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A Framework for the Pedagogical Evaluation of Virtual Learning Environments

Sandy Britain

Oleg Liber

Introduction

This report updates an earlier JISC report by the same authors entitled 'A Framework for the Pedagogical Evaluation of Virtual Learning Environments' (1999). That report can be found online at: [\[http://www.jisc.ac.uk/uploaded_documents/jtap-041.doc\]](http://www.jisc.ac.uk/uploaded_documents/jtap-041.doc).

The structure of this report is as follows:

- Chapter one provides an overview of the current context of e-learning
- Chapter two presents the revised framework which elaborates and extends the model
- Chapter three presents a review of a selection of current systems against the framework

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1: The Changing Landscape of Elearning

Introduction

In 1999 we proposed a pedagogical framework for the evaluation of VLEs that was grounded in both educational and organisational theory, (Britain and Liber, 1999). That report was driven by the lack of work in the field at the time examining how VLEs could enhance teaching and learning. In 1999 many institutions were evaluating VLEs with a view to making their first step into using Internet-based ICT in their teaching and so the report was written to help educators understand how the design of systems could facilitate or constrain their pedagogical use in different contexts.

Now in 2003, elearning has matured considerably. ICT developments to support teaching and learning are no longer predominantly confined to isolated projects within academic departments and learning technology support units, but instead form a core part of institutional strategy and policy (Conole et al., 2002). Widespread uptake of VLEs within HEIs has been supplemented by work to join up institutional administrative systems with VLEs to form Managed Learning Environments (MLEs). At a national level, e-learning has become the subject of a variety of government sponsored strategic initiatives in support of the programme of widening participation in HE and FE and promoting e-learning as an approach to improving the quality of education provision and empowering learners. The government's vision for the future of e-learning is encapsulated in the DfES e-learning strategy consultation document 'Towards a unified e-learning strategy' (online).

However, a recent JISC survey suggests that despite the current investment in e-learning through development of MLEs, this work has yet to make a significant impact on the quality of teaching and learning and pedagogical innovation; even though these are most commonly cited as key drivers.

'Enhancing the quality of teaching and learning' is the key driver, identified by almost every institution, for MLE development. However, the reality appears to be that the student experience is being enhanced through improved delivery of teaching materials and course announcements, improved access to learning resources and better communication. Pedagogical issues are not (yet) a part of this, and, indeed, appear to have been of secondary concern until now.

Managed Learning Environment Activity in Further and Higher Education in the UK. JISC / UCISA report (2003)¹

Since the 1999 report was published, the landscape of Elearning in HE and FE in the UK has changed considerably. Many of these changes are reviewed in the Landscape report from which the above quotation was taken. The quotation serves to highlight the tension that exists between three of the core themes of e-learning developments today: The trend towards institutional level management of e-learning initiatives, the desire to enhance the quality and creativity of teaching and learning using e-learning and the desire to provide an empowering and student-centred learning experience

A key premise guiding the development of the framework presented in our earlier report was that the electronic environment provides the potential for alternative forms of organisation that free education from some of the constraints of the traditional face to face environment. It is our view that the organisational structures and processes that constitute the educational environment have a major impact on how teaching and learning is conducted in that environment. Consequently, it we suggest that HOW a particular VLE or MLE is designed and constructed for the purposes of management can have a profound impact on how likely it is to constrain or facilitate the use of a variety of pedagogical approaches. Other authors have commented on this relationship (e.g. Conole, 2004).

¹ This report will be referred to henceforth as the MLE Landscape report for simplicity.

In the first part of this chapter we examine e-learning developments over the last four years, since our previous report was published in relation to the core themes identified above. In the second part we explore ways in which recent technology developments and educational initiatives may help to address the need for pedagogical flexibility and innovation in the design of e-learning tools, environments and architectures.

VLE use within institutions

Recent evidence shows that there has been a dramatic increase in the uptake of VLEs by institutions in the last four years. A survey by UCISA in 2001 of VLE use in HE institutions found that 40% of the 89 HEIs included in the survey reported using a VLE (as opposed to an estimate of 7% four years previously). The greatest growth had taken place in the year prior to 2001.

By contrast, the MLE landscape report survey in 2003, which received returns from 358 institutions across both HE and FE, reports a very high prevalence of VLE usage in all types of institutions surveyed. 85% of FE colleges, 84% of pre-1992 universities and 97% of post-1992 universities report using one or more VLEs in their institution.

Given this high level of VLE uptake by institutions, how are VLEs being used within institutions to support teaching and learning functions? The MLE Landscape report provides some information.

Firstly the majority of institutions report using VLEs with less than 500 students. Only a small minority of institutions are using VLEs with very large numbers of students (more than 2000). This suggests that many institutions are still at a stage of tentative exploration of the use of e-learning rather than mainstream adoption.

Secondly, the survey shows that in many cases VLE use is optional. Whilst it is not desirable that VLE use should be a mandatory requirement, it remains the case that unless teachers perceive the VLE as adding value to their teaching then they are unlikely to invest the time to use it voluntarily. Also experience to date has shown that students will not engage with online learning opportunities unless they are integrated into their programme of study, including its assessment criteria and learning outcomes.

Thirdly, for VLEs to begin to have greater impact on teaching and learning activities, we suggest that staff are in need of a higher level of professional development than they are currently receiving if they are to use the new VLEs for anything beyond routine administration: course announcements, lecture notes online and a list of Internet links. Even where lecturers are setting up discussion threads but with little understanding of how to engage students, how to structure their online interactions, or how to integrate these aspects of the course with other learning activities, their efforts have limited impact on students' learning experience. Part of the problem (in HE) is that lecturers often do not view themselves as teachers or their role in educating students as teaching. Where this is the case it is as much an issue of identity as engagement or professional development.

Our final point and the one to which we give the greatest emphasis here is the possibility that one major reason why the predominant pattern of use VLEs is for the basic course management tasks mentioned above and consequently why there has been little pedagogical innovation using these tools to date is that the first generation VLEs do not obviously support more radical or diverse learning activities. If the design of the software environment encourages a pattern of use that mimics traditional lecturer-student roles there is little incentive for lecturers to adopt new approaches.

In our earlier report we argued that there is a strong link between the way that a VLE is designed and the way that it is typically used. More explicitly we suggested that the majority of VLEs at the time were designed to support a model of teaching and learning interactions that was strongly based around information transmission via the provision of structured content from teacher to learners and the subsequent testing of learners on the content with little consideration given to the activities that the learners themselves might engage in.

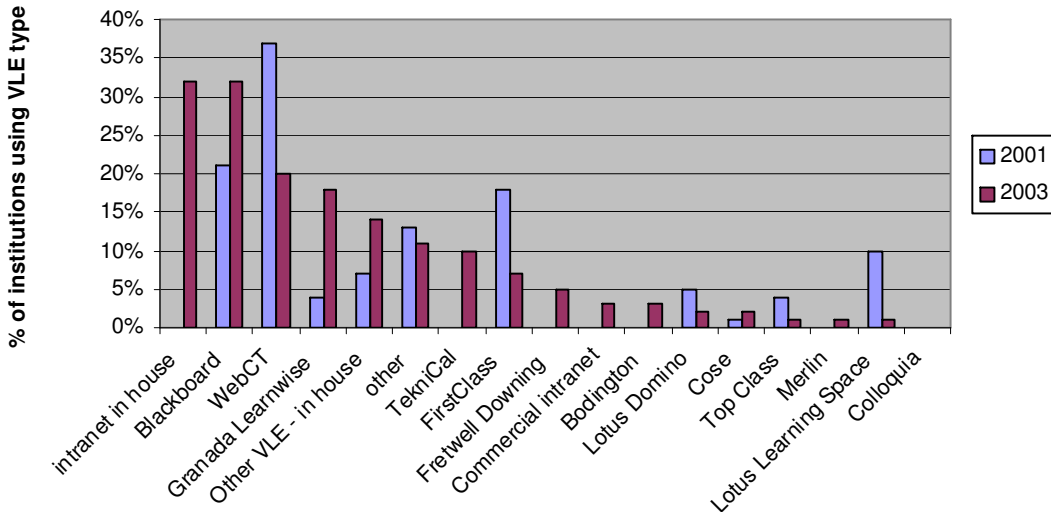
In the next section we review the changes in the types of VLE used in UK HE and FE to see how this situation has changed in the last four years.

VLEs in use in institutions

In 1999 when elearning in HE and FE was in its infancy, there were a relatively small number of web-based applications that might be termed VLEs. Mostly these had come from the US and from either a business training or purely distance learning background. Examples included TopClass, Lotus LearningSpace etc. Two notable exceptions were WebCT and Blackboard. Although still originating in the US, these came from developers with a Higher Education background who subsequently formed companies to market their products commercially. These two systems soon began to dominate the market both in the US and in the UK.

The chart in figure 1 below shows a comparison of the percentage of different types of VLEs being used in institutions in 2001 and 2003. The 2001 data comes from the UCISA VLE survey of that year and the 2003 data from the MLE landscape report already cited.²

VLE use in institutions - a comparison between 2001 and 2003



It can be seen that Blackboard and WebCT are the most commonly used commercial systems. The UCISA survey of 2001 shows WebCT as the most popular system, followed by Blackboard and FirstClass. The 2003 data shows that of the commercial VLEs Blackboard and WebCT remain the most popular, being used in 32% and 20% of institutions across both sectors, followed by Granada Learnwise (17%), Teknical Virtual-CAM (10%), FirstClass (7%) and Fretwell Downing (5%). As the first wave of elearning development has matured in the UK over the last four years these commercial systems have come to dominate the marketplace.

² The following differences in the data sets should be borne in mind when making a comparison: The 2001 survey only included HE institutions, but the 2003 survey results were obtained across HE and FE institutions. Thus, for example, First Class still has a higher level of use in HE institutions than in FE, but the combined data from both types of institution would indicate a drop in use. Learnwise is much more commonly used in the FE sector and so the apparent rise in the level of use of this system is skewed by inclusion of FE institution data only in 2003. Where there is no data for a particular system from 2001 it may be that the system was not available then or that data was not collected. For example there is no data from 2001 about the number of in-house intranets.

One of the criticisms levelled at these first-generation commercial VLEs in our earlier report was that they lacked the flexibility to be adapted to the variety of different teaching and learning situations found in HE. Adopting a single VLE across the institution may often not be appropriate as different departments and / or modules may have radically different demands from their elearning tools. Many institutions surveyed in 2003 reported having two or more VLEs in use in their institution and the high level of in-house developments strongly suggests that commercial systems were not always appropriate to learning and teaching needs. It may also indicate that the expense of commercial license fees was prohibitive where sufficient technical expertise existed to do in-house development.

Integration: Joining-up Institutional systems for eLearning

Following the Further Education Funding Councils joining the JISC in 1999, the JISC established a steering committee for Managed Learning Environments in FE, and in the process invented the concept of a Managed Learning Environment (MLE). The committee's aim was to help FE colleges to integrate VLEs with their existing management information systems, which were crucial in providing student returns to the government on which funding was claimed. This gave rise to some considerable activity (including some funded pilot studies) in examining how VLEs could become an integrated part of any institution's administrative and support systems, such as the student records, finance and library systems, instead of existing as an isolated system. It was quickly realised that student and course information already held in administrative systems was involved in implementing many of the functions of a VLE. Problems associated with replication of this information - not to mention time-consuming data-entry tasks - mean that some level of integration with student records systems is highly desirable if not essential. The need for data transfer between MIS systems and VLEs is one driver behind MLE development, but not the only one. In addition there was a more general demand by both students and staff for web access to institutional information and services coupled with a desire to join-up administrative systems (e.g. finance and student records).

Inevitably different institutions and even different groups within the same institution have different views about what the aim of MLE development is.³ A report for the JISC 'Building MLEs in HE' programme (Boys, 2002) suggested that MLE developments can be broadly viewed in either of two ways. The first is primarily as an exercise in integrating an institution's technology systems, which involves the additive combining of existing institutional services and processes. The second is a comprehensive approach that involves the re-thinking and re-design of existing processes and relationships and then producing technology integration to support the organisational changes. These are two very different ways of thinking about the process of building an MLE.

Most MLE developments to date have taken what Boys characterises as an additive approach. One popular solution is to develop a web portal for the integration of institutional systems and services via a web applications layer with a browser interface. Recent technology development such as Web Services and portal toolkits such as uPortal make this an increasingly attractive and tractable approach. Vendors of MIS systems and VLEs provide other solutions either through the formation of strategic corporate alliances that allow integration between selected products or through provision of an entire enterprise solution.

But Boys argues that approaches to MLE development such as these fail to address many of the important functions of an MLE for elearning, in particular they can easily bypass issues of organisational change that may crucially affect the benefits of MLE development for enhancing teaching and learning. Other commentators have echoed this criticism. It has been suggested that a major problem with existing practice is that it ignores or postpones many of the benefits envisaged at the outset of VLEs, which require far richer student profiles than exist in current MIS systems.⁴ For example, Diana Laurillard's vision of interactive learning systems has each learner arriving online with a personal profile that includes detailed records of what they have already learned (at the level of learning object, rather than module or programme), with a profile of their learning preferences, and with a developmental portfolio of

³ The JISC programme 'Building MLEs in HE' funded a variety of MLE implementations. This was one of the common findings amongst projects.

⁴ Helen Beetham (personal communication)

transferable skills. A learning portfolio might also include a history of their interactions with their tutors, peers, and other significant learning conversations they may have had. Whilst some might view such ideas as idealistic, it is useful to return to this vision to see how far short current developments have fallen.

Although, for most institutions taking a piecemeal or additive approach to MLE development through a focus on improving existing systems is the most pragmatic approach, it is unlikely to ultimately yield the hoped-for benefits in enhancing teaching and learning. This is more likely to be achieved by taking a comprehensive approach that involves reviewing and changing existing practices within the institution, including teaching and learning practices. Furthermore any development must take an approach centred on the student not on administration. However, such an approach at present appears to be difficult to justify or implement for many institutions.

Boys (2002) concludes with the following recommendations for implementing a comprehensive approach to MLE development:

- A 'problem seeking' rather than just a solution driven approach
- An explicit model for the management of change, relevant to tertiary education
- Explicit organisational and educational goals, preferably including some kind of institution-wide business process review
- Development methodologies which centre on structure and quality of *content* and *processes* rather than on technical *compatibilities*
- Involvement of students from the outset
- Alternative 'visualisations' of what a MLE should be like

For institutions to begin to engage in the process outlined by Boys above they need greater confidence in the technical frameworks and architectures that will support the accompanying changes. Recent developments in this area are discussed towards the end of this chapter.

At the beginning of this chapter we quoted the recent MLE Landscape study in saying that MLE developments thus far had improved the student experience whilst pedagogical concerns have received comparatively little attention. The evidence we have reviewed above provides some indication of why this has been the case. Much activity has been on MLE or portal development, which has often been more concerned with administrative aspects and improving student experience in a general sense than with teaching and learning. Instead of focusing on process review and organisational change to support elearning, developing staff skills in the use of VLEs for innovation in teaching, developing local tools, applications and learning activities to meet specific learning needs – institutions have focused on ease of use, centralisation and integration with existing systems. Secondly, despite high VLE uptake by institutions, uptake by learning and teaching staff remains relatively localised, and use by students is often ad-hoc and optional.

Current trends and Future directions for e-Learning

What we might conclude from the above is that there has been an insufficient level of attention given to the nature of teaching and learning practice in elearning developments to date. This is understandable since there have been major barriers to overcome in the form of implementing the technical infrastructure, professional training and getting staff and students on board with the idea of elearning. In the second part of this chapter we discuss ways in which current developments may help to establish a greater focus on teaching and learning in the future. In particular we focus on the following:

- Learning Design and activity-centred approaches
- Open Interoperability Standards
- Frameworks and Architectures

Learning Activities and Learning Design

The discussion we have presented above suggests that for pedagogical innovation using elearning tools to become a reality, both software designers and educators alike need to shift their thinking from a focus on course management to include the design of learning activities themselves.

Significant steps have already begun to be taken in this direction in the development world. The first major contribution was the development of EML (educational modelling language) by Rob Koper and his colleagues at the OUNL in the Netherlands. The work involved in the development of EML has more recently fed into the construction of the IMS Learning Design Specification. Both of these developments are discussed below.

The development of EML which began 1998 was spurred by a dissatisfaction with several features of what we have thus far characterised here as the prevailing model of elearning to date; that is a heavy focus on content or learning objects and an inclination towards information transmission as the overriding yet implicit pedagogical model.

The OUNL team, by contrast wanted to provide a language to explicitly model the interactions involved in a given teaching and learning situation so that this could be incorporated into the design of a learning activity. EML was developed as the notational system for modelling 'units of study', which is their abstraction of a learning activity (e.g. a course, a module, a lesson etc).

This is a departure from the prevailing learning objects model of elearning design, which is centred on units of content and metadata rather than units of activity. The major problem with the learning objects model, argue the EML designers, is that it fails to provide a coherent framework that can express semantic relationships between the learning objects in an educational context. EML is designed to provide a way to type objects according to their pedagogical use, derived from a pedagogical meta-model. The rationale behind the construction of the pedagogical meta-model is described in Koper (2001).

The main contribution of EML to the elearning community at large is that it has played a core role in the development of the IMS learning design specification. The primary aim of the learning design specification is to allow teachers or designers to describe a learning design in a standardised way that means it could be 'run' in a variety of learning-design aware players or environments.

Unfortunately there are currently no environments that can take an existing learning design and run it, also there is a paucity of tools available to assist in creating a learning design. However, there are two recent developments that are worthy of mention here.

The first of these is LAMS (Learning Activity Management System) LAMS is a learning design inspired system for the creation and running of learning designs in the form of sequences of learning activities and is reviewed as part of this report

The second development in the space is the RELOAD project – www.reload.ac.uk . This project funded under the JISC X4L Program is engaged in producing tools for the creation, editing and running of both learning objects and learning activities that implement the appropriate IMS / SCORM specifications. The project is implementing IMS content packaging, simple sequencing and learning design specifications in a suite of open-source tools including a package editor based on the existing Packagelt, a SCORM player for running SCORM 1.3 content and the Colloquia VLE.

These two tools currently still in development point a new direction away from the primacy of content management in VLEs towards systems that make activity-centred learning design using interoperability standards a reality. There are still a variety of difficult technical issues to overcome in creating learning designs in one system and running them in another. However, the fact that this work is underway and is feeding into the further development of the interoperability specifications is a positive step.

Frameworks, Open-standards and Services

In this section we look at current development efforts which may transform the elearning landscape from one dominated by large scale components: the MIS system, the VLE, the library system etc into one where common services are shared between application components at a finer level of granularity.

Various initiatives are exploring the core common services of an elearning architecture. These initiatives are working towards a common understanding of the technical framework required to underpin flexible, student-centred elearning. Using a combination of (possibly open-source) components that communicate with each other by means of standardised interfaces (such as those provided by Web services) these developments could open up the field to a much wider range of pedagogical tools, which can be flexibly allocated to different contexts within an institution than is currently possible.

Here we discuss two related developments in particular: advances in interoperability specifications and initiatives to develop open-frameworks for elearning.

Further Development of Interoperability Specifications and Standards

Since 1999 there has been the vast amount of work globally that has gone into developing an infrastructure for interoperability through the production and refinement of learning technology standards specifications, notably by the IMS Global Learning Consortium, although a number of other bodies are also involved. This work is seen by many in the field as essential to the future of elearning by aiming to ensure that software systems can work with each other, that learning content and student information can be transported and reused and repositories can be searched using standard metadata.

