experience, evaluation of the development process
4	learning, teaching, assessment	student access, authentication, orientation and training, learning activities, teaching approaches, assessment
3	design, development, and trialing	balance of educational media, production, teamwork, staff development, prototyping, editing, trialing
2	the planning processes	curriculum issues (objectives, learning activities, assessment, outcomes, evaluation), resourcing issues, technology issues, feasibility, approval (faculty, university board)
1	the decision to develop or redevelop a course with ICT	purpose, relationship to other courses, feasibility, scope, student needs, consultation, university mission statement

In stage 1, staff begin by undertaking some sort of decision-making. Those initial decisions depend on the size and scope of the redevelopment or design of the course, the needs of students, the learning strategies of their department, and the culture of the institution. In stage 2, learning objectives and outcomes are used to give direction to educational and technological planning, learning activities, assessment, and the type(s) of educational media to be used. It is during the planning stages that key issues related to ICTs must be addressed in order to assure sustainability and quality: resourcing (a type of cost/benefit appraisal of the technologies and their usefulness in terms of the learning outcomes); feasibility (understanding the difference between what is desirable and what is feasible in terms of a university's readiness to support staff); and staff development (whether or not the teaching staff have sufficient skills to support students in ICT-based learning experiences).

For purposes of improvement, perhaps the most important quality-assurance process from a student perspective is the trialing that occurs during stage 3. At a minimum, it should be done before the curriculum materials are provided to students so that outcomes of the trial can be used to improve the quality of the resources.

In stage 4, students use ICT-supported resources, materials, and activities, to achieve their learning outcomes. A key aspect to help students at this stage of the process is to show them how to use the ICT-supported resources effectively to help them achieve their learning outcomes. Discussing the variety and nature of activities during this stage is beyond the scope of this study. For the sake of efficacy, we turn to an evaluation of the learning outcomes of stage 4 in stage 5.

For campus-based experiences of learning, where the ICT is supporting only part of the experience, evaluation is complex. The whole learning experience needs to be evaluated from a student perspective. If the quality of the ICT-supported part is also of interest, it needs to be evaluated in similar and consistent ways, for the sake of validity, and related to the whole. If such data are systematically and cyclically collected, the information can be used by staff to improve their understanding of the students' expectations and ratings of ICT as it supports the whole learning experience of a course.

## **Towards necessary but insufficient indicators**

In discussions among the universities participating in this study, common themes arose that were related to sustaining the quality assurance of learning supported by LMSs in blended contexts. We based our summary of the key points on the experience of the participating universities and prior research. To have any chance of assuring the quality of learning activities supported by dotLRN, the combined experience of the participating universities suggests that there needs to be activity in the following six areas:

### **1. Leadership and ongoing funding**

Modern universities, especially large universities, have multiple stakeholders who contribute to determining what a university claims to be. In conflict with this characteristic is a general trend toward fewer resources available for higher education. Without a sponsor to protect and advocate for ongoing funding for the use of ICTs in supporting quality student learning, sustained, quality-assured, and institution-wide support for ICTs would be unlikely to develop.

### **2. Policy**

Policy formation goes to the heart of clarifying the culture of an institution. If there is no policy and planning for a particular area, one cannot realistically expect enduring and influential growth and change. This is particularly true for the quality assurance of ICTs when they are embedded in existing learning and teaching processes and systems, as opposed to when they stand as a discrete entity. For a university claiming quality assurance of ICTs in learning and teaching, a stated intention to support, enhance, augment, and elaborate the student learning experience through the use of ICTs should be evident in the university's strategic plan and operating policies if the quality assurance of ICTs in learning has any chance of being addressed.

### **3. Evaluation services**

Evaluation of ICTs in learning for campus-based universities must focus on the whole learning experience if the evaluation outcomes are to relate meaningfully to a blended experience. Part of this evaluation service needs to

consider how ICTs are used in the student learning experience and how their use contributes to the quality of the learning outcomes.

