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Necessary but insufficient indicators to quality assure blended learning supported by learning management systems

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Abstract

This study describes a set of indicators that identify emerging necessary but insufficient evidence for the quality assurance of learning supported by learning management systems in blended learning contexts. The indicators are evaluated by comparing seven universities that use a common learning management system to support students' 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 amongst the universities shows a better understanding of technical rather than educational issues related to quality assurance, and a case is made for activity in six key areas in Universities if they have any chance of assuring 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 are continuing to be influenced by the way teachers are integrating information and communication technologies (ICTs) into course design. No longer is the use of ICTs that facilitate distant 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 the relationship of ICTs to the student experience in terms of the learning be assessed? This is a difficult question, not the least 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 of trying to improve student learning through a use of ICTs is agreeing upon how to talk about it. What is meant when the term ‘ICTs’ is used? What is the focus of research into 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 realization of ICTs in the student experience of learning at university. The use of an on-line learning management system such as WebCT™, Blackboard™, or dotLRN™, to support campus-based learning experiences is an increasingly widespread international phenomenon in higher education. The briefest of searches in leading journals into research in higher education or on national websites responsible for teaching and learning such as the Higher Education Academy in Great Britain, 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 a way of complementing the face-to-face experiences of students. DotLRN is an open-source learning management system containing a number of ICTs (Calvo et.al, 2003). These include presentation tools (WimpyPoint, Wiki, blog), assessment tools (a QTI compliant environment), communication tools (forums, chat, video conferencing) and management tools such as Curriculum Central (Turani, 2006).

In this study, the use of dotLRN to support the blended learning experiences of thousands of students across seven universities is considered. Similar concerns for the quality assurance of student learning supported by dotLRN amongst the participating universities motivated intra-institutional discussions. The discussions led to an agreement to investigate what a minimum set of indicators might look like to assure the quality of learning being 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 meaning 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 that contain a number of presentation, assessment, communication and management tools, for example, dotLRN, WebCT, Blackboard.
- *E-Learning* is defined as the use of ICTs to help students learn (HEFCE, 2005).
- *Blended learning* in this study will be 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 that are addressed at the level of the university which are the concern of most faculties.

The definitions of some terms require more explanation. One such term is ‘quality assurance’. Quality assurance (QA) 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 realized for many years, and are difficult to measure.

Quality assurance in higher education cannot simply focus on the ‘what’ of things, 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 a *process*. Improvement of a process is one of the key principles underpinning models of quality assurance for higher education such as the Transformative model (Harvey and Knight 1996), the University of Learning model (Bowden and 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. It has also shown that this is related to how teachers conceive 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 and Trigwell, 1999)
- The quality of learning is closely associated to what students think they are learning and how they approach their studies (Marton and Booth, 1997; Ramsden 2002)

- The quality of the student experience is related to variations in the approaches to teaching which are adopted by teachers (Prosser and Trigwell, 1999)
- The quality of learning can be assessed by closed-ended instrumentation at the end of a students' course. For example, the Course Experience Questionnaire and student experience questionnaires (Ramsden, 1991; Prosser and Trigwell, 1999).

The trialing and evaluation aspects of the course development and teaching processes present a significant challenge to universities who 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 arising from ICTs is to determine what those QA processes look like when QA strategies at the course level are aggregated upwards to the level of the institution.

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 and Gamson, 1987; IHEP, 2000) E-Learning is divided into key process areas: learning, development, coordination and support, evaluation. Using descriptors for each process area, the maturity of a university using E-Learning to support learning can be assessed. In the United Kingdom, the Higher Education Academy is sponsoring an E-Learning benchmarking program. One approach to benchmarking E-Learning between universities involves the use of a 'pick and mix' tool. This is a list of 18 factors which 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 VLE) in the institution, ranging from no LMS to one LMS, the stage of recognition of the workloads involved in using E-Learning ranging from no recognition to full activity-based cost recognition of workload. Both of the programmes of research in New Zealand and the United Kingdom offered some insight to the participating universities of this study of 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 a course level
- It facilitates a way of talking about the integration of ICTs from a student perspective

- It provides a way of focusing on 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: Examples of issues raised by introducing ICTs into course development and teaching processes.

No	Stage	<i>Related issues</i>
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 which consider	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

Table 1 identifies a typical course development and teaching process (Ellis and Moore, 2006). If we consider it 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. Not all staff, when redeveloping courses with ICTs, 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 learning activities chosen, the type of evaluative data collected and the theory that underpins the evaluation instrument design.

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 need 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 are used to improve the quality of the resources.