According to Bill Olivier of CETIS, there are two main motivations for the development of interoperability standards. The first is portability of content and data exchange. If we buy or develop a piece of content we want it to run on a variety of different platforms. The second is to lower the cost of systems integration by allowing existing systems to work with new e-learning systems. Without standards we are dependent on bespoke integration which is time consuming and expensive or lock-in to proprietary systems.

It may seem that we have started to peel off on a technology tangent here and that we have forgotten that the point of this article is about enhancing the quality of teaching and learning but we haven't done either of these. Let us re-iterate a point that is central to this report: technology should adapt to fit teaching not the other way round. So by implementing interoperability standards, it may be possible to put together different elearning tools for different contexts within the same institution, the same department or even the same module. This would allow different subject departments, for example, to choose different eLearning tools that suit the particular teaching approach, instead of having to use the institution's chosen VLE. The aim is to put control of how teaching happens back into the hands of the educator not the software designer.

Importantly, work in defining agreed technical standards for data interchange means that small to medium content providers and software developers can compete effectively with the big players and lock-in to proprietary systems can be avoided, where once one major system has been adopted, it becomes impossible to migrate to another without major costs being incurred to transfer (or re-enter) data that has been saved in a proprietary format. Interoperability allows systems from different vendors to work together (interoperate), and as a consequence, has paved the way for the development of open frameworks for elearning. The idea of these is that instead of having to buy into a single monolithic VLE application institutions will be able to put together a variety of lower-level components which will provide more flexibility and better suit their elearning needs. These new developments are discussed in the next section.

Open frameworks and eLearning Architectures

This latest set of developments has been inspired by the shortcomings of the one-size-fits-all model of current VLEs we have outlined already. Educational technologists feel that there needs to be an alternative that can reduce costs by permitting a saving on the license fees charged by software vendors for their systems and at the same time provide more flexibility control over teaching and learning processes.

Already some in the development world feel that the time of the 1st generation of VLEs as typified by the currently popular applications is coming to an end and the future lies in the development of component-based architectures. The pace of development in learning technology means that architectures must be adaptable and easy to configure and

reconfigure. These will give institutions greater flexibility, confidence and control over their own elearning management.

Scott Wilson of CETIS draws a picture in which the situation today is characterised by the existence of giant components: A VLE / LMS component, one or more MIS components, a library component etc. The aim of recent MLE integration attempts has been to get these large-scale components exchanging data and working together. As Scott explains, this is inefficient because many common services are replicated. An example is the number of times users have to sign on to institutional systems – the library system, the VLE and student information systems often all require the user to log on separately, since each system has its own authentication system. If we break these down into smaller components (e.g. have a separate authentication component that is linked to all the other systems) and provide a coherent architecture and standards-based data exchange then the common services can be separated out to create a more efficient modular system. IMS have described an abstract framework for elearning architectures. It is a layered architecture with a 'sea' of available components at the bottom layer. The middleware of the architecture consists of layers 2 and 3, which implement the common, services and application services. At the top level are E-learning applications, which use objects and services defined at lower-levels of the architecture.

One of the main contributors to this work is the Open Knowledge Initiative (OKI). Founded at MIT in 2001, the OKI is a collaborative project to produce an open and extensible architecture in which e-learning components can be embedded and communicate with each other and external enterprise software. Phase 1 of the project is due to complete in July 2003 with delivery of a set of Open Service Interface Definitions (OSIDs) to specify interactions between services both within and across institutions, a reference implementation of each service with open-source code and two open-source learning management systems – Stellar and Coursework.

Inherent in the idea of an open architecture is a foundation on the open standards specifications discussed above and the development of open-source components that conform to the standards. In order to assist these two streams of development moving forwards together there is a strong relationship between IMS and OKI made concrete in a memorandum of understanding between the two projects.

This is an exciting strand of development as it lays the foundations for the design of pedagogically effective systems suited to specific demands of individual institutions and courses. It both obviates the need to purchase a single VLE for an entire institution and opens the door to portable content and student data.

The optimism surrounding open-standards and the development of common frameworks for elearning has to be tempered by the understanding that there remain difficult technical and organisational problems with both the transport and reuse of learning activities at the elearning level and the top-down approach involving the specification of educational interoperability standards that meet needs across the industry. The identification of common architectures for core services is one thing, but producing an open framework that can accommodate the interactions and fine granularity components at the level of educational applications has not yet been addressed. While this approach offers considerable hope for the future there is a long journey still ahead.

A complementary approach is the work of developer and practitioner communities working with the growing number of open-source products producing add-on tools and custom integrations to fit a wide variety of contexts where standards have not yet been specified or are in the process of evolving. This work in turn has much to contribute to the continued development and refinement of standards and to further understanding about what is educationally useful in elearning. What is important is that the educational community understands that it is part of this development process and has its opportunity now to make its contribution to these developments. Both JISC and CETIS have discussion forums and run events in which the community at large is invited to contribute opinions about how to bring teaching and learning into the centre of elearning development. This report is intended to be one contribution to that process.

2: The revised pedagogical framework

The principle aim of this chapter is to review and extend the framework for pedagogical evaluation of e-learning tools that was presented in 1999. In the sections below we review the contribution of each of these models to the framework and the discuss issues that emerged when they were applied to VLEs.

In this chapter we:

- Describe the theoretical models
- Show how they can be applied to evaluate eLearning tools
- Construct a series of questions that emerge from the framework

Overview of the Pedagogical Framework

Our aim in providing this framework is to help readers to analyse eLearning tools without being distracted by the details of user interface objects and components. While these are of some importance in the user experience, it is the workflows that are facilitated by these that need to be focused on. The framework provides a means by which reflection on aspects of pedagogical process can be structured, and then how elearning systems encourage or discourage these can be evaluated.

We would stress, however, that the framework does not seek to provide a “true” evaluation of elearning tools and systems; there inevitably remains an interpretive aspect. The framework does, however, provide a means by which discussion about specific process aspects of tools and systems can take place in a structured way, and hopefully result in better choices and design decisions.

Education providers using VLEs and other ICT tools for e-learning have two primary aims:

- To enhance the quality of teaching and learning by allowing teachers to use pedagogies that are not possible with large numbers in a face to face environment
- To manage the delivery and administration of programmes of learning through an electronic (on-line) medium. This includes management of groups of students.

The first of these is a more difficult problem, but (perhaps as a consequence of this) much more effort so far has been put into the second. It is not surprising then that the MLE Landscape study reached the conclusions quoted in the first chapter of this report.

We suggest as a result of the work conducted in developing the pedagogical framework in 1999 that these two aims are intrinsically linked and that HOW a particular VLE or e-learning platform or course management system is designed and constructed for the purposes of management can have a profound impact on how likely it is to constrain or facilitate the use of alternative pedagogies.

The framework as formulated in the 1999 report was constructed out of two different theoretical models: The **conversational framework** (Laurillard, 1993) which is a well-known model of effective teaching practice for academic learning and the **Viable System Model (VSM)** (e.g. Beer 1981) which is a model for the design and diagnosis of effective organisational structures drawn from management cybernetics. These two models are complementary, with the first providing a model for incorporating effective teaching and learning practice into an e-learning environment and the second providing a number of criteria from an organizational perspective which influence whether the system will facilitate or inhibit the ease with which a pedagogic model such as the conversational model can be used within that system.

A concrete example will clarify our point. If a VLE is constructed on the basis that all learning activities have to be created and sequenced in advance of a course beginning, then there is no way that a teacher can create and add a learning activity to the course on the basis of a preceding conversation at the level of concepts with the students (a basic idea of the

conversational model). Alternatively if all the students in one group are treated as belonging a single 'class' object to which learning activities are assigned in the VLE, then there is no possibility for creating individual learning activities.

In these examples design decisions in the creation of the VLE that have been made on the basis of a particular model of the management flow in the teaching and learning process directly affect the pedagogical flexibility of the environment.

Many first-time users of VLEs seek to adapt the way that they work to the way that the software needs things to be done. It is an ongoing abrasive feature of HCI that we should attempt to adapt to the software's preferred modus operandi rather than the other way around.

Happily most of the VLE vendors are much more aware of these sorts of criticisms than they were in 1999 and the systems that are around now are much more sophisticated than their earlier counterparts. Consequently, since it remains just as important that systems are critically appraised and that design features are evaluated to reveal their limitations and inconsistencies, the methods of evaluation need to become more sophisticated to match.

The Viable System Model

The VSM was described in a simplified way in the report of 1999. The aim was to elucidate enough of the model to show how and why it provides an extremely relevant and useful basis for the evaluation of VLEs, without overwhelming the reader with details of the theory on which it is based.

The key premise on which the VSM is based is that it is VARIETY⁵ that threatens to overwhelm organisations and it is this variety that needs to be managed by any organisation. This is particularly relevant to precisely those issues that education is facing today and that e-learning, it is hoped, will help alleviate. That is to say: how can the quality of educational provision be maintained in the face of increasing student numbers and increasing diversity. The cybernetic answer to this problem is that the variety of educational provision must be increased to match the increased variety presented by the environment. The VSM proposes a number of communication channels by which the variety of the controller might be increased. These channels were elaborated in the 1999 report to yield criteria for the evaluation of VLEs in the effective management of large numbers of students so that resource intensive pedagogic models such as the conversational model could be used in an e-learning context. These criteria are:

- Resource negotiation
- Adaptation
- Self organisation
- Monitoring
- Individualisation

We reproduce below in fig X the diagram that was used in the 1999 report to illustrate the relationship between a management system and a controlled system using these channels

⁵ Variety is a measure of complexity used in cybernetics and comes from the Law of Requisite Variety Ashby (1956). Simply put, the law of requisite variety states that the variety of a controller must match the variety of the system to be controlled.

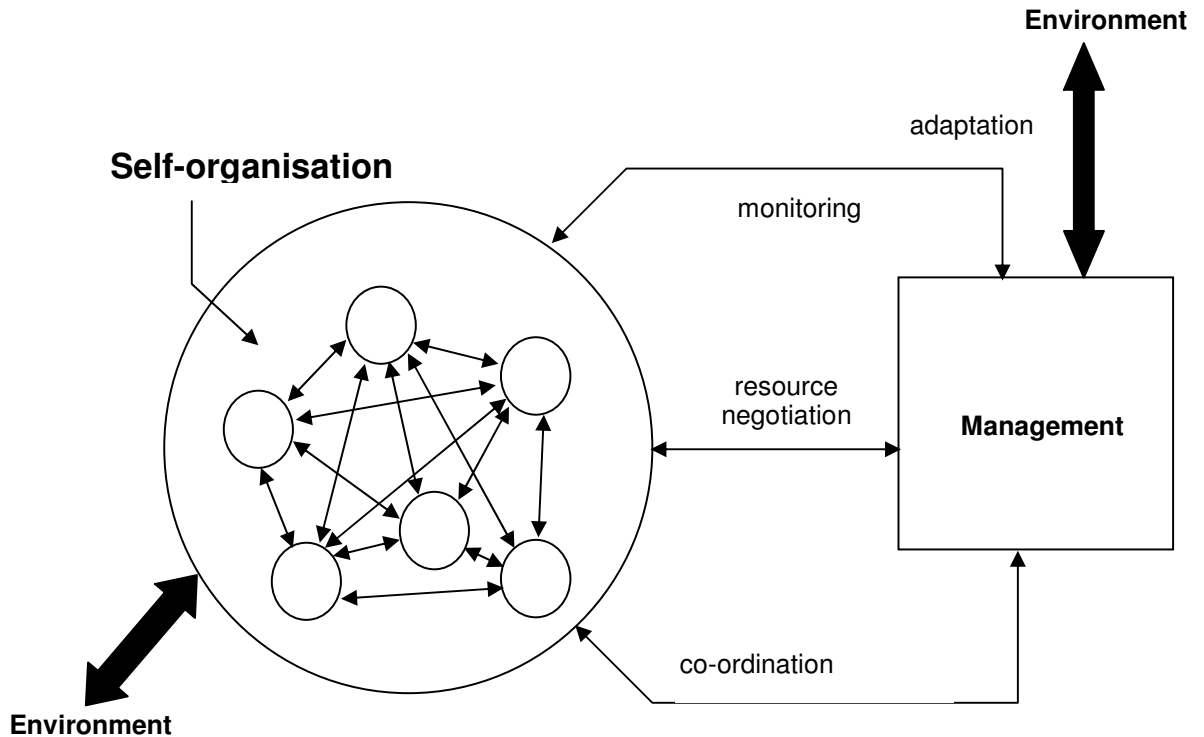


Figure 1: The simplified VSM

In order to deepen our understanding of how the VSM can contribute to our depth of insight into how the design of e-learning management tools can affect pedagogical effectiveness; we need to elaborate this model in a few ways. Specifically we need to refer to two aspects of the VSM left out of the previous description for the sake of simplicity:

1. **RECURSIVE SYSTEMS** (viable systems contain and are contained by other viable systems)
2. **MANAGEMENT SUB-SYSTEMS** (a viable system is comprised of a number of sub-systems with specific roles)

Recursive Properties of the VSM

Course management can be viewed from a number of perspectives or levels:

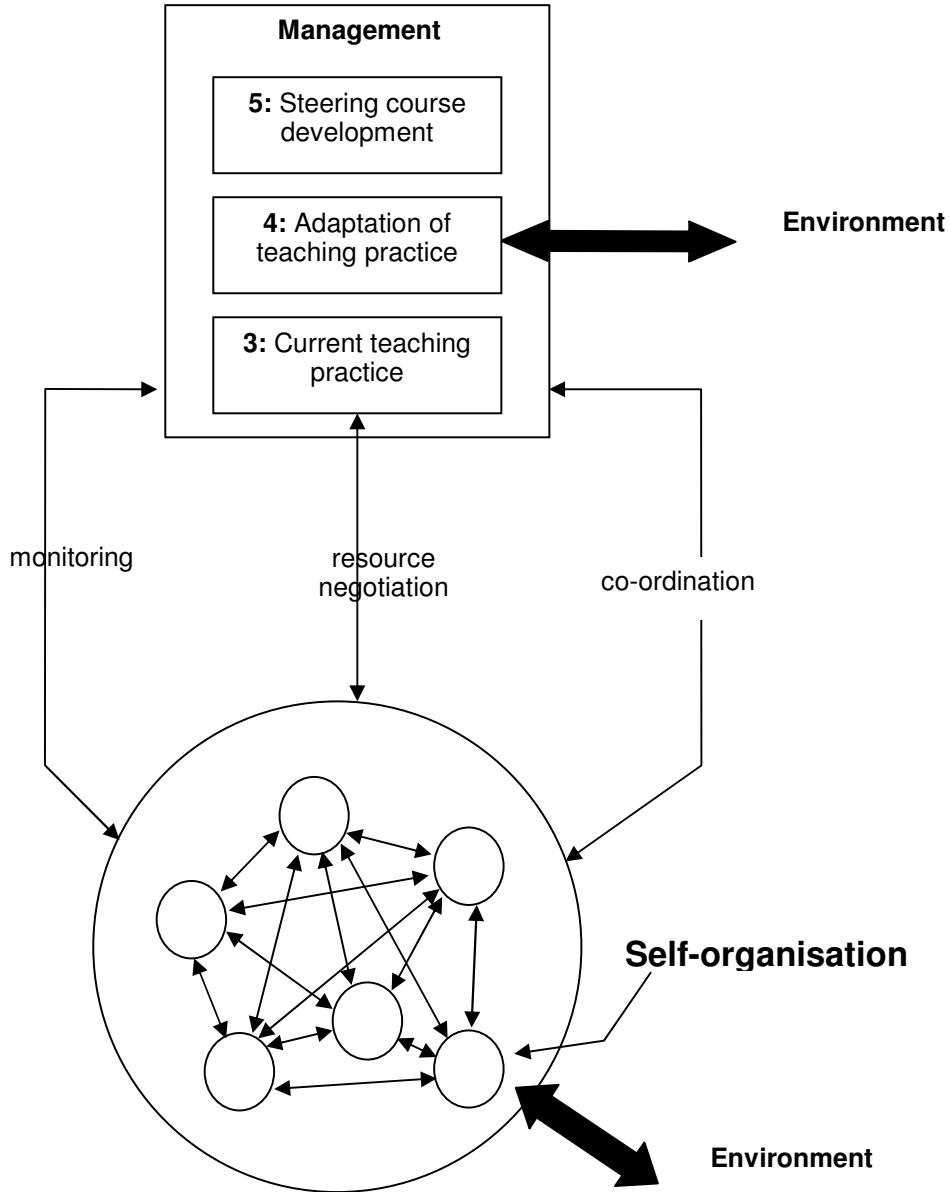
- Programme level
- Module level
- Individual level

It is important to be specific about the level of teaching and learning activity we are talking about. One of the criticisms of the first generation of VLEs is that almost without exception they are centred on the activities at the module level. To be more precise they are designed around the interactions between teacher and learner and the administrative activities that occur at this level of granularity. They do not scale well to programme level activities at a more macro-level or, at a finer grained level of analysis, the activities of a single student.

As a tool of analysis the VSM is ideally equipped to accommodate changes in level of focus, as it is a basic mathematical feature of the model that the same general entities and relationships remain valid at any level of analysis. Whether it is a single organism or a global corporation or an entire national economy, the same general principles of viability are the same – i.e. that the variety of the controller must match the variety of the system to be controlled. And at any level of analysis (so the model states) the same sub-systems and channels of control and coordination are involved in the process of managing variety. The model is inherently recursive.

The structure and functions of management

The more detailed diagram below (a 90 degree rotation of the simplified model in figure x) expands the management 'box' to illustrate the structure and different functions involved in



managing a viable system.

Figure 2: The Elaborated VSM, Module level

In the VSM each of the sub-systems has a specific cybernetic function, and the reader is encouraged to study these for a deeper understanding. For the example of a module as interpreted by the authors, their function is as follows

System 1: all the activities undertaken by learners in directly developing their learning – the PRIMARY activities of the module

System 2: a framework to coordinate the learners' activities so that their demands for teaching and support do not conflict, and to allow them to benefit from each other's activities; this will include course schedules and assessment frameworks.

System 3: this system is responsible for directly managing the learners' activities – typically this is where the teacher is located.

System 3*: this is responsible for checking on the ongoing "health" of the course. Formative assessment plays a role in this, but other techniques can be used to pursue its purpose in making sure that learning is taking place successfully across the learner group as expected

System 4: this is where responsibility for developing the course resides – finding new resources and developing new teaching ideas based on the needs of the learners. In many cases this is the responsibility of the teacher, but on other cases may involve a course design team.

System 5: the needs of system 3 (managing the delivery of a module), and system 4 (adapting and improving the module), need to be balanced to avoid the extreme examples of a module that never changes and one that is never stable; this balancing is the role of system 5, which steers the module as it unfolds. Typically this is the role of a module management team or academic board.

These systems need to be well interconnected, and the VSM identifies the key channels that maintain good communication between sub-systems, elaborated below. These channels connect systems, which generate different levels of complexity (variety), and so they need to be designed to make sure that variety is disposed of in planned ways; this is the role of pedagogic design.

Variety management using e-learning systems at the module level

Resource Bargain channel

Resource bargaining is the process by which system 3 (the teaching staff) makes an agreement with the parts of system 1 (the students) on what they need to provide for each other. One aspect of this is the establishment of rules – safety rules, employment rules and conditions, wage rates, management procedures and so on. It also enables establishment of mutual responsibilities – what the parts of system 1 need from system 3 to do the job properly, and what system 3 needs from the parts of system 1 for the requirements of the larger system to be met.