#### **4. Support for teaching and learning with ICTs**

If ICTs are used at the enterprise level to support student learning, then the ramifications of timely support of students and staff become serious. There is a range of strategies that are necessary to ensure the quality of learning when ICTs are used in the learning and teaching experiences. For example, when an LMS is used at the enterprise level, the QA strategies necessary include:

- backup and disaster recovery strategies for the LMS in case of computer failure;
- testing of the compatibility of platforms and browsers of an LMS;
- implementation of authentication services for users of the LMS;
- a rapid query-resolution process for technical issues raised by users of the LMS.

The quality-assurance issues are not restricted to the above, but also involve learning strategies such as:

- standards for orientation of student users in how to make the most of the resources on the LMS;
- a query-resolution process for learning issues raised by users of the LMS (For example, a helpdesk could be used to resolve both learning and technology issues);
- guidelines for the typical materials that students could expect on their subjects' web pages, which are published on the LMS. These guidelines could promote standards across all websites so that students can develop a set of sustainable expectations of how the LMS supports their learning across degree structures.

The point of listing some of these examples is not to create an exhaustive list of the issues that arise during learning when ICTs such as those found in LMSs are used to support students' experiences. Rather it is to underline the necessity of services and resources that are contingent on the scale of the ICTs being used by students across an institution.

#### **5. Support for planning, design, and development with ICTs**

Integrating ICTs into the student learning experience across a university requires appropriate knowledge and infrastructure, minimum standards of resourcing, and the time to engage in the design and development activity. Teachers who engage in these types of activities are often expected to fit them in around research and face-to-face teaching responsibilities, with little, if any, workload recognition for the time involved. Consequently, workload formulas or other workplace indicators should recognize in some way the time required to integrate ICTs into course design.

The scope of support for the planning, designing, developing, and trialing of ICTs in student learning is potentially endless. If an LMS is used at the enterprise level, its disaster recovery, technical robustness, and ongoing stability should be managed in such a way as to inspire confidence in the staff who invest significant time developing learning resources for students who depend on it. In addition, some sort of staff support for design and development issues should exist, such as either funds for small-project development or hands-on support from specialists with whatever necessary expertise is required (for images, texts, simulations, videos, etc.).

Resources for trialing ICTs that are aligned to the evaluation criteria of the whole learning experience are key aspects of ICT quality assurance. Course designers can use the outcomes of trialing, including user feedback, to tweak and adjust the resources before students use them. At this stage, it is necessary to ensure that the evaluation questions are not just about the technology, but about how ICT-supported resources help students achieve the learning outcomes that the materials have been designed to support.

#### **6. The decision to develop or redevelop a course with ICT**

Teachers should be able to access the university's vision or mission statements so that they will be able use ICTs to promote the university's strategic vision. This should be accompanied by a growing institutional and disciplinary understanding of which e-learning activities and materials are most appropriate and valuable for a school or department to develop and nurture.

University support and structures in the above six areas were thought to be worth investigating as emerging necessary but insufficient indicators that would need to exist within a university if it was, or was contemplating, supporting the quality assurance of ICTs in learning and teaching at the enterprise level.

Using these indicators as a way of comparison, how do the seven international universities supporting blended learning experiences measure up? The universities discussed in the study below all use the learning management system dotLRN to some extent. Some already use it as an enterprise system and some use it at departmental levels but may be contemplating its use at the enterprise level. Trialing the necessary but insufficient indicators described above, we investigated systems and structures in the participating universities in terms of their readiness for assuring the quality of learning supported by dotLRN.

## Participants and methods used

The sample consists of seven universities that use dotLRN to support blended learning experiences at an institutional or departmental level. Cooperation in the project was achieved through a research interest common to the participating universities. One university is from Germany, one from Norway, two from Spain, two from Central America, and one from Australia. The responses are from both small and large universities. Table 2 provides a profile of the participating institutions.

