HOW TO MANAGE THE WIDESPREAD USE OF LEARNING TECHNOLOGY: MANAGED LEARNING ENVIRONMENTS

Sarah Porter
Joint Information Systems Committee
University of Bristol, UNITED KINGDOM
s.c.porter@bristol.ac.uk

Abstract

The widespread introduction of technology to support learning and teaching has put pressure on the UK educational community to consider its ability to support and manage online learning. The Joint Information Systems committee (JISC) has recently invested £5 million in working with further education colleges and universities to implement and research Managed Learning Environments as a key concept in the support of learning through the use of IT. This is in response to driving strategic objectives in the Further Education (FE) sector and strategy combined with a gradual uptake of learning technologies in the Higher Education (HE) sector. JISC has worked with the educational community to agree definitions of Virtual and Managed Learning Environments and through its development programmes has tested out these definitions. Recommendations for good implementation practice have focused upon cultural and organisational issues to support change management in organisations. The use of emerging learning technology standards is crucial to the future development of flexible learning environments that meet the needs of the whole UK educational sector.

Keywords

Management of learning

Background

The Joint Information Systems Committee (JISC) is a strategic advisory committee working on behalf of the funding bodies for further and higher education (FE and HE) in England, Scotland, Wales and Northern Ireland. It also works in partnership with the UK Research Councils. The JISC promotes the innovative application and use of information systems and information technology in both Further and Higher Education across the UK by providing vision and leadership and funding the network infrastructure, Information and Learning Technology (ILT) and information services, development projects and high quality materials for education. Its central role ensures that the uptake of new technologies and methods is cost-effective, comprehensive and well focused. Members of the JISC and its committees are senior managers, academics and technology experts from across the education sector. This provides strong links with the community and ensures the JISC remains responsive to the changing needs of FE and HE.

JISC's Five Year Strategy (JISC, 2001) identified as its second key priority for 2001 to 2005 to: 'Help institutions create and maintain Managed Learning Environments (MLEs) to support students'. The JISC Development Group has taken principle responsibility for taking this priority forward through a programme of discussion and debate, awareness-raising, and development activities in colleges and universities.

One of the key objectives that JISC has already achieved within the UK is to agree with colleges and universities a common vocabulary for learning environments and, in particular, to define what is meant by the term Managed Learning Environment. This paper will present the JISC definitions for Virtual and

Managed Learning Environments. It will summarise the development activity that JISC has funded in Further and Higher Education in the last two years, and which has substantially moved forward shared understanding and objectives in this arena. It will then discuss the conclusions of these programmes of development, and the future activities and priorities for colleges and universities in the UK in moving towards better management of online learning as part of their core business.

Institutional context and drivers: why MLE?

The JISC MLE agenda has not developed in isolation. In the main, it has been driven by pressures in both the Further and Higher Education sectors in the UK. Some of the context for these pressures is described below in an attempt to summarise the key institutional imperatives for moving towards the development of Managed Learning Environments.

Drivers for Further Education colleges

The UK Further Education sector has seen recently some substantial changes to its remit whilst funding has been cut in real terms. At the same time, the Government's Department for Education and Skills is putting increasing pressure on colleges to meet quality targets (DfES, 2001) and, overall, colleges are operating in an environment of increased competition and uncertainty.

A new funding body to manage the FE sector, the Learning and Skills Council (LSC), has been set up with a far broader remit than its predecessor, the Further Educational Funding Council. The LSC has an extended mandate that covers work-based learning, School Sixth Forms and Adult and Community Learning as well as FE colleges. Its emerging agenda is putting an increasing emphasis on the need to address social exclusion and widening participation; to make learning even more relevant to the workplace; and to address national priority areas such as Basic Skills. The FE sector is responding to these changes by trying to move towards a system that is based less on course-based teaching towards individualised student-centred learning. Information and learning technology is being prioritised as a tool to support that move. The LSC's Distributed and Electronic Learning Group (DELG) recently published a report that stated: 'well planned, high quality, expertly supported e-learning, will play an increasingly important role in enriching and extending post-16 learning provision, making a major contribution to the delivery of the LSC's targets' (LSC, 2002).