What might this mean in education? In f2f learning many rules are established at the institutional level – how many hours of teaching students can expect, and typically what they need to do to successfully complete the course, and so this part of the agreement is tacit – but not always. In less formal courses, and those less oriented on certification, this agreement needs continuous negotiation. It should also be noted that in the VSM, this agreement needs to take place with each individual student – it is about balancing the resources the teacher has available between the students to achieve equitable learning. And as a homeostatic loop, variety needs to be managed by some means.

So what typically happens? In strictly formal situations, there is a one shot resource bargain at the start of the course, and each student gets the same deal – they get so many hours of lectures, and in return have to do the work necessary to pass the assessment, which is irremedial. But teachers usually agree to make themselves available for individual questions, at the end of or after lessons, and sometimes offer limited times when they can be visited by students, singly or in groups; sometimes they may use teaching assistants or graduate students. Some students can, in this way, get extra support if they need it – more explanation, additional reading - but it usually represents a small part of the total hours on offer.

In a more resource-based situation, the negotiation is somewhat different. The teacher agrees to provide learning resources appropriate to the individual students' needs, and to provide individual assistance around these resources. Agreeing the limits of the teacher's inputs becomes more difficult to establish – what can each student expect in this situation? The student's responsibility is to read or engage with the resources, and manage their demands on the teacher's time. Resource bargaining here becomes more difficult and needs to be a continually open channel, as individual needs are able to be better expressed, and time management – the precious resource in education – is crucial and problematic.

Each pedagogic approach will require a variation on the way resource negotiation takes place; and managing variety is crucial if the negotiation process is not to swamp the teacher. There is no point finding out what individual needs are if this results in there being no time to respond, and technology tools can help, in allowing students to express their needs, and in allowing teachers to search, sort and otherwise manage these and design their responses. Variety management tools could include aspects of personal development planning (PDP) as well as structured messaging tools, but little work has been done in providing these

appropriately – PDP in particular seems to be used at a more global level, after or between modules, and not within them. The biggest issue online is time management for teachers – demands for responses from students are expected to be met quickly (free of time and space) in a way that could not be expected in a campus based situation. Some means of establishing the limits of the teacher's responsibility need to be created. Many VLEs do not provide any tools to help with this.

Coordination Channel

In the VSM, coordination is concerned with damping oscillation, thus making it impossible for competing demands of the system 1 components to destabilise the system. This can be interpreted in a human situation in preventing conflict through good system design. An example is a timetable, which ensures that people meet in allocated rooms at a particular time, avoiding competition for these resources. Another example is a schedule, which ensures that work is structured to allow available resources to be used effectively without competition. So coordination is about system design, and does not usually involve real time action. The timetable is not invented in real time, but at the start of the year, and then runs for the whole year.

In a course or module, coordination should prevent conflict arising between students through competition for resources. Scheduling access to resources, including the teacher and each other, providing common ways and tools by which this access can be structured, and establishing protocols are all part of this.

In a sense, the organisation of a classroom is a powerful coordination device. Seats in rows tell the learners what they are supposed to do – face the front and listen. The classroom gives subtle yet powerful messages on how to behave, and the formal education inculcates an expectation in students about what a lesson should be like, which coordinates their behaviour.

In online environments things are less clear. In a sense, the whole VLE is all about coordination – it constrains what and how things can be done. By being asynchronous, the limits of timetabling are lifted, and by making all resources available online removes the need for resource scheduling. The problem that remains concerns human resources – the students and the teacher. What structure is needed to allow students equitable access to the teacher's time, and what will ensure that they can help each other without constraining all students to march in time together? This is where pedagogic design is important. The design of the course – the sequencing and structuring of learning activities and resources (including assessments) – is how a teacher can provide a co-ordinatory framework. Like classrooms, many VLEs provide limited opportunity for flexibility here. Just as a 1 hour lesson in a lecture theatre encourages coordination by sitting still and being quiet so that the class can all learn together, many VLEs encourage a method that can be caricatured as "read this material, check the forum and do the test". It takes some effort on the part of the teacher to overcome these, but they do – and are supported to some extent by the design of the system. If you can move the chairs, you have more choice in a classroom; if you can adapt the workflow of a VLE, you can provide more flexibility in your learning opportunities.

Monitoring Channel

Beer argues that monitoring is concerned with soaking up the variety left in the system that system 3 and 2 have not managed to do. It is concerned with checking that the system is operating successfully, with monitoring the health of the system. It involves management checking the operations of the subsystems of system 1 (not the managements). He suggests that monitoring should be spasmodic and occasional.

Monitoring means different things to different people, and it is important that it is well understood in the educational context. It is NOT formal assessment, nor is it necessarily concerned with tracking what people have read or done, though this may play a part. It is about finding out in depth whether what is expected is actually taking place. In education this is much more difficult than in other spheres. You can check if a worker is doing his job properly and is happy by an occasional visit, and by looking at his output. It's harder to perceive this with a learner, who may try to conceal their lack of understanding through embarrassment, and who might hope to pass the course through rote processes. A teacher

needs to be able to occasionally engage in a deep way with a randomly selected individual to find out if understanding is developing as expected; and during a course, each student may need to be visited, depending on the teacher's sense of how the course is going. This can be onerous, and this is why tracking is so popular. It provided the illusion that student progress is monitored. Actually it is the resource bargain that is being monitored, that the student should at least access the material, or enter the discussion space. It does NOT monitor understanding. MCQs give no more than a glimmer of deep understanding. In our view, only learning conversations between teacher and student can hope to achieve this depth of monitoring successfully. The system needs to facilitate this, and help the teacher to manage a large number of these conversations successfully.

Self-organization channel

In any human system, variety management depends on the cooperation of the high variety system. Beer's example is the police; if every citizen decided to act as a criminal, then we'd need a policeman for each individual. It is because people generally obey the law that allows police to only deal with the residual variety created by the lawless. In other words, people manage their own variety. Education is no exception. Students learn by themselves, they help each other, they find other materials to help with things they don't understand, and they set up study groups. Some are better at this than others; some have better facilities than others. Traditional universities provided opportunities for self-organization – cafes, bars, common rooms, libraries. Newer institutions do this less well, space being more expensive than when older universities were established. VLEs rarely provide for self-organizing activities hardly at all. What opportunities are there for students to organize themselves outside the formal learning sessions/areas? The fear of system abuse has led to there being no private space in most VLEs. No doubt students use other electronic means – email and chatrooms – but a powerful message is given to learners by the lack of self-organizing opportunities in VLEs, that the institution does not value their independence, does not value their privacy, and feels that learners should be monitored at all times. The implication is that personal exploration of ideas is not valued nor encouraged. From an ethical standpoint this is of some concern; but from an educational standpoint it raises major questions, and needs to be addressed. If we don't encourage self-organization of learning, learning will tend to be more "surface". A learning organization, especially one where higher learning takes place, has to be one where people are enabled to engage freely in debate, argument and thereby increase understanding. Education is not a commodity that can be transferred by some mechanistic process. It requires self-transformation, and often involves deep personal struggle if it is to be meaningful. It needs to be nurtured and appropriate supporting facilities need to be provided.

Adaptation

Founded on a rich model of the organization, system 4 is responsible for ensuring that the whole system is aware of external threats and opportunities. For a course, these involve the teacher or others responsible for the course design staying involved in the subject matter and pedagogy debates outside the immediate course – there needs to be a rich connection to the knowledge environment in which the course is engaged. Opportunities available in this environment may include new learning resources and new ways of teaching the subject in question; these may come from colleagues locally or wider a field, or may be available on subject networks. Threats may be the outdated of current materials and ideas. It would be beneficial if it were possible for the teacher to vary the way the course or module is provided to incorporate new materials and processes, but many VLEs have to be pre-packaged and don't support that flexibility. It may be that materials and pedagogies are not suited to the particular cohort or part of it – it should be possible to change them based on new opportunities.

Balancing the needs of the present and the future

All courses or modules need to have a clear model of how they are to be provided, in many cases with learning materials pre-planned and pedagogic strategies in place. These need to be managed as the course unfolds, structured by good timetabling or scheduling of activities. At the same time new ideas and new resources that are relevant to the course should be being researched and gathered in as rich a way as possible. However, these two parts of the system need to be balanced so that a course can on the one hand avoid being unable to

adapt in the light of learner experience, and on the other avoid a constant chopping and changing as new, “better” resources and methods become available. It is thus crucial that the systems responsible course delivery and

course development (systems 3 and 4 in the VSM) have a rich connection, and are able to negotiate the balance appropriately, allowing the course to develop in a way that meets learning needs as they become evident.

Managing the needs of delivery and adaptation

If a course is well designed and managed, then these needs can be properly balanced with little intervention from higher level management. However, to avoid conflict arising, and to provide a channel for learners to make their concerns known, there needs to be a mechanism by which the overall development of a module can be steered. Since the curriculum of most modules in institutions tends to be strictly defined, this is often only triggered at validation and review time. But in a more dynamic course, where the content may be defined in real time (some research degrees) there needs to be the possibility for a higher level involvement on a more frequent basis, to regulate adaptation and provide an emergency channel for learners should a crisis arise.

The programme level

The preceding section discussed the application of the VSM to a teaching and learning situation – a course or a module. These typically tend to be the unit of learning in UK HE (and FE to some extent). But a module is almost always part of a larger programme (or programmes) of learning, which needs to be coherent – indeed lack of coherence is a criticism that is made of modular structures. The VSM can help here too, and the interpretation of VSM channels is elaborated below.

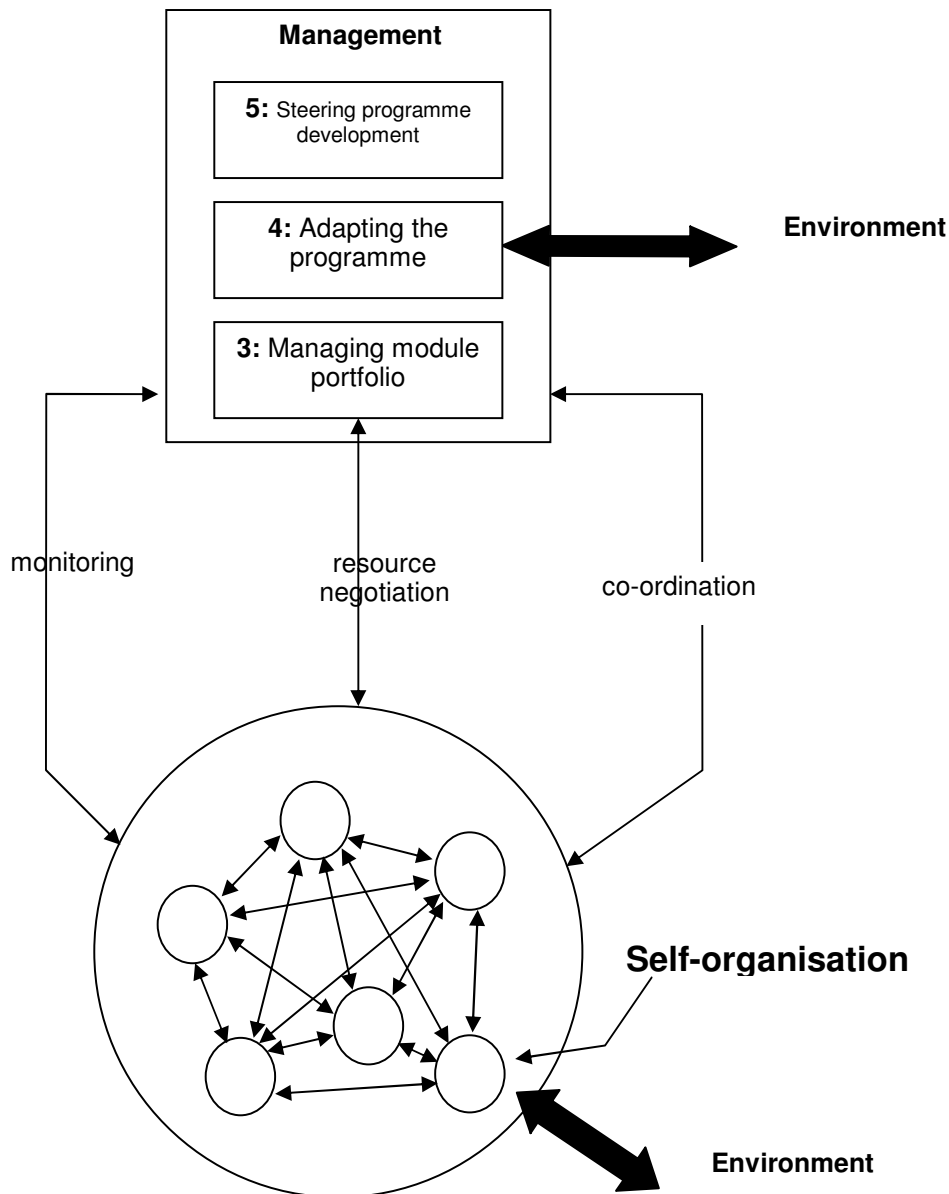


Figure 3: The VSM at the programme level

Resource bargaining channel

The management unit for a programme (usually at department level) needs to negotiate the resources available to the modules it is constructed from. Typically this is done at the start of a programme; but it could be that resources are varied depending on the progress and needs of courses as they unfold. This would require that course leaders are able to report on their needs and progress in order to negotiate resource provision, and that mechanisms to facilitate this have been put in place.

Coordination

Typically modules are designed to operate completely independently of each other, having first defined which other modules are pre-requisites or co-requisites. However it may be that opportunities are lost for inter-module activities. For example, it may be that there are times when two modules could be merged for some aspect of their content. However in a strictly timetabled situation, such interoperation is incredibly difficult to manage. This could be a place where eLearning tools could offer new opportunities, by offering new frameworks to allow coordination between multiple modules' activities; however most leading VLEs do little to support learning at the programme level.

Monitoring

To be able to assess the health of any module, programme management needs to be able to have access to individual learners' progress information. Once again, VLEs could provide tools to facilitate this, but usually fail to do so, since they tend to work only at the module level.

Self-organization

In many institutions teachers talk continuously about their teaching, and learn from each other's experience as it takes place – they can help each other by teaching sessions, or through peer-observation, or by sharing resources. A VLE could make powerful tools to support this sort of self-organization between courses or modules, but again rarely does so, leaving this to be provided by other institutional systems, (which may be part of the MLE).

Adaptation and balancing the needs of the present and the future

Any programme of learning needs to be constantly examining its set of modules, and considering whether and when new modules may be needed, based on changes in the knowledge domain, the needs of society, and new resource capabilities (e.g. funding sources). Once again, technology can and does play a large part in this, but usually not integrated with the VLE, where the needs for adaptation are expressed.

Managing the needs of delivery and adaptation

The programme board is usually charged with the task of ensuring appropriate development of a programme of study. To do so well it needs good information from programme management based on the actual experience of course delivery, as well as an excellent understanding of development opportunities. Technology can play an important role in providing this information in a manageable way, and VLEs could play an important part of they were able to provide flexible reporting.

In summary, since many VLEs operate purely at the modular level, they rarely provide any integrative support for programmes; rather, they make it more difficult for the assessment of student learning at a level appropriate for programme development. This is a huge opportunity missed.

The student level

It is possible to use the VSM from the perspective of a learner who is following several modules simultaneously. They need to manage their current learning while planning their learning future. The VSM helps to elaborate how they can do this, and where tools can be useful.

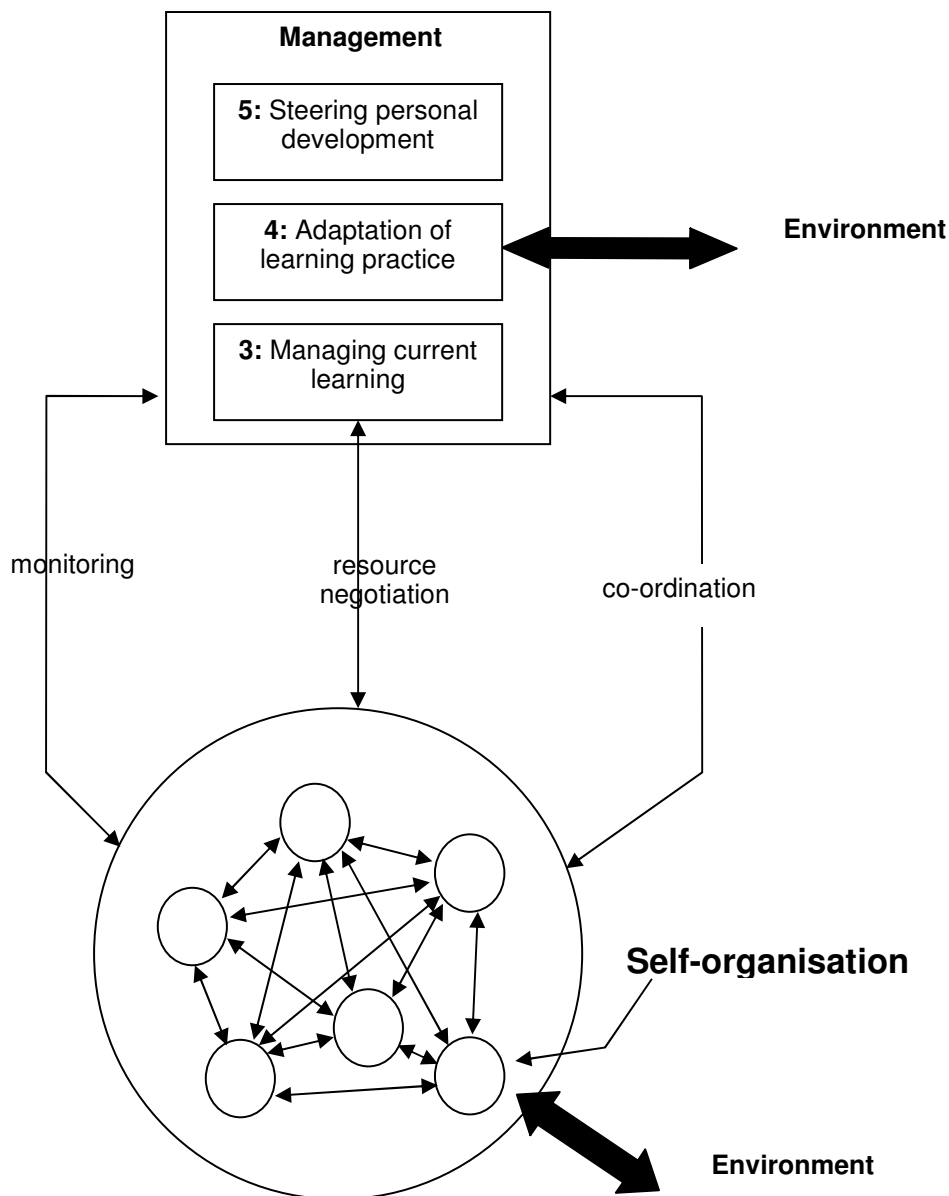


Figure 5: The Viable System Model, learner level

Resource Bargaining

The learner needs to assess the requirements of the modules they are following, and plan the time and effort they devote to each, depending on the demands of any module at any particular time.

Coordination

They need to develop a plan or framework that help them avoid any conflict between the demands of different modules – this could be a timetable or a time management tool.

Monitoring

Learners need to reflect on their learning in a deep way in order to be able to identify where problems may be arising. Self-assessment and reflective practice tools can help here.

Self-organization

Groups of learners can be incredibly mutually supportive, both within the formal course structure and informally. Learners often use email and chat tools outside the VLE structure to establish these self-help networks; it would be useful to have these provided as part of a course or programme structure.