In stage 4, students use the ICT-supported resources, the 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 so as 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 amongst 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. Based on the experience of the participating universities and prior research, the following points summarize the key points. 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 tension with this characteristic is a general trend towards fewer resources available for higher education. Without *a sponsor who protects and advocates 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 can not 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, rather 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 university strategic plan and policies operating at the university 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 evaluate how ICTs are used in the student experience of learning 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 an enterprise level to support student learning, then the ramifications for timely support of students and staff become serious. There are a range of strategies that are necessary to ensure the quality of learning when ICTs are embed in the learning and teaching experiences. For example, when an LMS is used at an enterprise level, the QA strategies necessary include:

- Backup and disaster recovery strategies for the LMS in case of total failure.
- Testing of the compatibility of platforms and browsers of an LMS.
- The implementation of authentication services for users of the LMS.
- Some type of rapid query resolution process for technical issues raised by users of the LMS.

The quality assurance issues are not restricted to these but also to learning strategies, such as;

- Standards for orientation of student users in how to make the most of the resources on the LMS for their learning.
- 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 students could expect on their subject websites published on the LMS. The purpose of these guidelines could be to promote standards across the all websites so that students could develop a set of sustainable expectations of how the LMS was being used to support their learning across degree structures.

The point of listing some of these examples is not to create an exhaustive list of the issues that arising during learning when ICTs such as those found in LMSs are used to support their experiences. Rather *it is to point towards the necessity of some services and resourcing being in place, which are contingent in size and scope on the scale of the ICTs being used by students across an institution.*

5. Support for planning, design and development with ICTs

The integration of ICTs into the student experience of learning 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 are engaging in this type of activity are often expected to fit it in around research and face-to-face

teaching responsibilities, with little, if any, workload recognition for the time involved. Consequently, workload formulae or some other type of 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 an 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 hours developing learning resources for students which are dependent on it. In addition, some sort of staff support for design and development issues should exist, either funds for small project development or hands on support from specialists with whatever necessary expertise is required (for images, texts, simulations, video etcetera).

Key amongst aspects for this indicator of quality assurance of ICTs, are resources for trialing of the ICTs that are aligned to the evaluation criteria of the whole learning experience. In this way the outcomes of trialing can be used by the course designers to tweak and adjust the resources before they are used by students based on user feedback. It is necessary at this stage to ensure that the evaluation questions are not just about the technology, but how the ICT supported resources are helping 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 put their hands on vision or mission statements made by the university that offer a way for staff to coherently align and motivate their use of ICTs to address the strategic vision of the university. This should be accompanied by a growing institutional and disciplinary understanding of what 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 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 are already using it as an enterprise system and some are using it at departmental levels but may be contemplating its use at an enterprise level. Trialing the necessary but insufficient indicators described above, systems and structures in the participating universities are investigated in terms of their readiness for assuring the quality of use of the learning supported by dotLRN.

Participants and methods used

The sample consists of seven universities who are using dotLRN to support blended learning experiences at an institutional or departmental level. Cooperation in the project

was achieved through a common research interest in 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

<i>University</i>	<i>Student numbers</i>	<i>Staff numbers</i>	<i>DotLRN users</i>	<i>DotLRN accounts</i>	<i>Expected user increases</i>
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 who 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. 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 15th century. Galileo University (<http://www.galileo.edu/>) in Guatemala is a new university, created in 2000 with a focus on information technology. Based in Guatemala, Galileo is a leader in Central America education in the study of technology planning and analysis; electrical engineering; and 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 the Universities surveyed use dotLRN as an enterprise solution. Some are using it as a way to innovate with the use of 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/>) is using dotLRN as a way of supporting the face-to-face learning experiences of 1000 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 organised in 3 Centers: The Social Sciences and Law Faculty, The Humanities, Documentation and

Communication Faculty and the School of Engineering. Around 300 students are using dotLRN to support their studies.

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

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 is designed in five 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 which considered high-level management, educational and technological issues.

The first question in each section is an open-ended question, designed to open up idea of the section to as much variation as possible. The following questions in each of the section target more specific issues felt by the researchers to be noteworthy.

Administration and analysis

Discussions were established 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 returned them completed to the researchers within a four week period. Answers were assessed for level of detail and completeness. Table 2 below summarizes the answers provided by the respondents to each question of the questionnaire.

Table 3: Open-ended questionnaire items

Questionnaire – ‘Assuring the quality of “dotLRN” use in campus-based universities’		
1. Leadership		Relates to indicator number;
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
Policy		
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 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 on-going activities of those people administering ‘dotLRN’? How?	2 and 4
2. Problem management		
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
3. Staff development		
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
4. User support		
4.1	What sort of user support is offered to staff and students using ‘dotLRN’?	4 and 5
4.2	Does the University provide helpdesk for staff? How many hours a week?	4 and 5
4.3	Does the University provide helpdesk for students? How many hours a week?	4
4.4	Is 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
5. Evaluation		
5.1	Are there any evaluation services for student learning on ‘dotLRN’ available in the University? What are they?	3