A recognition of the potential role for technology in supporting educational objectives has been recognised in the FE sector for some time. The Further Education Funding Council Circular 99/45 (FEFC, 1999) detailed the FE support for JISC and made specific recommendations about research into managed learning environments:

"The committee recommends early detailed research into managed learning environments with the aim that a specification and open standards for these environments be developed for the sector […]. The Council has approved funding for these activities and has asked the FEILTC to give them early priority in the implementation plan."

Thus we can see that the drivers for the exploration of Managed Learning Environments has been led, in the English FE Sector, by centralised approval and funding from the college funding councils. This has further been supported by a programme of identifying and sharing ILT expertise in colleges, through the ILT Strategies and ILT Champions programmes, and by the allocation of funding to colleges for the purchase of learning environments software.

Drivers for Higher Education Institutions

The situation is very different in Higher Education. In Higher Education, the awareness of managed learning environments comes from an upsurge in usage of Virtual Learning Environments (or Learning Management Systems). The current interest in the purchase and deployment of Virtual Learning Environments comes from the timely convergence of at least three factors that are present within Higher Education institutions. Firstly, there has been a paradigm shift in the use of technology to support learning and teaching by individual academics and teachers. Ten years ago, equally complex and sophisticated software packages were available to Higher Education but only a small proportion of teaching staff were even aware of the software, let alone trying to use it to support their students. Costs in setting up software, creating materials and training students were simply too high for the majority of

tutors. With the now commonplace use of the Internet by teachers for email communication and to support their own research, there has been a corresponding shift towards the possibility of using web technology to provide support to students. We have thus seen a gradual increase in the use of some technologies – perhaps email communication, perhaps lecture notes on a web page, perhaps more sophisticated uses of technology in limited cases – to support the teaching process.

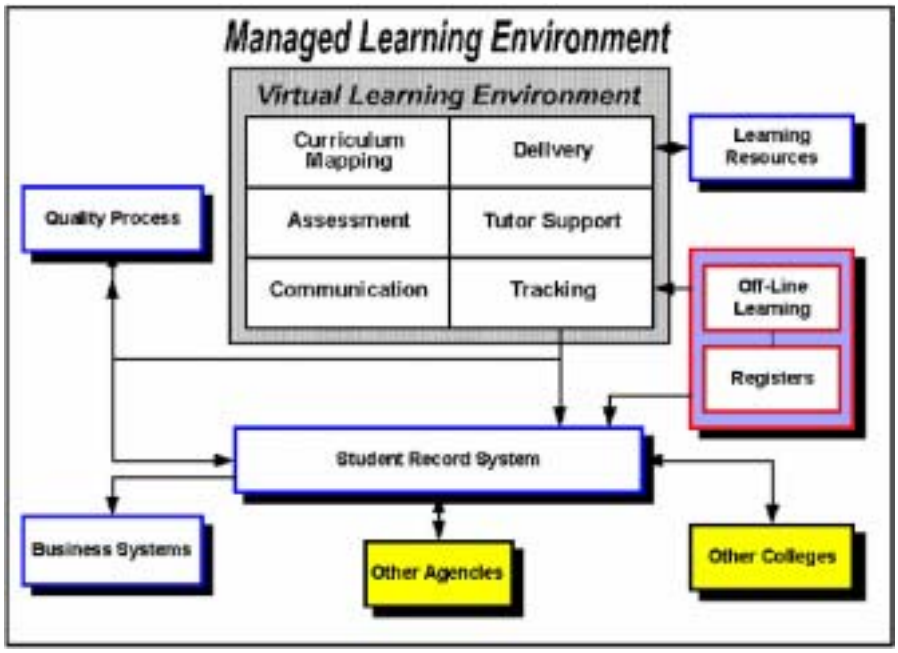
Secondly, some institutions have also begun to change in the way that they view learning technologies and are increasingly treating learning technologies as one aspect of their institutional strategy rather than as peripheral to mainstream activities. The University and Colleges Information Systems Association (UCISA) survey of VLE use in the UK reveals that for 76% of respondents, VLEs are cited in their institutional strategy documents such as their information strategy and their teaching and learning strategy (UCISA, 2001). This increasingly centralised view of learning technologies has meant that substantial resources are being put into the development or purchase of new learning technologies that will support students and teachers across the whole institution.