Table 2. Universities surveyed for the project

University	Student numbers	Staff numbers	DotLRN users	DotLRN accounts	Expected user increases
Heidelberg	41,000	6,500	48,000	48,000	-
Valencia	54,000	3,000	30,000	30,000	+ 30,000
Galileo	40,000	300	20,000	20,000	+10,000
Bergen	17,000	3,500	16,000	40,000*	-
Nicaragua	10,000	N/A	1,000	1000	-
Sydney	45,000	6,000	500	500	-
Carlos III	17,000	1,750	300	300	-

\* dotLRN is used by staff as well as by students

Table 2 shows the universities that were surveyed as part of this project. All use dotLRN to some extent and all use it as a way of extending the face-to-face experience of students. Large numbers of students use dotLRN in the first four universities. The University of Heidelberg (<http://www.uni-heidelberg.de>) is Germany's oldest university, with a long tradition of educational innovation and openness. The University of Valencia (<http://www.uv.es/~webuv/>) offers competitive undergraduate, masters, and doctoral programs in a number of disciplines. The university is well known for its medical school, which dates back to the late fifteenth century. Galileo University (<http://www.galileo.edu/>) is a new university created in 2000, with a focus on information technology. Based in Guatemala, Galileo is a leader in Central American education in the study of technology planning and analysis; electrical engineering; and the design, development, and application of educational technology solutions. Today, the LMS has 16,000 registered users, and actively supports 524 courses, 100 professors, and nearly 3,000 students. The University of Bergen (<http://www.uib.no/info/english/>) is Norway's major urban university, with two main physical campuses. The university's 17,000 students make up 10% of the population of Bergen, and its many centers and institutes are the city's most important academic institutions.

Not all universities surveyed use dotLRN as an enterprise solution. Some use it in combination with new ICTs to extend the students' face-to-face experience. For this reason, the number of users tends to be comparatively lower. Universidad Nacional de Ingeniería, Nicaragua (<http://www.uni.edu.ni/>) uses dotLRN to support the face-to-face learning experiences of 1,000 students. The University of Sydney is a research-intensive, campus-based university in Australia. DotLRN in this university is used to support the face-to-face learning experience of around 500 users. Universidad Carlos III de Madrid (<http://www.uc3m.es/>) is a modern university, created in 1989, in the outskirts of Spain's capital. It is organized into three centers: the social sciences and law faculty; the humanities, documentation, and communication faculty; and the school of engineering. Approximately 300 students use dotLRN to support their studies.

In order to investigate readiness for the quality assurance of dotLRN in the universities surveyed, we used open-ended questions concerning key issues related to the "necessary but insufficient" indicators for QA.

## The open-ended questionnaire

The size of the project and the geographically dispersed nature of the participants determined that the most efficient methodology for data collection was an open-ended questionnaire. The questionnaire comprised six sections: leadership, policy, problem management, staff development, user support, and evaluation. These sections made the most sense to participants in terms of key areas of activity related to an implementation of dotLRN while considering high-level management, educational, and technological issues.

The first question in each section was an open-ended question, designed to allow as much variation in responses as possible. The following questions in each of the section targeted more specific issues that the researchers considered noteworthy.

## Administration and analysis

We established discussions with all potential university members of the dotLRN Consortium. Recruitment took place through these discussions, and 80% of the universities contacted agreed to complete the questionnaire in sufficient detail for analysis. Questionnaires were emailed to respondents, who completed and return them to the researchers within a four-week period. Answers were assessed for their level of detail and completeness. Table 2 below summarizes the answers provided by the respondents.