Adaptation

Learners need to be able to plan their future learning based on their current and past learning. They need tools to know what is available, how the demands of society and employment are changing, and what resources may be available to them.

Managing overall progress

Learners need to be able to reflect on their current learning activities and their future learning needs and wishes; tools that bring together information on both of these, and enable reflection and planning – personal development tools – need to be incorporated into the total eLearning experience.

Using the VSM

In this section we have elaborated the application of the VSM to three levels of learning management – the course or module level, the programme level, and the learner level. These three recursive levels of our elaboration of the VSM correspond to the themes we identified in chapter one namely:

- Supporting pedagogical innovation using elearning (module level)
- Supporting institutional management of programmes (programme level)
- Supporting students management of their own learning (learner level)

We have identified the issues this brings into focus, and how they might be addressed within a VLE. Technology brings new opportunities for managing complexity, where there were previously none. The choices we make affect both the pedagogy and the flexibility available to learners.

In our 1999 report we used Laurillard's Conversational Framework to amplify the framework created using the VSM described above because it captures in detail the workflow of teaching and learning interactions that are capable of supporting a wide variety of pedagogical models and approaches. The conversational model helps to exemplify the difference between a student-centred workflow and the so-called 'transmission' model that pervades education at a variety of levels in face-to-face environments and has been replicated to a certain extent in 1st generation VLEs. In the section below we briefly describe the main features of the conversational framework:

The Conversational Framework

There are a number of key characteristics of the conversational model as applied to academic learning, drawn from Laurillard, (1993, pp.94-95). This model elaborates on Pask and Scott's Conversation Theory (refs) to emphasise the importance of dialogue in effective academic learning. Laurillard argues that the nature of much academic learning is largely defined by the acquisition of complex concepts and the creation of conceptual distinctions. This cannot be achieved by a pedagogy based around the one-way presentation of content; there needs to be a two-way dialogue between teacher and student at the level of conceptions. According to the conversational model this dialogue is central to academic learning. The process of learning is supported by the creation of interactive 'micro-worlds' (learning activities) in which the student can actively engage in practice that enhances and reinforces the ideas that have been formulated through discussion. The model emphasises that these activities should be created and adapted on the basis of the conceptual dialogue, rather than pre-set in advance. The final key aspect of the model is that opportunity for reflection is provided as part of the teaching and learning process.

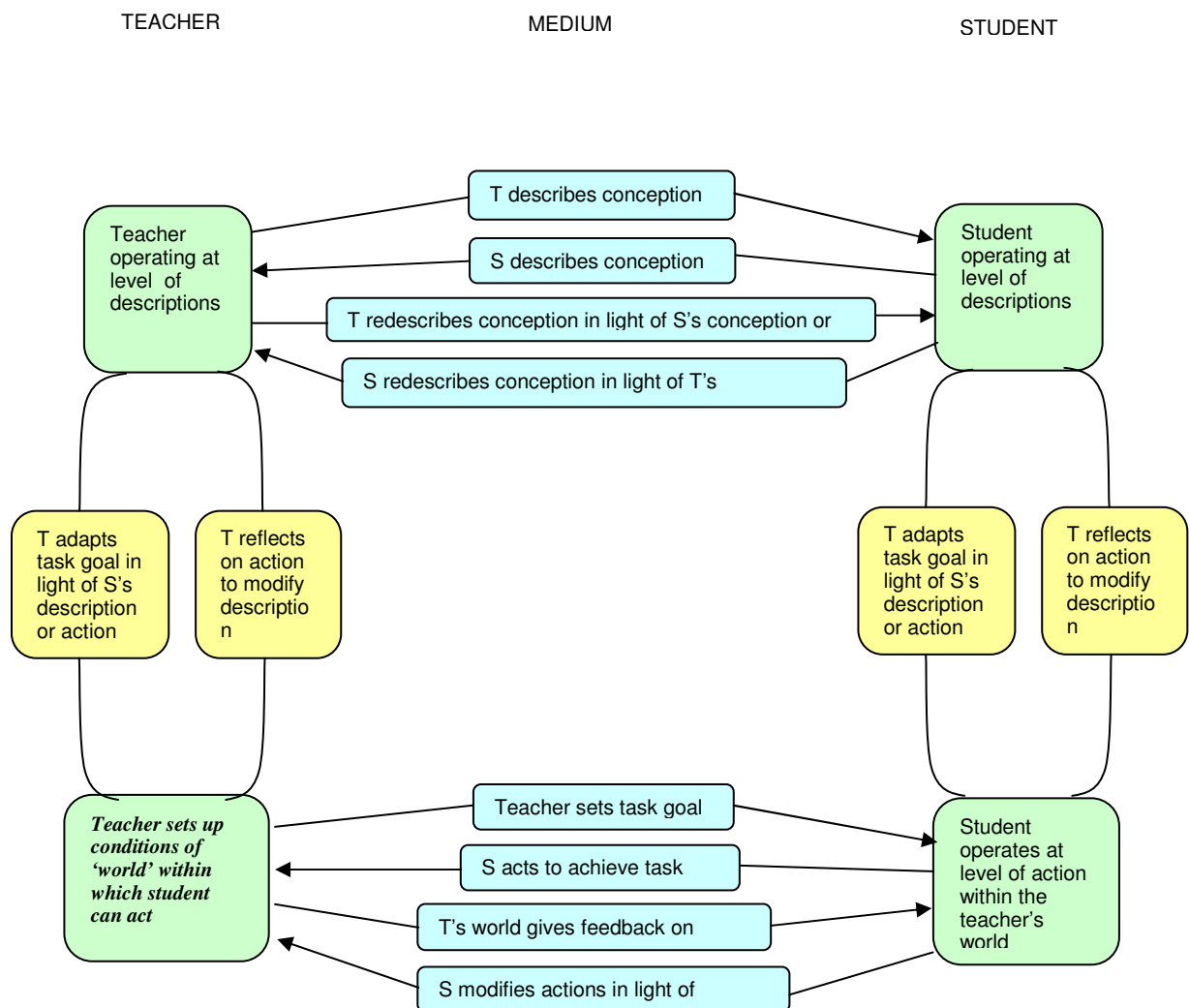


Figure 6: The Conversational Framework (adapted from Laurillard, 1993)

The primary workflow actions that take place through the interactive medium are as follows:

1. Teacher presents / redescribes conception
2. Student presents / redescribes conception
3. Teacher sets up micro-world activities
4. Student interacts with micro-world activities
5. The system provides feedback on the action
6. Student modifies actions in light of feedback

The conversational model as shown in the diagram of figure X depicts the workflow between tutor and student during learning. Certain activities (centre in blue boxes) are interactive and take place through some medium. Other activities (right and left in yellow boxes) are internal to either the student or the teacher. If we suppose that the medium involved is a VLE, then this model provides a clear set of requirements for evaluating the system's suitability for supporting the processes that form the basis of interactive learning.

The conversational model and VLEs

This relatively simple framework offers much potential as a methodology for evaluating virtual learning environments. A similar proposal was put forward by Crawley, 1999.⁶ In order to make this scheme work, all interactions must be assumed to take place via the medium of the VLE. It is then possible to make judgements about how well the VLE handles each of the individual interactions labelled in the model. The sort of questions one might ask are: How does the learning environment allow a teacher to present a conception? What does it mean for a teacher to set up a micro-world within a VLE? How can the student interact with the micro-world?

The model raises further questions about the mechanisms that support conversations. How easy is it to track conversations relating to a particular issue? Can conversations be enhanced by presentation of additional resources? Yet other questions relate to the overall flexibility of the system. How adaptable are micro-world structures once they are in use? How easy is to tailor them to individual students needs?

We might also want to ask whether the learning environment provides any extra tools to support reflection by the student on the relationship between the conversation at the level of descriptions and the activities they have completed or whether it provides structuring to assist the student in modifying their actions.

The interactions illustrated in the model do not necessarily occur in the linear order given above and the model involves recurrence at several levels. In particular the conversation may shift freely between the conceptual level and the level of actions. Any software environment supporting learning should allow this to occur naturally.

Evaluation criteria for VLEs from the Conversational Model

In order to evaluate a virtual learning environment using the conversational framework we need to establish what tools are provided within the software to allow dialogue and action to mutually influence each other to allow modification of both conceptions and actions on the part of the student as described above.

Additionally we need to be able to say what level of structuring is provided for each interaction. For example if e-mail is used as the tool for communication between tutor and student in a given VLE we need to know how the use of e-mail is embedded within the context of the dialogue about a specific topic or set of learning goals. Thus we might consider whether it is:

- a) simply a link to the users own e-mail client and existing mailbox
- b) a built-in e-mail client that allows messages to be stored and viewed from within the software

⁶ Crawley develops a modified form of Laurillard's model in which the 'teacher' role is replaced by a 'group'. This modified model is an attempt to address one of the primary limitations of the conversation framework, which is that it only represents conversations between individuals and thus is not adapted for collaborative learning

- c) a fully integrated client that automatically builds a conversation thread that is easily located from material relating to the specific topic of discourse.

Clearly b) and c) would be more sophisticated tools from the pedagogical perspective of the conversational framework than a).

Another issue that quickly becomes apparent is that the notion of a 'micro-world' takes on a different meaning in the case of VLEs than more traditional forms of courseware. In essence, the VLE provides the tools for a teacher to build a micro-world by allowing the teacher to construct learning activities enriched by multimedia resources and simulation programmes.

The crucial point from the perspective of the conversational framework is that the teacher should be able to construct the learning activity following a conversation with the student at the level of conceptions and the identification of a learning goal for the topic in question. Thus for any given learning environment we should consider how well the tools provide for both structuring conversations and actions and also how well they allow for integrating dialogue with actions.

Discursive Tools

All of the VLEs described in appendix A contain tools for conducting conversations. Naturally these rely to a great extent on e-mail and asynchronous discussion groups. It is important to consider how well the VLE leverages e-mail technology to support the conversation as an integral part of learning. For example, is the conversation accessible directly from the learning topic within the course structure or does the user have to move out of the course work in order to continue the conversation? Does the e-mail or conferencing tool allow attachments to be included with messages? And if so, can the attachment be extracted and embedded into the users course work structure? Does the tool allow learning goals to be specified and recorded on the basis of the conversation? Ideally the agreed learning goal should be in a prominent location with respect to the topic of learning.

Adaptability

How easy is it to adapt the activities associated with a learning topic according to the needs of an individual student or student sub-group as revealed by the conversation? This raises the question of whether students in the same group can be easily differentiated within the VLE once a course or learning activity is in progress.

Interactivity

A basic pre-requisite for a VLE is that it should be interactive. It is not enough for material to be presented to a student and then be tested on it. A VLE should allow the students to restructure the presented material, add resources of their own, annotate material, launch and run simulations etc. In other words the student should not merely be a passive observer of the 'micro-world' constructed by the teacher, but should be pro-active in shaping the 'world'.

Reflection

How does the VLE allow the teacher to help the student link detailed feedback on their actions to the topic goal? A concept-mapping tool might be a helpful feature in this respect. Alternatively, contextualised discourse for every level of the topic structure should be possible.

When we used the Conversational Framework to look at some of the available VLEs in 1999, we found that many of them did not measure up well.

One of the characteristic flaws of early VLEs was that whilst there would typically be strong channels for the teacher to present ideas and materials to the students, there were either weak or occasionally non-existent channels for students to present their understanding and ideas in a discursive manner. A second feature of the conversational model is that teachers should be able to adapt the learning activities they present to students on the basis of their conversations with the students. It was another shortcoming of 1st generation VLEs that the learning activities were not easily adapted once the course was underway.

Whilst the conversational framework is a useful tool for evaluating some of the important aspects of online pedagogy, its main limitation is that it is based around communications between one teacher and student and is not suited for evaluating the management side of e-learning tools function.

In the evaluation framework we developed in the 1999 report we separately presented a set of questions based on the VSM and a set based on the Conversational Framework. Whilst this was appropriate when we were only effectively considering the module level we decided that it was too cumbersome a framework to be practically used across all three levels. Thus the revised framework presented in the next section merges the two models into a single set of key questions at each of three levels.

The Revised Pedagogical Framework

In this section we have taken the two models, the VSM and the Conversational Framework, and teased out a number of key questions that these suggest need to be answered when evaluating eLearning tools or VLEs. These combine insights from both models, and address the three structural or recursive levels identified earlier.

Part 1: The Module

1. What tools does the system provide for teachers to present/express their ideas to students?
2. What tools does the system provide for students to articulate their ideas to teachers and other students?
3. Can teachers and learners extend/change their presentations during the module's time period?
4. A VLE is not a single tool; it is a structuring and coordination system containing a variety of tools. These questions are about the model of teaching and learning interactions that forms the basis of the system.
 - Can a module be structured sequentially and / or hierarchically over time?
 - What facilities are there to organise learners in a variety of ways in the module (whole group, small groups, individuals)?
 - What types of learning activity are supported by the system?
 - What underlying pedagogical model(s) or approach(es) does the system encourage?
5. How are the 'rules of the module' expressed and made evident to the student? By this we mean such things as the learning outcomes, the obligations of the learner and the mutual commitment teacher and student make (e.g. the amount of time a teacher will spend messaging each week, the number of assignments a learner will be expected to complete, etc.)
6. What facilities are there to monitor how well learning is progressing on the module?
7. What can learners do on their own, outside of the purview of the teacher?
 - Can they find and manage resources – do they have their own file stores or repositories?
 - Can they talk to other students (other than in the main module discussion), create their own discussions, create their own learning activities involving peers?
 - Can they locate people with similar interests outside of their own module, course, year or institution? I.e. is information about people available?
8. To what extent is it possible for the teacher to adapt the module structure once teaching is underway?
 - Can you add / change / delete resources?

- Can you add / change / delete fragments of module structure
- Can you add / remove people? Can you split them into different groups?
- Can you create and assign resources or learning activities to individuals?

Part 2: The Student Level

1. How is your system student-centred?
2. Does the system provide time management / planning / organisation tools for the individual student to organise their work?
3. Can the student get a view of current and completed modules? Can they drill down into their completed modules and view a record of work they completed?
4. Can a student monitor his or her own activity? For example can they obtain statistics on what they are spending most time on, whether their time is being evenly shared or not? Can students provide feedback on the quality of the module?
5. How are you thinking about PDP? Can a student do Personal Development Planning (PDP) within your system? Are there module-maps they can use to choose modules from? Can they show register interest in / actually sign up to new modules within the system?

Part 3: The Programme Level

1. Can you see the whole degree or programme within the system as a coherent entity rather than just a collection of unrelated modules? In other words can you obtain a view at programme level? If so what can you do at this level?
2. Does the system allow specification of programme rules for delivering a module? Does it permit or provide a space for negotiation between programme managers and module tutors on resource questions?
3. Can the performance of a module be monitored by the programme manager? What facilities are provided for this? Can guests be signed up to allow QA examination or peer observation of module activities?
4. Can the programme be adapted from within the system? Does the system provide tools for new modules to go through design, development and validation and then be added to a programme?
5. How does the system support teachers working on different modules to coordinate their activities and assist each other?

These questions represent our interpretations of the models applied to elearning. However we do not feel they are the last word, but form the basis for a much more detailed set of questions beyond the scope of this report, and that may form the basis of a larger research exercise. In the next chapter we elaborate the results of using these questions to guide us in the evaluation of several VLEs, undertaken in most cases jointly with representatives of the system developers.

3: A review of E-learning systems using the framework

In this chapter we report on a study in which the pedagogical framework discussed in the previous chapter was applied to a variety of e-learning tools, environments and architectures. The broad aims of the study were to obtain a rich picture of current tools, systems and architectures designed to support e-learning. Specifically it was to investigate the current capabilities, current issues and future directions of e-learning technologies in relation to the three main themes of the framework previously described, namely:

- Pedagogical variety and innovation in teaching and learning
- Institutional management of e-learning
- Student management of their own learning

In the first section of this chapter we describe the rationale behind the study in the context of our previous work and the theoretical framework presented in chapter 2. We then describe the methodology we used for the study before presenting a review of each of the systems included in the study.

Rationale and background

In Britain and Liber, (1999) we presented a simpler form of the framework described in the previous chapter. Although the report stopped short of providing a review of systems, when we examined a number of the 1st generation VLEs available at the time against the features of the framework we found that they performed poorly in a number of ways:

- Systems were mainly geared towards content structuring and presentation – i.e. a one-way transmission model of education
- Discussion and dialogue were generally hived off to a separate discussion place not integrated with or more importantly driving the sequence of content.
- Much greater emphasis was given to teacher and administrator tools than to students' tools.
- There was a distinct lack of student self organisation or presentation tools
- Courses were not easily adapted once started

There are many other examples in these VLEs of where the design of the software appears to have been more geared towards what looks and feels familiar about the teaching and learning process than towards what innovative ways effective learning might be promoted when some of the constraints of f2f environments are removed.

The design of first generation virtual learning environments seems intended to reproduce certain cultural cues, or even 'stereotypes', about learning and teaching in a college environment. Individuals are assigned to a small number of carefully designated roles – student, instructor, course builder – with no acknowledgement of the complex and multiple roles that students and teachers are called on to play in the course of a typical teaching session. Metaphors such as 'noticeboard' and 'common room' are derived from traditional campus-based situations without questioning whether these are still appropriate. Many innovations in face-to-face teaching, such as problem-based, outcomes-based or student-negotiated learning, are not easily accommodated in the structures by which commercial VLEs allow management of student time and student groups.

One of the main simplifications of the framework presented in 1999 was that it only dealt with one level of recursion – namely the teaching and learning interactions at the module level. The aim of the present study is to review the characteristics of a range of e-learning systems using the elaborated framework presented here at each of the three levels of recursion identified in chapter two.

Overview of Systems

Systems were selected for inclusion in the study according to the following categories:

- Recently updated and/or re-designed commercial e-learning platforms
- Pedagogically innovative or open-source e-learning tools and VLEs
- Major UK E-learning initiatives

- Open Technical frameworks for e-learning

Using these categories the vendors or creators of the following systems were invited to participate in the study:

Commercial E-learning platforms
WebCT Vista
Blackboard Academic Suite
Granada Learnwise version 3
FirstClass
Teaching and learning tools and VLEs
LAMS
COSE
Moodle
Major Initiatives
University for Industry / Learndirect
UK E-Universities Worldwide
Open technical frameworks
OKI / SAKAI (not included in this draft)

It is worth noting that the number of systems and architectures that we were able to include was restricted to this number by the time constraints of the study rather than for any other reason. Systems that we would have liked to include but were unable to were: Teknical which is widely used in the FE sector, Bodington which is an easily customisable open-source system based on the metaphor of navigating a building and Zope, which is an interesting open source technology that has been used for a number of recent e-learning developments (e.g. Edu-Plone and FLE3).

Methodology

The study was conducted using a semi-structured interview based on the questions derived from the cybernetic framework that are described in chapter 2. This interview allowed the system vendors to answer the questions themselves and the review is intended to provide an overview of current systems and demonstrate the use of the framework in practice. Educational practitioners with a deep working knowledge of one or other of the systems may answer the questions in a different way.

A contact person was established for each of the systems included in the study and that person was contacted by email to explain the study and invite them to participate. The contact person then either agreed to participate or passed the request through the organisation until appropriate person(s) to take part were determined. A follow-up email exchange then took place and the 'participant' was provided with a standard document explaining the purposes of the interview and providing the list of questions. This document is reproduced in Appendix 1.