Thirdly, there has been an emphasis for several years at the national strategic level on the use of technologies to support learning, teaching and training. Initiatives such as the National Grid for Learning, the University for Industry, Scottish Knowledge, the e-University and many others funded by the Higher Education Funding Councils and Department for Education and Skills have all raised the expectations for technology to support learning activities and, in particular, to offer the potential through technology to widen participation in education. This strategic vision from the government departments and others has a significant impact upon the strategy in institutions, and together these three factors have created an environment where learning technologies have the potential to be used on a large scale across higher education.

The UCISA Survey revealed that 81% of respondents are currently using at least one VLE at their University and an increase in this level of use is predicted. As larger numbers of learners are supported through the VLE, it becomes crucial to consider how this scaling up of technology use can be supported throughout the whole organisation. Issues of systems integration, support, new roles and overlapping responsibilities between different departments are leading institutions to consider a more coherent and strategic vision for their use of ILT: a managed learning environment.

Managed and Virtual Learning Environments: definitions

"Managed Learning Environments (MLE) include the whole range of information systems and processes of the [educational institution] (including its VLE if it has one) that contribute directly or indirectly to learning and learning management." (JISC MLE Steering Group, 2000).



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Any institution that tries to implement a VLE across the whole organisation will quickly find that the widespread use of a learning environment actually impacts on many different parts of the institution and the processes that are currently in place in the institution. For example, the use of a VLE across a whole department means that all learners need to be registered the start of the academic year and given access to the appropriate course materials. This undertaking needs to tie in with registration procedures for courses and modules – it is only after all students are correctly registered for their courses that they can be given access to the correct materials in the Virtual Learning Environment. Consider what then needs to take place at the end of the academic year – the first year's cohort of students need to be given access to a new set of resources, and a new cohort of students given access to the resources that the previous group no longer need to see. The department will also need to consider the management of authentication to the system: many VLEs currently require that users have a separate username and password for their system, and the allocation of usernames and passwords may have to be managed separately from that of the University network, for example.

How much more convenient and sensible it would be if instead of duplicating systems in the institution such as student record systems, course registration systems, authorisation systems, and so on, the VLE could instead draw upon the data that already exists. Even better, the VLE could return some of the rich data that it collects about student use of the system to existing systems and help the institution to build up a much clearer picture of the online activities that its students are undertaking.

This concept is key to the principles behind the Managed Learning Environment: where all the processes and systems of the institution are viewed from the perspective of supporting learning activity. The diagram below gives a simple example of some of the systems and processes that might be included in a MLE. Whilst this diagram is by no means perfect, it has proved instrumental in providing the UK FE and HE communities with a shared understanding of the range of systems and processes that may be involved, and a clear and concise definition to use to frame discussions within their own organisation.

Unlike a VLE, no Managed Learning Environment software can currently be bought 'off-the-shelf'; each institution will have to bring together a number of different systems in the institution in order to build their MLE. This may include building automatic links between systems that do not usually work together. Managed Learning Environments encompass an area that is far broader than simply software products. As stated above, the MLE framework does not end with software systems but may include the whole range of processes and systems that support learning activity within an organisation (JISC, 2002).

Programme of activities

Community consultation and agreement of definitions

JISC began to discuss the definitions of MLE activity with the education community in early 2000 through a series of strategic workshops which provided the community with a forum for the discussion of definitions of MLEs. One of the key quotes to emerge from that exercise was:

'The hard truth is that without an MLE/VLE a University is not sustainable far into the 21st century' (JISC, 2000).

The JISC, recognising that the implementation of an MLE is a difficult area, established the MLE Steering Group (MLESG) to take forward the crucial task of agreeing definitions for VLE and MLE. The Steering Group recognised early in its work that the immaturity of both the products and the thinking about their use was causing confusion in the sector, as was the vocabulary being used. In the JISC Circular that set out the work programme of the group it was noted that:

"Coming to terms with the MLE concept is made more difficult by the ambiguity of the term's existing usage. Existing products described as MLEs, while sharing some superficial uniformity, vary considerably in their functions. Moreover, a variety of terms (Managed Learning Environment, Virtual Learning Environment, Learning Management System and On-line Learning amongst others) appear to be used without clear differentiation from each other. There is no particular reason why any one of these terms should be used in preference to another – the main concern is that they should be used consistently across the sector."