Table 3. Open-ended questionnaire items

<b>Questionnaire: Assuring the quality of dotLRN use in campus-based universities</b>		
<b>1. Leadership</b>		<b>Indicator number</b>
1.1	Who is the most senior sponsor of learning management systems used to support student learning in your university? To whom do they report?	1
<b>Policy</b>		
1.2	What sort of university policies exist that influence the implementation or administration of “dotLRN”? What are the policies for?	2
1.3	Does university policy require staff to cyclically review course websites on “dotLRN”? If so, how often? Do staff review the course websites or does someone else?	2 and 3
1.4	Does university policy require staff to observe copyright issues related to course websites on “dotLRN”? How is this monitored?	2 and 5
1.5	Does university policy shape the ongoing activities of those people administering “dotLRN”? How?	2 and 4
<b>2. Problem management</b>		
2.1	What sort of problem management strategies are used by the “dotLRN” administrator?	4 and 5
2.2	How often does the “dotLRN” administrator test the stability of “dotLRN”?	4 and 5
2.3	How often does the “dotLRN” administrator test the compatibility of platforms and browsers with “dotLRN”?	4 and 5
2.4	What are the backup strategies for the “dotLRN” system in case of catastrophic failure?	4 and 5
2.5	Is the live “dotLRN” server co-located with the backup server (or is it housed elsewhere)?	4 and 5
2.6	Are users of “dotLRN” required to use a university authentication service when logging on?	4 and 5
<b>3. Staff development</b>		
3.1	What sort of staff development activities are provided that help staff how to use “dotLRN”? Who provides them?	5 and 6
3.2	Is there any e-learning training provided for teachers using “dotLRN”? By whom?	5 and 6
3.3	Are there any examples of successful course websites available to teachers using “dotLRN” for the first time? If so, please explain.	5 and 6
3.4	Does the university provide advice about resource implications of delivery models to teachers using “dotLRN”? Is so, please elaborate.	5 and 6
3.5	Are there any allowances made in teachers’ workloads for work related to developing course websites in “dotLRN”? Is so, please add some details.	4, 5 and 6
<b>4. User support</b>		
4.1	What sort of user support is offered to staff and students using “dotLRN”?	4 and 5
4.2	Does the university provide a helpdesk for staff? How many hours a week?	4 and 5
4.3	Does the university provide a helpdesk for students? How many hours a week?	4
4.4	Are there any guidelines for how long it takes to reply to a staff/student query? If so, what are they?	4

4.5	Are there any guidelines for the learning design of websites on “dotLRN”? What are they?	5
<b>5. Evaluation</b>		
5.1	Are there any evaluation services for student learning on “dotLRN” available at the university? What are they?	3

Table 4. Summary of answers to questionnaire items by respondents from the universities in Table 3

University	Leadership & Policy					Problem management					Staff development					User support					Evaluation	
	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4		4.5
University A	√	x	x	x	√	√	√	√	√	x	√	√	√	x	√	√	√	√	√	√	√	x
University B	√	x	x	√	√	√	√	x	√	√	√	√	√	x	x	x	√	√	√	√	x	√
University C	x	x	x	x	x	√	x	x	√	√	√	x	x	x	x	x	√	√	√	x	x	x
University D	√	x	x	x	√	√	√	√	√	√	√	x	√	√	x	x	√	√	√	√	x	x
University E	x	√	√	x	√	√	√	√	√	√	√	√	√	√	x	x	√	√	√	x	x	x
University F	√	x	√	x	√	√	√	x	√	x	x	√	√	x	x	x	x	x	x	x	x	x
University G	√	√	√	√	√	√	√	x	√	√	√	√	x	√	√	√	√	√	√	√	x	√

Table 4 is a summary of responses made by the participating universities. It can be read in five sections: leadership and policy, problem management, staff development, user support, and evaluation. The symbol “x” indicates (based on the answers in the questionnaire) that the university does not appear to have a minimum set of processes and systems in place to generally claim sufficient resources devoted to the area investigated. The symbol “√” indicates that it does. The greater the number of x’s in a section, the greater the need of attention to the area. The following identifies the criteria by which the researchers assessed the responses by the universities:

**Leadership:** For enterprise-level users of dotLRN, universities were assessed as having a high-level sponsor if the nominated person reported to the most senior academic manager in the university, for example, in Australia, the vice-chancellor, or in Europe, the Rector (1.1, 1.2). For lower-level users of dotLRN, the departments were assessed as having a high-level sponsor for dotLRN if the nominated person was the dean of the faculty or (the equivalent).