In all cases, the participant(s) interviewed were key persons associated with the product: They were: the original creator or chief architect of the software (who generally also had a background in learning technology in tertiary education); or a senior marketing person accompanied by a product specialist

The participants were given choice about how they would like to conduct the meeting in which the interview took place. In practice the meetings took one of two forms. If the participants were in the UK, the interview was a face-to-face meeting, which included some level of demonstration of the product. If the participants were abroad, then the interview was conducted over the telephone.

The interviews were recorded and a transcript of the interview was created. The transcript was then condensed and edited to form the basis for the information presented in the tables for each system in this report. Following creation of the tables of responses they were then

returned to the participants in question so that they could check the accuracy of the reporting in terms of the meaning and content of the conversation

The Interview and Research Questions

Each interview began with interviewer briefly explaining the background, aims and nature of the study. Then the participants were invited to provide an overview of their system, the background to its development and the direction it is heading. The aim of this open question was to give the participants a space to talk about their context, the differentiating aspects of their product, the issues that it was designed to assist with and their future development plans.

Following that the interviewer asked the questions derived from the framework. The participants were reminded that the aim of the study was not to provide a comparative evaluation of different products, but to obtain a picture of where each product or initiative was positioned in the e-learning landscape and what the issues were from their perspective.

During the interview process, if the discussion began to focus on particular issues, the interviewer asked follow-up questions to explore the issue in greater depth. Or, if the discussion moved off a tangent the interviewer allowed it roam before going back to the questions. The transcript was then used afterwards to locate parts of the conversation that related to each question.

The Reporting Model

The reporting model used for each system is as follows:

- Title and Version of the system or initiative
- The relevant website addresses for further information
- A brief description of the system or initiative
- Tables of Responses to interview questions
- Commentary on the responses

The main sections of interest in the reports are the tables of responses and the commentary. The model is designed in this way to separate the authors' interpretations of the responses as much as possible from the responses themselves. To aid this process the responses have been entered into the tables in the first person using the participants' words as closely as possible. There are several sources of information on participants perspectives contained in the tables:

- The different content of different participants responses to each question
- Where participants return to a particular theme or set of features across different questions
- Where participants pay greater amounts of attention to some questions than others

The interpretative commentary for each system summarises and interprets the information in the tables from the authors' perspective and highlights the key issues and themes that emerged during the interview.

A reference table is reproduced in Appendix 2, which puts the questions that pertain to each category in the framework in the table cell associated with that category. This is intended to help remind the reader of the specific questions that prompted each response and it would be useful to be able to refer to this document when reading the tables of responses.

As a further guide, where there are several sub-questions in each category an underlined word or phrase indicates the subject matter of the particular response in question. For example under the category of 'presentation and re-presentation of key concepts' in the Module table a number of participants talked about content creation and publishing as a separate idea from tutors presentations. In this case the phrase content creation is added in under-lined formatting separate from tutor presentation. This convention is not so much intended to be a rigorous categorisation of ideas as a guide to readability and comprehension.

WebCT – Vista

Website: www.webct.com

Description:

WebCT is one of the market-leading VLE vendors in UK HE and FE. There are two main strands to the organisation: one is software development and the other is provision of services. WebCT have two main products: Campus, which is their course management system and Vista, which is an enterprise-level application. Vista includes all the course management features of Campus but has added features to accommodate the provision of courses across the institution and across multiple institutions. WebCT pointed out that some of the key additional features of Vista are:

1. A flexible learning context to allow differentiation between different departments, tutors and subject areas. For example between advanced and novice users. Also the course structuring requirements may be different for medical schools or business schools. Different departments may have different security systems, authentication systems, and business process models. So there is a whole structure above module level that Vista is designed to handle.
2. Ability to take content management away from the course level – Vista allows the creation of independent content so that it can be re-used at an institutional level
It also allows monitoring of students at institutional rather than the module level.
3. The ability to devolve control down through the hierarchy of the organisation through a flexible roles and permissions model.

The Vista code-base has been completely re-built and the system is a J2EE 3-tier architecture. The questions have been answered in relation to version 2.1 which is a new release that adds significant features over version 2.0

Table of Responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Tutor Presentation tools:</u> The tutor can create a sequential activity structure (known as a learning module) based around a table of contents. The activity sequence can include a whole range of tools: simple content pages, discussion tools, assessment tools, media library objects, SCORM objects, glossaries, syllabus, whiteboards etc. There is an HTML editor for creating content. You can also link out to remote objects such as a reading list on a library system.</p> <p><u>Student Presentation Tools:</u> From a student point of view any of the tools can be made available to a group or individual through the permissions model. Group assignments can be published, either by the instructor or Student.</p> <p><u>Adaptation:</u> Any of the authored content or presentations can be readily adapted on the fly</p>
2: coordination of people, resources and activities	
	<p><u>Hierarchical and sequential structuring:</u> you can have both views. A learning module is a structured rule-driven sequence of content and activities. But it can also be just an unordered collection. You can create any combination of hierarchical and sequential structuring.</p> <p><u>Creating student groups:</u> It is possible to create any grouping of students and to change or make new groups at any point. So you could spontaneously create an assignment workgroup for example and assign different materials to different subgroups.</p> <p><u>Pedagogical orientation:</u> As far as possible we leave it to academics to define their own pedagogical model. WebCT's aim is not to dictate how you do teaching and learning. We leave it open so you can define the pedagogical models in terms of templates. The tendency amongst academics is still unfortunately to opt for a transmission model. The challenge is one of professional development, which our company can help with too.</p>
3: resource negotiation and agreement	

	It can be up to the academic what description they put alongside an object; you can display the inherent rules with some objects – when it is going to be displayed, to whom it is available and when. That also works from an academic and instructional point of view. You could for example have a personal discussion forum between tutor and student with the thread resulting in the delivery of a piece of content to a student or it could be the student that decides what content to select following the discussion – so there is support for that process.
4: monitoring of learning	
	Tracking facilities. You can get information about what tools have been used and when, how many discussions, what groups of contents, how many emails, what grades did students get at different times, right down to the individual student sessions, tracking both information and activity.
5: self organization amongst learners	
	Students have their own file-space and can search for and manage their own resources. Students can't set up their own learning groups but they can self-subscribe to ones that have been created by the academic. We have a 'people links' so anywhere you see someone's name you can send them an email. We have some plans to do profiling information – there is plenty of profiling information collected by vista but we don't make that available at the moment. You can find out who else is online at the time and who is in the same module.
6: adaptability of module and system	
	Templates can be defined at any level from institution level to the course level and e-learning modules can be derived from these highly flexible templates. Changes can be made to content within these templates, which cascades to the courses where they are used. Content design and course layout however is not restricted to being developed within templates; work can be carried out at the course level as well. If desired content can be created within content repositories and referred to from within courses so enabling content re-use and collaborative development.

Learner	
1: Learner-centredness	
	There are some trends in student centredness e.g. a move from a transmission model to an activity-based model. Students can be involved in the decision about what they study, self-enrolment, formation of study groups – those tools and functionality are available. Some of this falls between the student information system and the VLE though. For example some of the rules about permissible combinations of modules are typically kept in the SIS, but Vista can manage this as well, if appropriate.
2: coordination of people, resources and activities	
	Yes students can view their current and completed modules and view a record of their work
3: time management / planning	
	Students have the ability to define their own calendar, which can also be integrated with a campus-wide calendar. They can see how far through the content they are compared to the group as a whole. They can see the timeline they are within with reference to a particular subject. Students can see who has replied to their posts. They have their own file area, so they can have a draft portfolio for their own work. They can drag and drop into their file area from their desktop with webdav.
4: monitoring own learning	
	Students can see their own grades. They can give private feedback to instructors. You can have anonymous surveys. We are introducing anonymous marking in the next version
5: adaptation / reflection	

Students can register their interest in a learning module based on an outline of what the module contains, then it becomes fleshed out when they sign up. You can have a syllabus embedded within a learning object if you want. It is largely dependent on the organisational model you want to implement.

WebCT Vista incorporates powerful API's that enable both commercial and open source portfolio applications to integrate with resources and student information within the VLE.

Programme / institution

1: Extensibility and integration

This is at the core of the new developments in Vista. The aim has been to create an application that fits whatever type of institution wants to use it. On the subject of open-source software: we support a variety of open-source initiatives. But as VLEs become more mission critical then they need to be performance tested. We have a full SDK. Some aspects are to do with integrating content utilities – e.g. FrontPage or Dreamweaver and then at the second level we call 'application bridging' you link to the application and it appears on the toolbar like other tools in Vista. This works either through java-based apis or through web-services. We have version aware APIs as well as System integration APIs. We use IMS where possible. The API that will be consistent throughout future versions and we are working with a development community who are developing extensions for Vista. All SDKs come with full documentation and support.

Our view is that there are some areas where you need that core reliability and scalability and there are others where it is appropriate for open-source. Open-source developments can be expensive to manage. So Vista has an oracle 9i backend and it gives us full scalability and cross-platform capability.

Integration with portal systems involves breaking down WebCT components into portal channels. With MyWebct you can choose which channels are linked into the portal so you don't have to have the whole application linked into the Portal and for instance you can choose which communication or calendaring channel you use. We are the only company to show integration using the OKI standards. With Vista, rather than just linking a student to the library you can link them into specific areas of the library. As another example of integration, there is an API straight to the calendar tool and you can sync. up entries so that calendar entries appear in outlook, the portal, and the VLE.

2: coordination of people and activities

This boils down to architectural decisions about how you design the workflow. There may be institutional level designers and course level designers. One person can have multiple roles, as they may be involved in different things on different courses.

3: resource negotiation and agreement

The concept is that components can be released to specific roles, so a learning module could just be released to academics for review. We also have an auditor role.

4: monitoring of modules

Vista allows monitoring at the level of an aggregation of modules so whatever view you choose is available. All the tracking information is available across modules

5: self organization of teachers

It is possible to for a group to work on a set of objects in a repository and create a learning module for academics to use. It depends on the model of your academic staff. Most institutions recognise the need for greater collaborative models for academics and getting rid of 'silo culture'.

6: adaptability of programme

We typically see this as a process in which course design happens at a template level as explained earlier. You can adapt and replace objects throughout the system – it is dependent on roles and permissions.

Commentary

Positioned as an Academic Enterprise System, the main benefits of Vista over and above the Campus product are at the level of the support for institutional and cross-institutional level management of degree programmes and support for student management of their own learning as indicated by the responses above.

In terms of support for pedagogical flexibility and innovation, the improvements in Vista over 1st generation VLE products are:

A new roles and permissions model means that any of the tools that can be used by tutors can also be made available to students

Student groups and sub-groups can be created or adapted on the fly

Content or presentations can be created or adapted on the fly

A learning module can be any combination of hierarchical or sequential structuring

Optional use of templates facilitates the process of course design and updating

Students can self-subscribe to groups

Monitoring is still based on tracking facilities of debatable information value. Student self-organisation is limited in that they cannot set up their own groups, although they can self-subscribe to those created by lecturers. Also profiling information is limited because of privacy issues. Although it is collected within the system, it is not made available

WebCT told us that what they provide as a commercial organisation over free open-source systems is a high level of reliability, scalability and support.

Blackboard e-Education Suite

Website: www.blackboard.com

Description:

The Blackboard e-Education Suite consists of three systems that can be licensed separately but together they make up Blackboard’s enterprise e-learning platform. They are the latest release of the Blackboard Learning System (6.1), a Portal system and a Content Management system. Blackboard say that the Academic Suite is a comparable price point to WebCT’s Vista product.

Table of Responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Tutor and Student Presentations:</u> Today the emphasis on presentation of ideas is still very content based. You can control access and sequence through the system so you can present ideas in a thoughtful order, but we want people to shift into using this for communication and collaboration using asynchronous collaborative tools and certainly we provide all of those features as well. But I would say still the way most people use our products is sharing ideas using PowerPoint or documents. The collaborative tools are now more integrated with content presentation. 3 years ago, a discussion board or chatroom would be an icon launched from within a very defined tool button, now those tools can be accessed anywhere in the learning environment. You can customise the navigation bar to only include collaborative tools. I do believe that the systems have become sufficiently flexible but the nature of the syllabus that instructors are teaching against is that it is organised against content and over a schedule of sessions so that is how they think about the learning environment – dates and content, rather than as a community environment that creates a third dimension to the traditional classroom.</p>
2: coordination of people, resources and activities	
	<p><u>Hierarchical and sequential structuring:</u> You can do both.</p> <p><u>Structuring groups of people:</u> You can create group sites within the course site. The group sites have discussion boards, chatrooms, and the ability to do file-exchange, to work on projects. You can assign students into those groups or do self-selection into those groups. There is an ability to break out the class into sub-groups where they can interact in their own private environment with their own materials. These can be created at any time prior to or during the course.</p> <p><u>Activity management</u> Timed-release of materials (content, assessments, learning units) provide flexibility to present content according to curriculum-driven criteria, including sequential and date/time-driven criteria. Learning Units in addition provide forced sequential or flexible but ordered presentation of content, assessments, and assignments</p> <p><u>Pedagogical approaches</u></p> <p>Our philosophy, which I think is the right one, is that blackboard is focussed on the 20% of functionality that 80% of the market is interested in at any one time: the generic tools not the pedagogically specific ones. The generic tools being discussion boards, chatrooms, assessments, gradebooks, announcement editors and the ability to add students, set up virtual installations where multi-sites of the same institution can have their own look and feel etc. But our philosophy through Building Blocks is to talk to third party developers, academic publishers and our clients about the 80% that at any given time, 20% of the world cares about: a mathematical notation tool, a constructivist approach to discussion etc...education is boundless, so I might surprise you in saying we don’t seek to implement any one or multiple pedagogical models, we are agnostic in that sense.</p>
3: resource negotiation and agreement	
	<p>This can be handled using templates. As a tutor you would be prompted in the profile question to answer questions about when you will answer questions, how to contact you and so on. Our announcements tool, which was a thoughtful choice, provides a live current teacher-student environment. We have something called an ‘office hours scheduler’ that I would put in this category, it allows you to schedule live in-person time.</p>
4: monitoring of learning	

	<p>This is a major theme of development in blackboard today that collectively we consider as Evaluation. That is evaluation by faculty, by programme, by student over time, or across students. The missing link is learning objectives i.e. the ability to associate activities, content and assessment against an instructional objective that is tied to programmes so you can start correlating certain things together. We need to figure out what people want to know so that the most insightful information can be reported out. I'll be very candid and say my biggest area of critique of our product and most products in the industry today is that the data we expose of what's happening in the learning environment tends to be fairly trivia-oriented or at best support the system administration. We have not yet done a great job of connecting different things that we are tracking in a way that is instructionally useful.</p>
5: self organization amongst learners	
	<p>This is another major development theme for us - Personalisation. 3 years ago the course site was a fixed environment structured by the instructor and navigated by the student, but there was no individual personalisation and the permissions system was cumbersome. So it wasn't a very empowering instructional environment. We have made huge strides. Now we have full portfolio capability where you can take artefacts out of each of the courses and keep it in your own personal space, there are preferences that you can set that carry across all the tools and all the course sites, so that you don't act as a new entrant each time you enter one of these course sites and the roles and permissions capability is now highly flexible. We also give institutions the ability to create their own roles.</p>
6: adaptability of module and system	
	<p>It is highly adaptable. A lot of this is a content management challenge i.e. can you link from multiple areas to the same document and if you update that document, then update all of the different sequences that might take advantage of it. Can you copy something, edit it and start a new sequence with it. There's a lot you can do of that nature so I think that the system has become much more flexible when it comes to that.</p>

Learner	
1: Learner-centredness	
	<p>Blackboard is an academic suite of three systems: Learning Environment, Portal and Content-Management System. A student ought to be able to have preferences, file-space and personal tools like blogging and private journaling that carry across the entire learning environment, rather than being restricted to within a course. So we have our Portal environment to create that level of personalisation outside of the strict teaching and learning segments of blackboard and the content system that powers our portfolio capability.</p>
2: coordination of people, resources and activities	
	<p>Absolutely – you log in and you come in at a view that is above any particular course. That represents your personal environment onto the system. There are various different channels. You get announcements across courses; there are tabs for the library and other campus features. As part of that you can see present and past modules.</p>
3: time management / planning	
	<p>There's the ability to have a calendar, tasks, notes. Obviously there's your portfolio, which can be used to store various documents. I don't think products like ours are ever going to approach the functionality of personal information managers like Outlook but there is plenty to help manage your instructional activities</p>
4: monitoring own learning	
	<p>Interpreting the question in the most conservative way, I think the honest answer is no, I can't think of any simple user interface element that reports out what a student has done during the day. I can't think of any commercial products that do that. It would be entirely possible to say, "Yes, all you have to do is X, Y or Z and you sort of accomplish it". You could build a building block. Yes, students can provide feedback to the tutors, and anonymous feedback if desired.</p>
5: adaptation / reflection	

PDP and portfolios: It is part of the portfolio system that you can have rubrics that relate to part of the programme and collect examples of competencies against those objectives so that you can track performance against the overall framework. It is also for career development after graduating as you can provide a link into the portfolio and it is much richer than just a resume or CV. You can export it as a WinZip file.

Programme / Institution

1: Extensibility and integration

Open-ness, extensibility and integration with 3rd party tools is what the Building Blocks program is all about. And that is something that we think we differentiate ourselves on. In BB there is a UI for a system administrator to upload an extension. When they do it there is a catalogue that will tell the system administrator what this building block actually does, so there is a system of rights to make sure nothing damaging happens. If the system administrator accepts it, it becomes a tool on the left that the instructor can turn on and off. It has an icon like any other BB tool; you wouldn't even know necessarily that it was a third party tool. If you have tracking turned on then you get tracking in that tool, if it has an assessment it can report back into the gradebook. All of this is very well structured. We have started to re-develop the UI to take into account that not every tool is shipped with the original product and that is a paradigm shift in the UI.

2: coordination of people and activities

Obtaining a programme-level view of courses

Unfortunately no! There we run into privacy issues. Some institutions are very, very sensitive about limiting what a faculty member knows about a student to only that information that is created during the course. One would think that it is quite logical that the benefit of these systems is the advanced biology class tutor has an idea how somebody performed in the introductory class biology. But unfortunately we have found it quite difficult. This is particularly a US issue. It differs across different regions across the world but the US is still our largest market...so we don't build it, but we are believers.

3: resource negotiation and agreement

You can do this by creating a dedicated course environment for tutor collaboration and interaction between say the programme managers, technology group and instructors; I think there are a number of vehicles for achieving that within the system. And obviously system administrators and programme managers can create roles for themselves that allow them to go into a course and do centralised curriculum design and management on behalf of the instructor.

4: monitoring of modules

Again the system administrator interface or the view across modules (courses) does provide an interface that allows a number of insightful reports. Tools are not yet available to view the performance of the student across multiple areas.

5: self organization of teachers

We have made huge strides in that top-down model. We started bottom-up allowing instructors to build their own learning environments and we have complemented that equally well with tools for centrally managed programmes, so I think it is much improved. I guess there is always more you could do but I think it is a full feature set in that area.

6: adaptability of programme

Again there are a number of tools there – teachers who are working on the same subject matter and are using a common set of materials. There is a whole workflow capability where I may upload something and allow a colleague to review it, approve it and then finally it ends up on the course website. There are a lot of tools now that assume several teachers may be teaching the same course, that or a piece of content may be taught across multiple courses. They provide a means of workflow support to allow faculty to work together rather than use email or some off-line support.

Commentary:

A variety of themes emerged from this interview. Where teaching and learning interactions are concerned, the responses to our questions suggest that the system has now become sufficiently flexible to handle a wide range of workflow models and that courses could be structured in a discussion-oriented or resource-based manner if desired. However, in common with webCT, the typical mode in which Blackboard is used is to support a content-based, essentially transmission model as that is the dominant mode of education.