Through extensive dissemination activities and consultation activities (see for example the MLE briefing papers that JISC commissioned, written by teachers and learning technologists who are active in the sector), the definitions have become widely used throughout the UK FE and HE sector.

Programmes of MLE development

In 2000, Managed Learning Environments remained very much a concept in the UK with very few examples of integrated learning and management systems, and no examples of a full-scale MLE. JISC has invested over £5 million over a three-year period to work with FE colleges and universities to develop MLEs and to monitor and explore the implications of the development and use of a MLE within an organisation. It is interesting – though perhaps not surprising - to note that the **development and planning** of a MLE will act as a significant agent for change within an organisation and these projects have monitored organisational and cultural issues as well as those of a more technical nature.

Building MLEs in HE

JISC has funded twelve projects that have investigated different aspects of MLE development. In many cases, funding has been allocated to UK universities to develop integrated systems that underpin learning and learning management activities. The 'joined up institutions for learners' strand of projects has developed learner-centred systems that bring together disparate resources into a single coherent interface, frequently some sort of 'portal' interface that is based upon web browser software. Projects have also examined the institutional and cultural issues of systems integration.

The projects have developed several different models for MLE development that enhance the agreed MLE framework. For example, the Sunderland University SMILE project and the De Montfort University MLE projects have developed its own diagram to describe their MLEs.

Other projects have focused upon the 'back office' developments and changes that are needed to support online learning. The Writtle College project has worked extensively to implement its new Information strategy by mapping the current information storage and transfer that takes place through disparate information systems and making a single source of accurate information available to staff. The INSIDE project has mapped out all information processes and flows between a department and central administration and used this as a basis for rationalising the information flow process to be more accurate and timely. This has laid the basis for the development of a student module registration system where students can self-register and select modules online.

Projects have taken a variety of approaches to technical development. Many have focused upon the use of open source software tools or platform-independent languages such as Java and XML to build integration systems that link together different systems. The programme emphasises the re-usability of technical solutions and some of what has been developed will be available for use by the wider community.

MLE Interoperability pilots
These findings are echoed in a second major programme of MLE development that JISC has sponsored. The MLE Interoperability pilots have explored a components-based model of MLE development, where different MLE components (in particular Virtual Learning Environments and Student Record Systems, but also some content management tools and repositories) are integrated by using open specifications. The programme has focused upon the use of the IMS specifications to exchange data between systems. The development that has taken place has been unique in JISC's development activities over the last ten years because of the close working practices that have evolved between the colleges and the commercial software vendors. Together, the colleges and software vendors have identified the key requirements for the systems and have implemented the IMS specifications in order to facilitate the movement of data between systems. The programme has also worked closely with the IMS developer community to not only use the specifications but to feed into the ongoing development of the specifications. One aspect of this has been the agreement of a set of 'English FE extensions' to the IMS Enterprise specification; these extensions have been approved by all parties and have been accepted for implementation into the general IMS specification.

The findings of the MLE Interoperability programme have been summarised (JISC 200a and b). Overall, the findings have indicated that whilst technical specifications made great gains towards easing the exchange of data between systems, they do not currently present a whole solution as additional work is needed to achieve data exchange. In addition, and echoing the findings of Boys below, the report finds that college process issues are at least as important as software issues, and that organisational structures can make or break MLE development.

Cultural and organisational aspects of MLE implementation

Cultural and organisational issues have proved to be the key to successful implementation of MLES. A supporting study by Boys (2002) has revealed that the development of MLEs in the JISC-funded universities has taken place according to four different models: comprehensive, additive, parallel or autonomous. MLE developments may involve the whole organisation in the change associated with implementation; may be an 'add-on' to the existing systems without actually changing those systems; may operate in parallel to the systems without any integration; or may be completed separate or autonomous to other institutional processes and development.

Boys takes these definitions further and identifies that 'there are 2 basic paradigms for MLE development, one concerned with merely integrating existing systems and the other with rethinking educational and organisational processes'. This comment is symptomatic of any implementation of a new system within a complex and established environment: a very common approach is to work around the current structures, to create tools and interfaces that give the appearance of integration without actually making changes to the systems and processes that are already in place. A second approach, and which is more in tune with accepted change management practice, is that the new system is used as a vehicle to explore current structures and processes that are no longer appropriate for the core business of the institution. The MLE can provide a vehicle for the department to re-engineer their current systems and processes and beneficial change to occur.