**Policy:** Universities/departments were assessed as having a policy-led approach to the implementation of dotLRN if existing policies required:

- performance indicators of quality of materials, for example, regular quality-assurance checks of websites on dotLRN (1.2, 1.5);
- cyclical reviews of websites (1.3);
- observation of copyright issues (1.4);
- performance measures for people involved, for example, helpdesk support and attendance (1.5).

**Problem management:** Universities/departments were assessed as having problem-management strategies for the management and review of dotLRN (2.1) if the following occurred:

- regular testing of stability of the platform (2.2)
- regular compatibility checks of dotLRN with browsers (2.3)
- existing backup strategies in case of catastrophic failure (2.4, 2.5)
- user-interoperability standards (2.6)

**Staff development:** Universities/departments were assessed as having staff development for dotLRN use (3.1) if the following were present:

- training for teacher-users (3.1, 3.2)
- examples of course websites (3.3)
- advice about resource allocation (3.4)
- acknowledgement of the effort involved in using dotLRN (3.5)

**User support:** Universities/departments were assessed as having user support for dotLRN (4.1) if the following existed:

- helpdesk for staff and students (4.2, 4.3)
- guidelines for responding to users (4.4)
- guidelines for the learning design of course websites (4.5)



**Evaluation:** Universities/departments were assessed as having sufficient evaluation services (5.1) if the following were present:

- a service designed to evaluate the holistic student-learning experience
- as part of that service, evaluation items related specifically to the use of dotLRN as a way of supporting student learning

The points under each section described above can be read as emergent minimum standards for the management and evaluation of dotLRN supporting student learning in blended contexts. The authors are not suggesting that these are the only minimum standards required for the successful ongoing management of dotLRN, but that they start to describe a space of activity that combines related management, educational, and technology issues related to the LMS.

## **Discussion**

This study investigated the experience of seven universities that use dotLRN as a student learning management system in relation to a minimum set of indicators for its quality assurance and improvement. The nexus between the quality-assurance issues and the open-ended questionnaire used to collect information from respondents is identified in column 3 in Table 1. This section discusses the issues in terms of the indicators necessary but not sufficient for the quality assurance of student learning enabled by dotLRN when it is used to complement face-to-face experiences of learning.

## **Limitations**

Before discussing the results in terms of the indicators, some limitations of the study should be noted. Firstly, the population sample included only seven universities. To develop more robust results, a second study, with a larger sample, should follow this one. Secondly, as with all research into widespread activity, a balance needs to be struck between the depth and breadth of the aspects of the phenomena being considered. In future administrations of the survey, accompanying interviews would enable a deeper analysis of the issues.

The study has indicated some areas of investigation that would increase the breadth of questions used in the survey. On reflection of the results in combination with some of the benchmarking literature (Bacsish, 2005a; Marshall, 2005), we believe an integration of strategic planning and funding questions would add to the issues raised by the course development and teaching process. In addition, it may prove to be more revealing if two surveys were used in the future: one for university-wide installations and one for local installations, to improve clarity of the issues at each level.

The limitations notwithstanding, the results provide some interesting outcomes for those interested in emerging developing standards for the management and evaluation of student learning supported by learning management systems.

## **Leadership**

Based on universities' responses by to the questionnaire, it seemed that if a sponsor of sufficiently high level was not interested in the use of an LMS as a way of supporting student learning, then there was unlikely to be sufficient sustained commitment to the maintenance and improvement of an LMS to support student learning. For small-scale installations at the department or discipline level, the ongoing sponsorship of the dean seemed necessary. For university-wide enterprise installations, an executive reporting to the most senior academic manager was considered necessary. The first section of Table 4 suggests that most universities had someone in a position to sponsor dotLRN as a solution for managing student learning.