The view expressed by Blackboard in our interview was that it was the role of their systems to provide the generic tools and overall framework to support e-learning but not to try and provide the distinctive pedagogical tools that are particular to different contexts – the variety is too great for a single organisation. Their solution is to open-up Java APIs through their Building Blocks programme to encourage 3rd party developers to create those tools

Blackboard were candid about the fact that current tracking facilities in their product fall short of the mark in terms of providing useful information for monitoring and evaluation, but said it was a major area of current developmental work.

From the student perspective, personalisation is another focus of development work. Blackboard too, have overhauled their permissions system to give greater flexibility and a wider range of actions to the student. The inclusion of a portal system and content management system within the suite means that students can work and store their own content at a level outside any course. Blackboard specifically mentioned the inclusion of blogging tools which is an interesting development

At the programme level, Blackboard provides support for institutional management of learning programmes through their Portal and Content systems and a range of enterprise-level functionality

Granada Learnwise Version 3.

Website: www.learnwise.com

Description:

Learnwise is, according to the MLE landscape survey, the third most widely used VLE across UK HE and FE, with most of its clients currently in the FE sector. It is now in its 3rd version. It is based on the WOLF system developed at the University of Wolverhampton. WOLF was based on ASP. In this incarnation it is now a 3-tier J2EE architecture.

In addition to the Learnwise VLE, there is an accompanying full-strength test and assessment module (Testwise), offline authoring tools (Publisher and Course Designer) and is accessible. (W3C conformant).

Learnwise is less expensive than its main competitors whilst still offering enterprise level capability.

Table of Responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Course creation and publishing:</u> The tutor can create structures and upload content. Granada supply two different offline tools for creating and linking content in the form of learning objects. WebDAV is supported so you can use drag and drop to expose the file systems to desktop tools. Granada publishes commercial content that can be edited and adapted by teachers.</p> <p><u>Tutor presentation tools:</u> Tutors can upload and share files and folders, upload content and order it, Course elements can be time released. There is space to add resources e.g. FAQs, weblinks etc and create a reference or reading list, and announcements</p> <p><u>Student presentation tools:</u> The main mode of interaction is to work with the content in the order they've been given it or if they have access to the table of contents then they can jump to any point in the course.</p> <p><u>Comms tools:</u> Students working in groups have all the comms tools: instant messaging, sharing files and folders, forums. There is form-based email, which is useful for novice users. Threaded forums and bulletin boards with formatting attachments. We have an html editor built in online. The forum gives email notification of replies to forum postings.</p>
2: coordination of people and activities	
	<p><u>Navigation:</u> A table of contents provides the navigation model; there is a content page with turn page navigation or 'jump-to-topic', so you are not restricted to doing things sequentially.</p> <p><u>Creating sub-groups:</u> Workgroups can be created with files and folders specific to each group which allows differentiation between groups</p> <p><u>Permissions:</u> A versatile permissions system means that the learning environment can be set up differently for different sub-groups and individuals</p> <p><u>Calendar management:</u> A feature that is useful for tutors who are mediating lots of courses is that they can simultaneously add a new task into the diaries of all their courses.</p> <p><u>A chatroom</u> with sub-rooms allows tutors to see what students are online at any one time</p>
3: resource negotiation and agreement	
	<p>There is a learning contract mechanism which students must agree to before starting to use the system</p>
4: monitoring of learning	

	<p><u>Assessment</u> The testing and assessment system – Testwise is the most advanced IMS QTI system that exists: very rigorous and highly customisable. There are banks of standardised tests for which questions have been academically validated. We are the only VLE vendor with a high-stakes assessment engine. Testwise uses the scorm API so all you have to do is drop a Testwise test into a course and then all the data flows across.</p> <p>All the posts to chat and forum get archived off and then that forms the basis of a record. Students can be polled using the Evaluations facility. Although it is under-used - It can be used for institution wide surveys. It is robust as it only allows the student to reply once, because it is authenticated before they get in. Tutors see and can track all students they are responsible for using the learning log tool.</p>
<p>5: self organization amongst learners</p>	
	<p>There is a <u>communities area</u>. This is completely freestanding from curriculum. These could be things run by student union. It is under the control of the community rather than an academic. A moderator for the community is set-up by an administrator.</p> <p><u>Information about people</u> It is possible to view other students on your course including their email and personal website if they have created one. Also Under 'my profile' there is a heading called 'expertise' – which helps to find people with a particular expertise.</p>
<p>6: adaptability of module and system</p>	
	<p>Under each tab and submenu everything is under tutor control, so they can switch everything on or off – for an individual student, a group of students or the whole course. That can be done at any time during set-up or running of the course. There is a tools api that allows you to put any tools you want on these menus.</p> <p>The flexible permissions and roles system in learnwise means that you can base a role on a template and give it a name and assign functionality to groups or individuals with precision.</p> <p><u>Portlets as components</u> We currently don't allow a forum tool to be embedded in a piece of content or content table. We are planning to go to a portal technology using portlets that will allow the user to completely change their view without changing the underlying objects at all. One of the pedagogical constructs we are looking at is that although now you have a content-centric paradigm, what we often find is people want a paradigm associated with a piece of project work, for example, where you want a different visual organisation of things. So you will be able to do this is by making components into portlets. The interface is completely abstracted. You could then create different templates for types of learning activity. That means you open the door to students being able to decide on how they want to view things for their own learning styles and pedagogic needs.</p>

<p>Learner</p>	
<p>1: Learner-centredness</p>	
	<p>A student can edit their profile, enter a photo and website. They can change the look and feel of the system (e.g. high contrast for visual accessibility) without modifying the integrity of the system. The language can be changed (e.g. Welsh)</p>
<p>2: coordination of people, resources and activities</p>	
	<p>Student can annotate content with notes. There is an area called My Folder where all my notes can be browsed. There is a summary of progress we call a Learning Log – the Americans call it a grade-book. There is a personal diary as well as a course diary. A view of current and completed modules can be obtained</p>
<p>3: time management / planning</p>	
	<p>Personal diary as well as course diary e-minders – set yourself a task and tell the system to remind you when it is time to do it. Calendars with import/export feature. Bookmark content.</p>

4: monitoring own learning	
	The learning log provides information for each student on their own learning progress, e.g. percentage of course completed, assessments, narrative feedback from the tutor, notes.
5: adaptation / reflection	
	PDP and e-portfolio functionality exists but is not currently released for students. It will be by mid-2004. There are testers available for people thinking of enrolling.

Programme / Institution

1: Extensibility and integration	
	<p>The 'Tools API' – is a powerful extensibility feature that allows you to connect to the external tools of your choice e.g. netmeeting. It is often used for library integration.</p> <p><u>Interoperability Standards</u> – sequencing has been a problem. SCORM 1.3 is not ready but is called SCORM 2004. This is now ready in terms of technology but not been established long enough for content developers to take full advantage nor long enough for VLE providers to implement. We <u>properly</u> support: Run-time api, packaging, metadata. A lot of VLEs have only implemented the minimum. It is an interesting area about compliance. We are having this certified by ADL. There are a couple of corporate systems that are ADL certified but none in the academic space.</p> <p>IMS enterprise is used in both directions to draw down student information and return grades– although none of the MIS vendors have implemented a catching device to trap grades being returned– it is not important to them.</p>
2: coordination of people and activities	
	<p>Learnwise is an enterprise system, it has a content repository behind it this allows multiple institutions or faculties to work together using the shared database. We can have a variety of authentication mechanisms on here (e.g. LDAP, mail server, static) and can cascade them.</p> <p>Learnwise uses the IMS enterprise notion of groups to represent classes, cohorts etc. Users can be assigned to groups by drag and drop by the owner of the group. Typically this would be used for enrolment – to assign a group of students en masse to a programme.</p>
3: resource negotiation and agreement	
	The learning contract tool could be used
4: monitoring of modules	
	We have a virtual attendance record - when people last logged on etc. Guest users can be logged on for QA review. Students can be polled both at the course and organisation (campus / school) level. Course usage report displays a list of courses, creation date, number of students enrolled, names of tutors, date last accessed, status and size (file store usage in Mb).
5: self organization of teachers	
	<p>What can you do with an organisation – you can create communities, choose a moderator, then the moderator then can add all users. Communities yes</p> <p>Set up 'best practise content silo organisations' and search via meta data to find content then link or copy</p>
6: adaptability of programme	

It is possible to create a new course from scratch or an organisation can be linked synchronously into a course available from another organisation. The offline course builder tool is easy to use - drag and drop

The course management System allows anyone designated as an administrator to manage all the courses - tutors can be changed or added to courses. The main idea is we want to take control away from IT departments and programmers and put it in the hands of users (teaching staff). So everything should be easy to adapt.

Commentary:

At the level of teaching and learning interactions, Learnwise is currently set-up (like WebCT and Blackboard) to support a tutor-structured, content-centric course model. But also in common with those systems there is a level of flexibility and adaptability that did not exist in 1st generation VLE products to support a variety of pedagogical approaches. Much of this increased flexibility is achieved by the clear separation of interface components, business logic and storage due to the 3-tier architecture, which allows for 'on-the fly' adaptation of templates or group-working structures as changes in one area can be updated across the system. There is a highly flexible permissions model as in the other two systems that allows a tutor to provide individuals or groups with any of the available tools and functionality.

On the subject of personalisation, the planned move to portlets to allow users to re-arrange user-interface elements to suit their personal preferences is an interesting development idea, although it is not in the system yet. Students can currently re-skin their UI from a choice of skins. Students have access to similar personal management tools to the systems already discussed.

There are discussion forums to support learning communities outside of the course framework, which can be moderated by students if approved by an administrator role.

Learnwise is also an enterprise-level system with the capability to allow multiple departments or institutions to collaborate using the shared database. It has a tools API to support integration of 3rd party tools.

FirstClass 7.1

Websites: www.firstclass.com www.semantise.com

Description:

FirstClass (now owned by Open Text Corporation) was one of the first conferencing systems to see widespread use in UK HE and was adopted by the Open University who continue to use FirstClass to support their degree programmes. Semantise is a UK company who sells FirstClass and do customisation and installation of the software for businesses and educational institutions in the UK and Eire. We talked to Semantise about FirstClass.

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p>The system supports all types of digital content, thus teachers can express their ideas through video, images, spreadsheets, documents, hyperlinks etc. As well as acting as a repository of all types of digital content, there is built in support for viewing and creating content containing the following formats: Plain Text, HTML, Rich Text Format, JPG, PNG, BMP, WAV, Tables. You can write stuff as an rtf. File and then FirstClass internet services converts it into html automatically for displaying in a web browser. There are bits in here that replicated bits of office functionality – it is more limited but probably enough for most students. A near-future release of FirstClass will support streaming video and voice-over-IP. You can also display FC content in presentation mode – sort of a crude version of PowerPoint.</p> <p>There is no gesture to start a new course –it is a more dynamic environment. But you can do time-release of course content – it is extensible through a scripting language that can tie into a student database so you can automate tasks.</p> <p>Threaded discussions occur in ‘conferences’ (modules), any number of modules can be created through a simple permissions model. Thus teachers can create their own modules and subscribe students and other teachers. Modules can contain digital resources (noted above), thus discussions occur in the same context as the resources being discussed. A conference is a container that you can message to, but you can also drop a file into and it’s all controlled by permissions. The conferencing area can contain other conferencing areas, chat rooms, calendars, content folders etc.</p> <p>Students can do exactly the same as tutors. Thus students can create their own modules and subscribe teachers and other students. You can delegate authority for anything (e.g. administration tasks) down to the student. The system doesn’t care if you are a student or not, it is down to the organisational model and how permissions are used</p> <p>It is non-prescriptive pedagogically in that it is simply an architecture, so it is not as obvious that you would have to use it one way or another.</p> <p>Anything that is submitted can be adapted. If there are people putting in documents it keeps the previous versions with a time stamp giving a paper trail</p>
2: coordination of people, resources and activities	

	<p><u>Sequential and/or hierarchical structuring:</u> Yes. But it is more flexible than that, you could take bits of a module and give it to someone individually</p> <p><u>Organising learners into groups:</u> Any learner can be associated with any module simply by making them a 'subscriber'. Through the permissions set of a module, learners can be organised in many different ways, for example as 'readers', 'contributors', 'browsers', 'moderators', 'controllers' and so on. Learners can be subscribed (and unsubscribed) to a module individually or in Groups or Sub-groups. You can cross structures with the groups you set up</p> <p><u>Types of learning activity supported by the system:</u> Discussion-based learning; variations on Question and Answer exercises, Essay Writing... There is no archetype of a 'learning activity'. But the new education module (shortly available in the US but not yet in the UK) has more prescriptive functionality regarding workflow. The education module allows cloning and time-delivery options. It exploits the calendar functionality and the synchronous communications have been enhanced. FirstClass has the concept of a piece of stationary, which allows you to create a structured document. The education module provides some educational templates. Stationary can be used for creating surveys, polls etc. The completed form is posted into a conference and the responses can be extracted to a database.</p> <p><u>pedagogical model(s) or approach(es):</u> I think the communication idea of things is so central that it is a fairly constructivist approach</p>
	<p>3: resource negotiation and agreement</p>
	<p>The rules of the module can be expressed through the module's 'Rèsumè' accessible via a single click. Furthermore, on initiation of a module, Rules can be posted and set to 'auto-open' the first time a learner accesses the module. The 'History' function can show the Teacher which students have read the rules. For further negotiation you can use discussions, set-up surveys and polls.</p>
	<p>4: monitoring of learning</p>
	<p>The best way to monitor whether learning is happening is to ask the students FirstClass makes it easy for students to feedback their ideas to tutors – but essentially it is up to the tutor. There are some tracking tools built into the education module and bespoke tracking tools can be built using FirstClass RAD and FirstClass Designer.</p>
	<p>5: self organization amongst learners</p>
	<p>Can students find and manage resources? Yes students have their own file storage. Also students could do team-based development using own areas and then drag and drop the results to public areas</p> <p>Can they talk to other students (other than in the main module discussion), create their own discussions; create their own learning activities involving peers? It depends on the implementation Students can be given the permission to administer areas of the whole system; use 'wizards' for creating structured content; create their own discussion area etc. This delegation is controlled by the rich set of permissions.</p> <p>Can they locate people with similar interests outside of their own module, course, year or institution? I.e. is information about people available? Yes</p>
	<p>6: adaptability of module and system</p>
	<p>Can you add / change / delete resources? Yes</p> <p>Can you add / change / delete fragments of module structure Yes</p> <p>Can you add / remove people? Can you split them into different groups? Yes</p> <p>Can you create and assign resources or learning activities to individuals? Yes</p>

Learner

1: Learner-centredness

	It is very person-centred as everyone has a great deal of control of his or her own space. The "Individual is King" in FirstClass in that individuals can be given as much or as little responsibility depending on the permissions they have. Each student has their own personal email box, address book, calendar, home page and they can create their personal Résumé (accessible by other students). They can create personal folders for organising learning resources / homework etc. The provision of a private email box means that the student's primary electronic communication device is also their learning environment, thus engaging the student in that environment.
2: coordination of people, resources and activities	
	Can students view their current and completed modules? Yes, but there is not an 'out of the box' gradebook – there is one in the education module and this type of functionality can be built in.
3: time management / planning	
	Yes, personal and shared calendars allow scheduling of tasks, booking of resources (e.g.: equipment for a practical exercise can be booked by students); reminders can be generated at various times prior to a task.
4: monitoring own learning	
	Yes, but not 'out of the box' functionality. Can students provide feedback on the quality of the module? Yes, you can create stationary for questionnaires etc. You can log on as anonymous user for anonymous feedback
5: adaptation / reflection	
	<u>PDP</u> You can have private discussions that someone can authorise you with access or the discussion can be visible and then anyone join in <u>Portfolios</u> – Each Learner can create a personal folder or folders containing work or links to work elsewhere on the system. The Education module will have more formalised Portfolio functionality.

Programme / Institution

1: Extensibility and integration	
	Because FirstClass can be integrated with any ODBC compliant database, you can add enormous amounts of extra functionality. So you can cast FirstClass as a VLE / MLE intranet. For example, in one institution we are using FirstClass as a front end for the student records system whilst delivering an online teaching and learning environment. With FirstClass Voice Services, you can integrate the FirstClass server with an organisation's phone system enabling users to have an always-accessible single mailbox for email, phone and fax messages. The FirstClass RAD and Designer programs plus other programming developer tools kits allows the standard functionality of FirstClass to be greatly extended and integrated with many other systems.
2: coordination of people and activities	
	You can gateway servers so you can be sharing across institutions. In other words can you obtain a view at programme level? Yes If so what can you do at this level? Whole programmes can be made available to other Learners / teachers; Programmes can be exported to other FirstClass systems; Programmes / Modules can be 'locked' to prevent further activity.
3: resource negotiation and agreement	
	Yes. Does it permit or provide a space for negotiation between programme managers and module tutors on resource questions? Yes, through conferencing discussion basis. Firstclass Education module allows development of curriculum maps.
4: monitoring of modules	
	Can guests be signed up to allow QA examination or peer observation of module activities? Yes
5: self organization of teachers	
	Many different ways; e.g., Scheduling of tasks through calendars along with reminders can assist workflow; 'Mail Rules' on modules can alert teachers of activity within a module. 'Teacher only' areas in a module provide a space for teacher-teacher discussion etc
6: adaptability of programme	

Yes, it can be adapted at this level

Commentary:

With its origins as a conferencing and file-exchange system, FirstClass is a different kind of system from the VLE systems such as WebCT, Blackboard and Learnwise. It is less obviously structured around the familiar educational workflow model of content structuring, assignments and assessments. It is also less fully featured, lacking tools like a gradebook, curriculum maps, tracking tools etc. although these sorts of tools are due to become available in the future with the planned release of the FirstClass Education Module (FirstClass ED).

The primary structuring mechanism and metaphor in FirstClass is the conference, which automatically puts collaboration and communication at the centre of workflow rather than content. Although a conference is simply a container and so can be used to support a content-centric course model. This difference is an advantage if teachers and students welcome the primacy of discussion and collaboration in the learning environment because of the greater degree of flexibility and self-organisation it affords for students and are not put-off initially by the less familiar, and more generic appearance of FirstClass. Anybody can set-up his or her own conference (as opposed to merely a discussion 'thread' in an existing conference) and subscribe anyone to it. There is a highly flexible permissions model that potentially allows students to be given administrator privileges for areas of the site.

Another advantage / disadvantage of FirstClass depending on your perspective is the use of an off-line client. The advantage is that it gives the student a high degree of control and speed in their personal management tasks such as email, address books, calendars and organising their file space without having to work through the web. The disadvantage is that many institutions are keen not to have to support off-line clients.

At an institutional level FirstClass can be customised in a variety of ways to fit into the organisational model of different institutions. Again at this level there is less obviously a standard model for how it would be used at this level, but a great deal of flexibility. There are SDKs and RAD tools to support customisation and integration.

Learning Activity Management System (LAMS)

Website: www.lamsinternational.com

LAMS Overview article

<http://www.melcoe.mq.edu.au/documents/ASCILITE2003%20Dalziel%20Final.pdf>

LAMS PowerPoint presentation and screenshot walkthrough

http://www.melcoe.mq.edu.au/documents/LAMS_Walkthrough.ppt

Description:

LAMS (“Learning Activity Management System”) is a system for creating and managing sequences of Learning Activities. The drivers behind the development of LAMS were the desire to facilitate good educational practice, along with the focus on design of learning activities encapsulated in EML and the evolving IMS Learning Design specification. Where LAMS departs from these models is that neither EML nor Learning Design incorporate models of collaborative work. This is the space that LAMS aims to fill. LAMS is currently being beta-tested in a number of institutions. A version 1 release is due out soon. The questions have been answered in relation to this version 1 release.