The overall message is that successful implementation of a new, integrated approach to learning technology cannot take place in isolation from existing processes and systems. All relevant structures and processes need to be considered and, where appropriate, re-engineered in order to achieve the most effective implementation. This requires support from all levels of an organisation.

Learning technology standards and specifications

It is in attempting to get systems to 'interoperate' that educational standards becomes very important. There are currently no agreed standards for describing data such as student records, or for tracking the use

that a student makes of a VLE. However, the IMS Consortium is working on the development of draft standards or specifications that will encompass many of the key areas for learning including content management and exchange, student data exchange, computer-aided assessment, and metadata. The UK has a support centre, the Centre for Educational Technology Interoperability Standards (CETIS) that is providing input to the development of learning specifications on behalf of the UK post-16 educational sector, and also provides support and information to the UK through its web site. CETIS runs a number of Special Interest Groups, in the main based around the IMS specifications, which provide a forum for non-specialists to input to the development of the IMS specifications.

In a practical sense, colleges and universities have been encouraged to test out the IMS specifications within their institution, and to feedback to the IMS Consortium about how well the specifications meet the needs of educational organisations. If we feel that the specifications need to be further developed because they do not meet our needs, we can pass this information back. This testing has taken place for the Enterprise specification, the Learner Information Package, and the content packaging specification.

It is seen as essential that the UK should adopt a coherent strategy for inputting to the early development of standards. We need standards in the future that will meet the varied needs of a large and highly diverse educational community, not standards that have been developed by and for commercial vendors. The best way to influence the development of standards is through inputting to their development and testing.

JISC and CETIS' involvement in the development of educational standards has taken two approaches. One, as described above, has been to test out specifications at an early stage and make recommendations for their further development. A second approach is to develop additional specifications that fill perceived 'gaps' in the available repertoire. This is a similar approach to that taken by the Open University of the Netherlands in its development of the Educational Modelling Language (EML, 2002). EML now forms the new area of IMS specifications, Learning Design, and has the potential to have the biggest influence to date on the development of flexible learning environments that meet the needs of different learners and teachers. More information is available on the CETIS web site (CETIS, 2002).

Future activities

The MLE agenda is not static and JISC is continuing to develop new programmes and activities that can help the educational sector to better explore learning environments and their implications for the management of learning. Current developments include a programme to explore the use of MLEs that cross institutions boundaries. The *MLEs for Lifelong Learning* programme is bringing together universities and FE colleges who encourage the transfer of students between organisations. The programme is exploring the development of cross-institutional architectures to support articulating or transferring students; cultural and change management issues for the integration of organisational processes across different organisations; and the sharing of learning resources across organisations.

JISC is reviewing the MLE conceptual framework and working with experts from the educational community to investigate whether it is possible to design a framework that can describe a MLE structure in a standard way. We hope to build on the findings of the CoMantle (Britain, 2002) project, which looked at theories of organisational structure and technology in learning and teaching, to draw together a framework that will encapsulate the different types of MLE structures that are being used in education. This framework will be published for discussion with the educational community. We do not wish to produce rigid frameworks that will restrict organisations but to attempt to summarise how organisations are using technology to support learning and teaching through MLEs and through other related technologies, such as portals.

JISC is also increasingly interested in the links between learning systems and library systems. A new programme of activity to be launched in September 2002 will explore the integration of VLEs and library systems, with particular focus upon the pedagogic activities that are jointly support by library and teaching department.

The learner-centred use and management of information is also an area that is key to JISC's future activities. Working with the government-funded Centre for Recording Achievement (CRA, 2002), the JISC hopes to take forward the standardisation of a learner-owned Lifelong Learning profile that will

belong to the learner for their whole lifetime, and can be transferred from organisation to organisation. Standards will have an important role to play in this crucial activity.

We also hope to take a step back from the implementation of technical systems and consider the more far-reaching questions about the effectiveness of technology to support the learning process. JISC hopes to fund a study in 2003-4 that will consider the impact of technologies upon the learner and the relationship between pedagogic models and learning through technology.

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