## **Policy**

Table 4 shows that in the five sections of the questionnaire, the area of policy is the most undeveloped section across the institutions. In one sense, the existence of a senior sponsor, but the absence of a policy-led approach, suggests a lack of engagement of a structured approach to the management and ongoing evaluation of the LMS. It seems to the researchers that without policies helping to shape LMS-supported activities, it would be difficult to set standards for quality assurance for teachers and students across faculties.

## **Evaluation services**

The last section of Table 4 suggests that most universities do not have evaluation services for learning supported by dotLRN, and the majority of universities do not require staff to cyclically review course websites on dotLRN (item 1.3).

Services that help teachers to holistically evaluate the student learning experience and how ICTs are used to support the experience are important to quality assurance for blended learning experiences. There is substantial research into the evaluation of student learning experiences (Biggs, 2003; Prosser & Trigwell, 1999; Ramsden, 2002), and somewhat less on blended learning experiences (for example, Ellis & Calvo, 2006; Ellis, Goodyear, Prosser, & O'Hara, 2006). Fundamentals for this area include validated student-focused surveys that consider the quality of the students' learning experience. When ICTs such as those found in dotLRN are involved, the evaluation system needs to incorporate items that evaluate the student experience of LMSs. A key issue to keep in mind is the part whole relationship between the LMS-supported learning and the whole learning experience, that is, one that includes the face-to-face experiences.

## **Support for teaching and learning with ICTs**

Table 3 suggests that most universities have an awareness of problem management issues and strategies necessary for implementing the LMS. Most seem to engage in systematic tests of the platform's robustness and interoperability with other systems necessary for supporting teaching and learning. In comparison, there is less awareness of more people-orientated support, such as staff development and user support. In terms of supporting people, Table 4 suggests there is a greater awareness of user support issues than of staff development issues. In the context of the questionnaire, user support issues include helpdesk support, a standard response time to queries from the helpdesk, and guidelines for the learning design of course websites. Staff development issues include training for teacher-users, sample course websites for use as guides, advice about resource allocation, and acknowledgement of workload issues associated with the use of dotLRN. The responses from the universities suggest that some would have difficulty maintaining the quality of learning supported by the LMS without a more holistic consideration of these types of staff development issues.

## **Support for planning, design and development with ICTs**

Some of the responses to issues summarized in Table 4 are particularly relevant for individual staff planning, designing, and developing resources for student learning through an LMS. The issues include copyright guidance (1.4), examples of successful course website design (3.3), and guidance for learning how to design course websites (4.5). In the majority of universities surveyed, these types of resources are not provided. Furthermore, issues related to the resource allocation necessary for a use of dotLRN (3.4), including workload implications (3.5), seems to be a comparatively unsupported area of activity for most universities.

## **The decision to develop or redevelop a course with ICTs**

In one sense, it is possible to consider almost all of the responses to the questionnaire as related to the decision-making of staff when considering extending the face-to-face learning experiences of students with a learning management system such as dotLRN. Given the work and risks involved, most teachers would understandably be loath to invest time and effort into using dotLRN if they were not assured that problems would be resolved, training was available, successful examples and design advice were accessible, workload was taken into account, and so on. It is only through a combination of all of these types of issues that quality-assured approaches to developing student experiences of learning with ICTs such as those found in dotLRN could be implemented.

## **Conclusion**

While the issues discussed under each of the indicators have arisen through a combined experience of managing dotLRN, they appear sufficiently abstract to offer insight into similar issues for other LMSs. Before such claims are made forcefully, further research into the quality assurance of student learning supported by LMSs and their constituent ICTs will be necessary. However, universities wishing to benefit from the experience of the universities included in this study would do well to emphasise issues of leadership, staff development, and

evaluation when setting up their quality-assurance systems for blended learning supported by learning management systems.

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