Table of Responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Content creation /authoring</u> LAMS is a system for creating and managing sequences of Learning Activities. A drag ‘n drop interface allows easy visual creation of sequences by joining together activities ‘tools’ from the LAMS menu of tools.</p> <p><u>Tutor presentation tools:</u> <i>Noticeboard</i>. This can provide simple text containing notes relating to sequences. <i>Share resources</i>. During authoring teachers can prepare resources for students. Optionally these can be adapted at run-time. Teachers can always register themselves as a “student” within a sequence, and contribute from this perspective. A new “Contribute” tool in monitoring is under development which will provide additional ways of teacher contribution during sequences without needing to be registered as a student</p> <p><u>Student tools</u> Not just discussion forum and chat; other tools include Q&A (student answers question, then sees all student answers presented together); polling/voting (student votes then sees all student votes collated together); journal (viewable only by teacher); chat and scribe (chat with scribe tool – especially effective in small group mode, with small group scribe outputs send to whole class page); share resources (where students and teachers can contribute URLs and/or files in real time during a sequence); submission (where students can submit work for marking/comments by the teacher)</p> <p><u>Extending / adapting presentations</u></p> <p>One of the key limitations is sequences need to be authored in advance and cannot be adapted at run-time. A work-around is to use several shorter sequences, rather than one long sequence, but there are plans to make sequences adaptable on the fly.</p> <p>Teachers and students can add URLs/files at run-time. A new feature (just completed, not yet released) allows for content of some tools to be defined during monitoring, rather than at authoring time – e.g. a Q&A tool with actual question decided during the sequence (perhaps based on outcomes of discussion); or a voting tool with voting categories decided during sequence, etc.</p>
2: coordination of people, resources and activities	

	<p><u>Structuring learning activities</u> Yes. LAMS is a system for building sequences. Hierarchical structures can be authored via different sequence constructions based on linear transitions or use of optional boxes (or both). But it is NOT a file system model. Any activity can be used that can be constructed using the tools and the sequencing methods available.</p> <p><u>Creating sub-groups</u> “Grouping” tool allows class to be randomly split into a predefined number of groups (future features will include additional “teacher defined” and “student selected” grouping options). Once grouping is included, any tool can be set to run in whole class or small group mode. It is possible to set several different groupings within a sequence, and use different groupings with any given tool. Again groupings cannot be created / adapted on the fly</p> <p><u>Pedagogical model</u> Aims to be pedagogically neutral – allows for a very wide range of pedagogies, including transmission, instructivist, constructivist, PBL, case based, etc. Fundamental design of system intentionally encourages a more student centred, activity led approach to learning (due to the construction principles of the authoring interface), but ultimately this is no guarantee of good pedagogy</p>
<p>3: resource negotiation and agreement</p>	
	<p>Noticeboard tool is a basic generic tool that allows any text to be added at any point in the sequence, which can be used to describe objectives, upcoming activities, expected preparatory work. Teachers can show sequences to students (via authoring) prior to start, and adapt on-the-fly based on student feedback. Various tools have their own embedded requirements (e.g., Q&A will not allow you to progress to see all other student answers until you have submitted an answer).</p>
<p>4: monitoring of learning</p>	
	<ul style="list-style-type: none"> - LAMS provides rich, real-time monitoring capabilities - Teacher can observe individual or group progress in real time via monitoring, including being able to “see” into any student’s contribution for any activity. - Anonymous student contributions are identified to the teacher in monitoring - Monitoring allows for both “sequence” and “student” views of real-time progress. - Monitor provides additional tools to teachers (independent of learner tools) for certain tasks, such as providing marking and workflow tools for submission marking - Any sequence can be archived, allowing for full record of all student activities to be stored, retrieved, etc. - SQL database provides potential for 3rd party analysis tools, such as Crystal Reports, etc - Full web logs of all activities, but statistics and analysis module not yet available - Teacher can intervene in sequence via “release” mechanism for “stop” signs, and contribute to discussion, etc. <p>NB: Instant Messaging during sequence not yet implemented – under construction.</p>
<p>5: self organization amongst learners</p>	
	<p>Finding and managing resources “Notebook” tool allows for private text area, which may contain URL links, etc. This area can be kept totally private to student, or parts can be made viewable to the teacher (under student control).</p> <p><u>Student interaction independent of teacher</u> - There are many opportunities for student interaction outside discussion. Independent discussion forums can be set up apart from main sequence(s). - However, students cannot current instantiate their own discussion areas, or design their own sequences etc. – LAMS is still quite teacher-centric in that sense.</p> <p>Information about people Not at present – this will be once Instant Messaging etc is implemented.</p>
<p>6: adaptability of module and system</p>	

<p>Depends on the specific tool, and the design of the sequence. E.g., share resources allows add new URL/file at run-time; new “define in monitor” feature allows content to be left as is/changed at run-time; sequence design determines whether changes can be made on the fly (i.e., not if it is one big long sequence, but yes if a collection of shorter sequences).</p> <ul style="list-style-type: none"> - Administration interface allows for add/remove people. All tools can be run in different group modes. - Resources/activities can be assigned to a single person (or a small group) by creating a new group in the administration interface, and then assigning the sequence to this group (this is different to the “within sequence” grouping tool).

Learner	
1: Learner-centredness	
	Heavily based on student contributions and interactions, rather than teacher contributions.
2: coordination of people, resources and activities	
	<u>Overview of current and completed modules</u> All sequences, new, current or completed, are available in the learner interface, and opening a sequence provides access to all completed activities via the progress bar navigation system.
3: time management / planning	
	Not at present, although a sequence could contain advice, etc as part of a noticeboard.
4: monitoring own learning	
	The multiple-choice tool can be used in a survey format so that students can provide feedback. Other comments could be provided via Q&A, voting, submission, etc.
5: adaptation / reflection	
	Not at present. LAMS is more about the activities required by the PDP rather than the PDP planning itself. This could change in the future if there was demand for integration.

Programme / institution	
1: Extensibility and integration	
	LAMS is not a fully featured VLE, but it could plug-into a VLE. Integration is important for LAMS and will achieved using standards wherever possible. Blackboard and WebCT integration planned for early 2004. The toolset is clearly extensible – New tools can be developed and added into the environment
2: coordination of people and activities	
	Shared areas; Import/Export sequences from one LAMS server to another
3: resource negotiation and agreement	
	Teachers can show sequences to students (via authoring) prior to start, and adapt on-the-fly based on student feedback.
4: monitoring of modules	
	Yes, provided that the manager or QA examiner is given the relevant access rights via the Administration area.
5: self organization of teachers	
	- Shared “departmental” area for collaboration on building sequences. - Monitoring does not currently have tools to share tasks among tutors.
6: adaptability of programme	
	Does not currently provide workflow tools for managing design, although the system has shared “departmental” area for collaboration on building sequences.

Commentary:

LAMS is not a VLE in the traditional sense, although it could be integrated with a VLE nor is it an enterprise level application. LAMS is designed with a very specific purpose in mind; that is the rapid authoring of learning activity sequences using a visual authoring interface. It is a tool for learning design in the broad sense rather than strictly in terms of the evolving IMS specification. LAMS ships with a set of activity tools that are intended to engender thoughtful educational practice. There are plans to develop a tools API to allow 3rd party developers to contribute additional tools to the toolset.

The approach to activity management embodied in LAMS with its drag and drop interface immediately appeals to teachers who are used to lesson planning and it has stimulated in the learning technology community because it demonstrates one way to move practitioners towards thinking about the design of their online courses in a deeper and more creative way without comprising ease of use.

Another important contribution made by LAMS is in the depth of monitoring, especially live monitoring it provides.

One of the main limitations of LAMS at the present time is the inability to construct or adapt groups or learning activity sequences on the fly. These features are due to be implemented in a future release however.

The planned integration of LAMS with WebCT and Blackboard has the potential to add greater depth to the activity management capabilities of these systems

COSE (Creation of Study Environments)

Website: <http://cose.staffs.ac.uk>

Description:

COSE is a VLE that grew out of a research project at Staffordshire University. It is openly designed to support a constructivist approach to teaching and learning which emphasises student activities, collaboration and the creation and sharing of artefacts.

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Content creation / authoring:</u> Content creation, sharing and re-use by tutors and students are central to the design of COSE is authored in the form of Pagesets. Content authored by tutors can be formally published within the system. Also COSE allows COSE content to be published onto a CD along with a COSE "player". The CD can then be used offline OR an online user can ask the online COSE client to look for content on the CD before looking on the corresponding COSE server - hence speed download times for heavy media etc.</p> <p><u>Tutor presentation tools:</u> Tutors can design learning opportunities and structure them with external resources and references. They can annotate resources using margin notes and they can communicate with groups.</p> <p><u>Student presentation tools:</u> Students get the same core tools as tutors. Students can create content using their own material or re-assembling material they have found. Students can annotate and share material. They can set up their own peer groups. What is shared with a group is private to that group. This can all be readily adapted on the fly.</p> <p><u>Communications tools:</u> Email, forums and chat are all supported. All email interactions are automatically contextualised within a group and a learning opportunity. Email is outgoing only as COSE is designed to work which each users preferred email system.</p>
2: coordination of people, resources and activities	
	<p><u>Hierarchical structuring of content:</u> you can have sub-projects and sub-activities. The sequencing is implied by the order of materials but there is no strict sequencing – it is not part of the philosophy on which the system is built.</p> <p>All Learning Opportunities and related materials are adaptable up to the point where they are published. The <u>structuring of people</u> into groups is central to the design of the system: You can have very deep nested structuring of people. In COSE, a course <i>is</i> a group of people. Various types of learning activity are possible e.g. discussion groups, work groups, collaborative annotation, synchronous chat and any combination of these can be incorporated into workflow.</p> <p><u>Pedagogical orientation:</u> COSE is based around active learning models from individual learning to large-scale cognitive apprenticeship. It is designed to encourage lecturers to think about structuring learning activities in a top down manner starting with learning outcomes.</p>
3: resource negotiation and agreement	
	<p>This is not a VLE issue so much as an issue of how you implement e-learning and course design. The whole top-down approach in COSE encourages you to structure learning opportunities effectively and guide people. The system helps encourage good practice but it can't enforce it.</p>
4: monitoring of learning	
	<p>COSE records everything people are doing. Students get a parallel view, so they can see exactly what they are doing. They also get an electronic profile.</p>
5: self organization amongst learners	

	Students can find and manage their own resources using the search tools and the basket tool for gathering resources. Students can organise their own workgroups and set up their own discussions within the system. People information is not available, they can search for people but there isn't a profile – I think this is not necessarily the place for it. I think I would put it in the PDP part of the MLE. Experience is that it takes extreme discipline on the part of the tutor to get learners to use things like that in an effective manner.
6: adaptability of module and system	
	Everything is adaptable unless it has been published

Learner	
1: Learner-centredness	
	COSE is organised so that people rather than content are at the centre of learning. Content is assigned to people – people are not assigned to content. Thus content can easily be selectively given to sub-groups or individuals.
2: coordination of people, resources and activities	
	COSE allows archiving of groups, so using group membership, a student can still get at the members of a group from 2001, for instance – and all the related materials. The student has a lot of control in this area.
3: time management / planning	
	No calendar or time-management tools
4: monitoring own learning	
	Students can provide feedback by any means they choose. The profile shows everything a student has looked at in the system; whose it is and they can annotate it. The profile is not exportable at this stage.
5: adaptation / reflection	
	<u>PDP Tools</u> : No. The profiling tool might be an adjunct to PDP but my view is that is a different function and belongs elsewhere in an MLE

Programme / institution	
1: Extensibility and integration	
	COSE uses standards wherever possible – so far we have mostly used the metadata and content packaging standards: Personal metadata is used for import/export. IMS metadata is used only for the COSE import/export facility, which is IMS conformant. We use IEEE LOM. We have also developed a 'little sco' (Standalone Content Object). This is IMS conformant and you can export it as a standalone playable object. ("scos" will be available in V2.1, which will also use UK LOM Core). COSE allows separation of 'something to do' from 'information' – so in that sense it is a learning design engine – it ought to work well with the learning design specification. COSE provides for the bulk registration of learners from MIS systems.
2: coordination of people and activities	
	The flexible content structuring allows learners to be given a view of their course at any chosen level of granularity
3: resource negotiation and agreement	
	This can be handled in COSE via the course group where multiple managers of the group are allowed. Communication/sharing can be done with just managers, or via an associated tutor group with the same facilities
4: monitoring of modules	
	This is more dependent on the business processes of the institution but COSE does have some things in it to support it. Tutors can turn students' submitted work into a resource and then add it into the system. It can be copied as a hint or theory. If you want to create a resource and then submit it for publication a window will open up listing super-tutors who are eligible to do QA, so it provides a QA mechanism – it just depends on who you designate as a super-tutor
5: self organization of teachers	

	For tutors to collaborate it is highly usable because it is based round searching, sharing and creating, and assigning to people. Tutors can collaborate on creating a learning opportunity or whole module and can communicate using the discussion tools prior to publishing. Tutors can create their “tutor groups”
6: adaptability of programme	
	Yes highly adaptable for all the reasons given earlier

Commentary:

COSE is a learning environment that is designed to support active-learning models. The emphasis is on tutors designing learning opportunities for students. A learning opportunity would typically take the form of an activity and a collection of resources. The learning opportunity can be fully supported by contextualised discussion, chat and personal messaging. Students are encouraged to set up their own peer groups, search for additional resources within the system and externally, share resources and annotate them. The system supports flexible structuring of people into groups to form the basis for collaborative work.

COSE has a strong constructivist background and this is evident in the way that the system is put together and the models of workflow embedded in the software. It can support a variety of different pedagogical approaches. It is learner-centred by design in that a ‘course’ in COSE is a group of learners to which content and activities are assigned rather than vice-versa. COSE is much more of a teaching and learning tool than an enterprise level VLE.

MOODLE (Modular Object-Oriented Dynamic Learning Environment)

Website: www.moodle.org

Description:

Moodle is an open-source VLE that is very similar in many respects to the course management components of the major commercial VLEs. The main difference is that philosophy behind Moodle has its roots in Social Constructionism, so there are both specific tools to support constructivist learning and other common features that are constructed in such a way as to correct limitations the creator perceived in the main commercial systems. Being open-source means that it can be downloaded and used by individual teachers or departments without necessarily requiring an institutional decision to purchase it. It also means that it is open and extensible by its developer community.

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p><u>Creating a course:</u> Moodle offers three different formats for a course template set for the site: weekly, topic or social-oriented formats. Content can then be uploaded to the course and activities added in the order that students will use them.</p> <p><u>Tutor presentation tools:</u> Resources (content), forums, journals, quizzes, assignments, surveys, choices, chat, workshops, user profile etc. The resource module primarily contains HTML pages and other documents, but you could add a resource that is an external program, there is an API to allow this. Forums are at the core of Moodle. Because Moodle uses a rich text editor - an html editor with wysiwig display, the forums get used for all sorts of things. You can rate the posts in forums according to different scales (e.g. rating posts on the extent to which they demonstrate separate or connected knowing) and that is an educational feature. There is an activity module and a journal module – the journal is structured, not just a simple text box. There are surveys but you have to use the validated instruments that are included, you can't construct your own yet. Workshops are peer-assessed assignments.</p> <p><u>Student presentation tools:</u> All of the above apart from resources (currently these are teacher only). We would like to change that to allow students to build up portfolios and we would like a filespace for them to take their materials from one institution to another. We are introducing versioning and access control. Forums are by far the most used tool, and allow arbitrary attachments, HTML formatting, etc</p> <p><u>Adaptation:</u> Absolutely. Anything can be adapted. But there is a 30-minute time-period for reflection that allows changes to forum posts after that period they become fixed.</p>
2: coordination of people, resources and activities	
	<p><u>Sequential/hierarchical structuring:</u> The system encourages you to lay out your module in a sequential order. A module outline is required.</p> <p><u>Organising groups of learners:</u> Whole group, separate subgroups, visible subgroups, individuals.</p> <p><u>Types of learning activity:</u> Various: Connected discussions with optional peer evaluation, Reflective journals, Reading, Glossary/Encyclopaedia writing (Students can build up a glossary and any of those entries automatically link from any text throughout the system), Chatting, Peer-evaluated assignments, Quizzing</p>
3: resource negotiation and agreement	
	<p>This is left to the teacher to express, using the tools provided. Each unit within the course can have an advance organiser to help focus activities. The teacher can set an introductory activity e.g. a forum at the beginning and a journal entry for private thoughts about the course, in order to establish the direction for the course</p>
4: monitoring of learning	
	<p>Each student has an activity report. This is a complete report with all the activities in the same format as presented to the student – you can see what they've read, what they've posted, all in context. There is also a gradebook for the graded activities.</p>
5: self organization amongst learners	

	<p><u>Student file upload</u> Yes, via forums and glossaries. Shortly a less structured storage system for students will be implemented.</p> <p>Communication with others creation of discussions and learning activities: Yes, within existing activities. E.g. if the teacher creates an "Open forum" then anyone can do anything in there they like. So students can't set up their own forums but can make a new thread within an existing forum. Teachers can go anywhere at the moment.</p> <p><u>Locating people:</u> Very much so. There is currently no information on people outside the course. Moodle.org provides a means for development of learning communities – it is used for tutors at the moment but could be used for students.</p>
	6: adaptability of module and system
	This is a prominent feature of Moodle. You can adapt the resources, the course structure, and the people groups. Resources and learning activities can be assigned to groups, but not individuals – unless you create a group of one

Learner	
1: Learner-centredness	
	Every action is tagged with person's photo and name ... this makes the person very prominent, promoting understanding of each individual. This helps teachers to remind themselves who the student is when in communication with them. All a student's enrolled courses are shown on the front page (once they log in).
2: coordination of people, resources and activities	
	The activity report (which students can be allowed to see) is very comprehensive, as is the gradebook. These show what is happening in a particular module. There is no overview of modules
3: time management / planning	
	Courses are laid out in an intuitive display to indicate the passage and times of all the activities in the course. We are just putting the finishing touches on a calendar to enhance this – it will contain all relevant dates and allow the student to add their own. We are trying to get useful information in the calendar rather than just a display with the date on. Calendars often are not a particularly useful way of viewing activity flow. Forums give you a sequential flow of activity – you can use your email box as an interface to go back through time with html links to bits of the website
4: monitoring own learning	
	Yes, students can view a record of their own activity using the activity report and they can provide feedback on the quality of a course or sub-unit.
5: adaptation / reflection	
	<u>PDP tools:</u> No, not yet. The support for the bigger picture outside individual courses is not there yet, but it's something I want to add. The other end of this is a lasting portfolio.

Programme / institution	
1: Extensibility and integration	
	, Moodle is open-source so it is highly extensible. It is also very modular with a robust core architecture and many new plug-ins are being developed. The authentication modules provide support for single sign-on integration with LDAP, mail or news servers. Import and export of Moodle data using IMS and SCORM formats is planned for the near future.
2: coordination of people and activities	
	There is no concept of programme-level progression in Moodle, although it would be trivial to publish a web page providing an overview moodle courses.
3: resource negotiation and agreement	
	No – Moodle is focussed at the course level.
4: monitoring of modules	
	Yes. Someone can be added as an invisible teacher (with editing privs), or they can log in using an invisible guest account (no editing privs). The admin of the whole installation can also go anywhere at any time.
5: self organization of teachers	

	Most sites make a "course" for teachers (who attend as students), where they can coordinate and assist each other.
6: adaptability of programme	
	At a content level, courses can be duplicated, copied, etc ... courses can also be hidden from student allowing development to take place before being "made live".

Commentary:

Moodle is primarily a course management VLE in the same tradition as the commercial VLEs with a number of distinguishing features. It is open-source and free. It has a community of developers and educational practitioners centred on the website moodle.org. This means it is a customisable and affordable VLE product especially suited to small colleges, schools and individual lecturers or departments who want to set up e-learning courses but don't have a budget for license fees. It is designed from a constructivist perspective and has a number of specifically constructivist tools e.g. reflective journals, peer group assessments, the ability to rate posts on a dimension which represents the level of connected vs. separate knowing demonstrated by the poster. It is designed to be modular and developers are encouraged and supported in developing new activity modules to complement the ones provided as standard with the system. Information about people is important in Moodle and a users profile including their photo appears where ever their name appears.

Moodle does not offer any programme level view of courses or currently provide any capability for students to organise themselves or maintain a presence outside of the teaching and learning area. It is not an enterprise-level system to compete with Learnwise, Vista or the Blackboard e-education suite and does not have the same level of functionality as those systems, but at the module level it is similarly flexible and adaptable and it does contain a variety of tools and features designed to encourage thoughtful pedagogical practice in an environment which is easy to navigate, use and administer.

University for Industry

Website: www.ufild.co.uk www.learndirect.co.uk

Description

Ufi Ltd. is a public-private partnership, which is charged with delivering the government's concept of a university for industry. Learndirect manages Ufi's e-learning services, which were rolled out in 2000. At the end of May 2003, there were 2040 learndirect e-learning centres across the UK and there are 637 learndirect courses on offer, 75% of which are run online. The courses cover areas such as business skills; IT skills: the basics of reading, writing and numbers; retail and distribution; environmental services; automotive components and multimedia.

Courses are may be taken either at a learndirect e-learning centre or if online from home or indeed anywhere. The number of home users has doubled in the last 12 months, indicating that this is becoming an increasingly popular approach for learners. A student can enrol on a course either through an e-learning centre, or there is a commercial option to enrol online. A tutor is assigned to each individual and each course. Additional support is provided through staff at e-learning centres and there is a national advice line, which also provides online advice and assistance.

The courses are typically 3-13 hours in length and are designed to offer 'just-in-time' learning in 'bite-size chunks' to both individuals and businesses. Online delivery is intended to provide flexibility of time and place to suit learner needs. Many of the courses are written with the training needs of Small to Medium Enterprises (SMEs) in mind. Most courses are pitched at NVQ level 2/3. Each course has defined learning outcomes of varying levels of granularity depending on the course.

A Ufi/learndirect course is centred on learning materials provided by approved suppliers. The three main suppliers are IBM, BBC and Microsoft, although colleges, universities and professional institutes also contribute materials. In many cases the instructional model is entirely encapsulated in the content. Assessment may be done automatically within the courseware or marked by a tutor. Once a course has been bought by learndirect, it is delivered via their learning management system (LMS). This is a tiered enterprise system with the usual WWW user-interface and database storage. Both the tutor and learner interact with the course and each other through the web interface. Administrative functions are the preserve of learndirect. Formal accreditation is done in conjunction with an e-learning centre. Some centres are becoming specialist test centres

Table of responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	Ufi courses are not based on presentations by tutors or students. They are short courses, typically 3-13 hours in length. Most courses are pitched at NVQ level 2-3. Ufi is a broadcast organisation and content aggregator. Learners interact primarily with content produced by 3 rd party publishers. Course structure and pedagogy are embedded in the content. Tutors play a supporting role. Individual messaging, threaded discussion and chat tools are provided as adjunct to the courseware.
2: coordination of people, resources and activities	
	Courses run on a self-paced, individual model so there is no real requirement for coordination. Learners are loosely organised into tutor groups and the learning centres provide a mechanism for coordination.
3: resource negotiation and agreement	
	Learner outcomes, commitment, assignments and progress are all in the course description. Face to face explanation is provided for learners who attend a learning centre.
4: monitoring of learning	

	Tutors can track how far through a course students are. They can view performance on assignments and message students who fall behind
5: self organization amongst learners	
	Learners have bookmarking and personal file space. Learners can create discussions (there is a Café forum), though these are not used a great deal – probably due to the short and individual nature of many courses. There is little information about people on account of privacy issues.
6: adaptability of module and system	
	No. Courses are standardised, content is standardised and support is standardised

Learner	
1: Learner-centredness	
	The Ufl system and educational model is learner-centred in that learners can independently browse courses online, enrol on any course on offer. The learner has flexibility of time, place and pace of learning and can (on some courses) set their own target assessment dates.
2: coordination of people, resources and activities	
	The student can get an overview of both current and completed courses including learning outside of learndirect.
3: time management / planning	
	Personal planning and organisation tools include: a calendar, bookmarks, A learning organiser with space to enter details on past learning, current learning and aspirations
4: monitoring own learning	
	Students can monitor their own activity to review performance and time allocation. They can also provided feedback on the quality of the course.
5: adaptation / reflection	
	There is a PDP tool - the Learning Organiser described earlier. Learners can browse courses within the system and seek advice on which course is best for them using the advice line, by email or within a learning centre. 'Tasters' are available for many courses.

Programme / Institution	
1: Extensibility and interoperability	
	The system is proprietary and serves the whole of Ufl course delivery and so is not designed to interoperate with other institutional systems or institutions. The system supports SCORM. 1.2
2: coordination of people and activities	
	Not applicable. Ufl/learndirect courses are stand-alone. Ufl manages the portfolio of courses on offer to maintain coherence, relevance, scope and enrolments
3: resource negotiation and agreement	

	Not applicable. Ufi is responsible for ensuring that courseware standards and course support standards are met. This is not part of the system.
4: monitoring of modules	
	The system provides a wide variety of data to Ufi for QA monitoring of courses at any summary level from tutor group up to national level.
5: self organization of teachers	
	Tutors can coordinate with each other and share experiences and best practice using tutor message boards.
6: adaptability of programme	
	Not applicable. The design, development and validation of courses is a centralised process conducted by Ufi.

Commentary

Ufi / Learndirect courses cater for people who need 'just-in-time' learning opportunities in 'bite-size chunks'. Ufi have a clearly articulated educational model that is centred on self-paced learning using standardised commercial content. The primary educational interaction is between the learner and the learning materials. In that sense the role of Ufi / learndirect is as a content-aggregator and broadcast organisation.

It is the content suppliers that are primarily responsible for the pedagogical approach as it is encapsulated within their course materials. Courses are very much of a 'one size fits all' nature. It is up to the learner, with support from learndirect, to select a course that suits their needs. The role of the tutor is to guide learners through the content that is supplied through learndirect and to support or advise them where necessary.

UK E-Universities Worldwide (UkeU)

Website: www.ukeu.com

Description

The UK E-Universities (Worldwide) is a company resulting from a public-private partnership that has received 55m in funding from the UK Government and UK Universities through the Higher Education Funding Councils.

The aim of the UKeU is to offer under-graduate and post-graduate level degree courses in an entirely online environment to students anywhere in the world. Courses are designed and run by the UKeU in partnership with one or more HEIs. The UKeU aims to be able to provide distance online degree courses better than any individual university could manage on their own thus tempting universities to offer courses to a global market through the UKeU.

The UKeU explained to us that because of their unique situation they need a comprehensive and highly effective online learning environment and management system that cannot be provided by the generic VLEs available. They have created a partnership with Sun to design and develop a learning environment tailored to the needs of the UKeU. This system is now approaching its version 1 release.

The UkeU described to us some of the unique features of their context:

The learning environment has to be able to handle all the teaching and learning requirements of a full university degree course, as there is no F2F element to UKeU courses. Thus, as few students at this level want to go through a course in an entirely linear fashion and have a variety of learning styles, ease and flexibility of orientation, navigation and visualisation are of prime importance. This in turn means that the design of courses must reflect this and the process of course design must be tightly controlled according to a design methodology that supports course development by collaborative teams. The course production environment needs to reflect the organisational structure and workflow of universities. Assessment is another key feature that needs to be completely supported online in this context, including the setting and handing in of assignments, marking and creating student transcript files. There needs to be support for single or multiple markers and anonymous marking. Also automated admissions must be supported so that students can browse for courses online and then following submission of an application, track the progress of their application. This is not a feature of generic VLEs. The final distinct element is scalability, where this means not just coping with very large numbers of users but efficient management of courses where, within a single cohort, there are multiple tutor groups.

Table of responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p>Course content is structured according to the UkeU learning object model and is supplemented by discussion forums. Discussions and content can be contextualised within a compound learning object.</p> <p>The UkeU does not focus on teachers as individuals but as specialist contributors to a course designed by a development team much like the OU model. So there is not much in the way of authoring tools, since the learning objects will have been produced in advance. This puts more emphasis on the initial design process. Student presentation tools are restricted to forums. After initial problems with the forum system it has been expanded to give increased functionality and control over viewing, message tracking etc. There is no area for students to actually build learning activities (objects), but students can upload documents as attachments in the forum tool.</p>
2: coordination of people, resources and activities	

	<p>The rigid hierarchical structure of courses enables versatile navigation through the narrative flow of the course. The hierarchy of Programme, Module, Unit, and Learning Activity is intended to allow students to quickly build a mind-map of the course and become familiar with the structure and content. Adaptive sequencing is not encouraged, as it is felt that this obscures the course map. From within every learning object, a learner always returns to the navigator to go somewhere else – there are no ‘next’ buttons that directly connect learning objects, as people will get lost.</p> <p>The social aspect of learning is important within UkeU. Students are coordinated as cohorts, tutor groups, activity groups (which can be a subset of or straddle a tutor group and may be associated with assignments), marking groups for peer assessment.</p>
3: resource negotiation and agreement	
	<p>This is not really a learning systems question. The responsibility for this lies with the HE partners. UkeU encourages them to make the resource agreement and learning outcomes explicit, but does not enforce this. The main approach is to encourage all courses to have a unit zero that acts a course description, provides an induction to the learning environment and contains this sort of information.</p> <p>Extensive advisory materials are provided on how to be a student and how to be a tutor and these can be referenced from taught modules if so desired</p>
4: monitoring of learning	
	<p>An alert will email a tutor if the student hasn’t contributed for a period or hasn’t submitted an assignment. Also, it is possible to tell if a tutor hasn’t been contributing and the director of studies gets alerted if the tutor hasn’t been online. There are various ways of analysing contributions to forums, which allows inspection of a particular student, and their contributions. It is possible to create questionnaires using the MCQ tool and make them mandatory if desired. Every learning object has a feedback button for students to assess the learning objects.</p>
5: self organization amongst learners	
	<p>Both content and resources are searchable. Students have their own private area where they can upload files and have their own website. They don’t have is a means, beyond augmented bookmarking, of reassembling course elements. Forums can be set-up for students to talk to other students at UKEU level, HEI level, programme level, tutor group level and activity group level. Asynchronous forums are the core communication tool. Synchronous tools are designed to specifically support activities. There is not much in the way of people information because of data protection issues. Anything on a student website is visible through-out UKEU however. Students can see who else is on the course including their email and homepage.</p>
6: adaptability of module and system	
	<p>It is technically possible to adapt a UkeU course on the fly, but that is under the control of the programme manager not individual tutors. It is possible to set up the system so that it could be done in an individual way but that is not the model of the UkeU.</p>

Learner	
1: Learner-centredness	
	<p>The system is learner-centred in the way it brings everything together in a single view.</p>
2: coordination of people, resources and activities	
	<p>There is a personal calendar, which receives a high-level of use. The next phase will be to have a dual calendar containing set module elements and student-adaptable elements. There are extensive help facilities on how to be a student.</p>
3: time management / planning	

	There are views that show current, and completed, modules. Past modules must remain available for three years, so that students can review and revise using their work. Forums become read-only once completed – likewise assignments.
4: monitoring own learning	
	Not really. Students can see who has read their messages. Time on task as measured by a computer is not very useful. It would be good to be able to see time on task as against mean for the course as a whole, in order to compare own performance with that of others.
5: adaptation / reflection	
	We are thinking about Personal Development Planning. People can register interest in a module and sign-up within the system. For people who are thinking about being students, you can present some of the modules to show non-registered students as a sort of taster. It would be possible to extend this to existing students, but is not there at present.

Programme / institution

1: Extensibility and integration	
	<p><u>Data transfer to HEIs.</u> This can be done using comma delimited files. We return the minimum information HEIs need on their own systems. They need student ID and the necessary data for HESA returns, and the current status of the student. They need information about assessments to generate a student transcript file and finally they need to know when a student has completed all work for the degree. When students have registered, their data can be drawn down at any time. There is a log file that can be interrogated at any time. The student record can be checked at any interval required by the HEI (daily, weekly etc.)</p> <p><u>IMS standards.</u> We have implemented Metadata, Content Packaging, and QTI and are tracking LIP. We are very interested in Learning Design (LD). It worried me initially as it seems to put teacher more firmly in control but it helps with creating a narrative (which is a problem for the system – the ability to cross-reference one learning object from another). So I think we won't try and implement LD in its entirety but we will try and use elements where appropriate. I am dissatisfied with the current level of accessibility support – (although CETIS inform us we are amongst the best)</p> <p><u>Component-based architecture.</u> We have developed with SUN a theoretical course model for the further design of our system – it is component based and where there is a public standard we have used it. In principle it fits the broad OKI model. Sun have tested putting alternative components in.</p> <p>We want to explore this. We see the LE developing - If we make the framework fully OKI conformant and make some of the components open-source. It is all J2EE we are using Jive as the engine for our forums.</p>
2: coordination of people and activities	
	You can see whole programme as a coherent entity. Resources can be attached at a programme level. Under development is assessment at a programme level, so you can build an entire picture of a student
3: resource negotiation and agreement	
	No, we thought about this but that way madness lies. There is no checking whether students have chosen a disallowed combination or not. This is checked by the director of studies.
4: monitoring of modules	

	Yes you can see what is happening in different tutor groups. Reports can provide information about whether a tutor group is doing something very different from the others. We have various pre-defined reports and as we find out what people really want to know, then we will create more. We have full-strength assessment engine which allows detailed reports on assessment data which provides Yes invisible QA monitoring is possible
5: self organization of teachers	
	This is part of the wider UKEU process
6: adaptability of programme	
	Yes it is all dynamic. Yes the programme is adapted from within the system. You can publish at programme level or module level. Modules can be assigned to a programme and then the whole published or modules can be published, and then assigned to an existing programme.

Commentary

The UKeU has a clearly defined model of the wider educational process that is comparable with the Open University model. Perhaps the most distinct element of this is the process of course production, which is team-based effort involving staff from the participating institution(s) and a project manager and senior technologist from the UKeU to oversee and guide the process. The LMS supports peer review in course development by allowing any course element to be marked as in production, open for review and completed. This specialised aspect of UKeU LMS functionality is underpinned by the content management system – Vignette.

Another core part of the UKeU model of the educational process lies in their definition of Learning Objects. UKeU describe their notion of a learning object as the smallest component of a course that describes and directs a learning activity. The activity may not necessarily include content; it may be an instruction to participate in a forum. The learning object, then, provides a thin wrapper around the activity specification that allows it to connect with other (perhaps content-based) objects. The learning object model here is more than merely content + metadata, rather it is an activity + metadata describing the activity. UKeU learning objects are not entirely free-standing including their own assessment as that model doesn't meet the universities' need to develop a narrative to make the connection between different parts of the course. Hence assessment activities are encapsulated in their own learning objects. According to the UKeU, this structural definition creates a very powerful tool since every aspect of the course can be described as a learning object and elements become interchangeable in the development of a course narrative.

However, whilst this approach provides considerable flexibility in developing and adapting UKeU courses, it doesn't help portability much even with standards (IMS). Although it should be possible to import any IMS content package, transferring objects between learning management systems is not that simple as elements in one system may well not map onto equivalent elements in the other system; those elements may not exist at all. So often only a very basic set of core data can be transferred, which erases much of the richness of the original object. The UKeU has taken advantage of fields in the content packaging specification that many other people typically don't use.

Discussion and Conclusions

The outcomes of this work including the broader themes and issues will be discussed as part of the workshop.

References To Follow

Appendix 1: Interview questions and project description sent to participants in advance

Introduction

In 1999 we wrote a report for JISC that proposed a framework for the pedagogical evaluation of Virtual Learning Environments. That report proved very popular and was widely cited. It is currently available from: http://www.jisc.ac.uk/uploaded_documents/jtap-041.doc. The framework we proposed was intended to help educational practitioners evaluate the pedagogical benefits of the VLEs available at the time, although the report stopped short of reviewing systems. Now in 2003, the elearning landscape has changed dramatically, as have the tools and elearning platforms that are being developed. We have now been commissioned by JISC to update the report to take into account the new systems and approaches to eLearning that are emerging. As part of the report we want to review the new possibilities offered by a selection of significant new systems and architectures.

We have listed a number of questions below which we would like to discuss with you during an interview. We would be grateful if you could examine these beforehand, and if any of them are unclear, to raise this with us during the interview.

We stress that the information gained in this study will NOT be used to directly compare one system against another, but to gain a picture of what parts of the elearning landscape are currently covered by different systems and where future developments are heading. We have chosen to review 10 new and / or innovative elearning systems for this study.

The Questions

Part 1: The Module

1. What tools does the system provide for teachers to present/express their ideas to students?
2. What tools does the system provide for students to articulate their ideas to teachers and other students?
3. Can teachers and learners extend/change their presentations during the module's time period?
4. A VLE is not a single tool; it is a structuring and coordination system containing a variety of tools. These questions are about the model of teaching and learning interactions that forms the basis of the system.
 - Can a module be structured sequentially and / or hierarchically over time?
 - What facilities are there to organise learners in a variety of ways in the module (whole group, small groups, individuals)?
 - What types of learning activity are supported by the system?
 - What underlying pedagogical model(s) or approach(es) does the system encourage?
5. How are the 'rules of the module' expressed and made evident to the student? By this we mean such things as the learning outcomes, the obligations of the learner and the mutual commitment teacher and student make (e.g. the amount of time a teacher will spend messaging each week, the number of assignments a learner will be expected to complete, etc.)
6. What facilities are there to monitor how well learning is progressing on the module?
7. What can learners do on their own, outside of the purview of the teacher?

- Can they find and manage resources – do they have their own file stores or repositories?
 - Can they talk to other students (other than in the main module discussion), create their own discussions, create their own learning activities involving peers?
 - Can they locate people with similar interests outside of their own module, course, year or institution? I.e. is information about people available?
8. To what extent is it possible for the teacher to adapt the module structure once teaching is underway?
- Can you add / change / delete resources?
 - Can you add / change / delete fragments of module structure
 - Can you add / remove people? Can you split them into different groups?
 - Can you create and assign resources or learning activities to individuals?

Part 2: The Student Level

1. How is your system student-centred?
2. Does the system provide time management / planning / organisation tools for the individual student to organise their work?
3. Can the student get a view of current and completed modules? Can they drill down into their completed modules and view a record of work they completed?
4. Can a student monitor their own activity? For example can they obtain statistics on what they are spending most time on, whether their time is being evenly shared or not? Can students provide feedback on the quality of the module?
5. How are you thinking about PDP? Can a student do Personal Development Planning (PDP) within your system? Are there module-maps they can use to choose modules from? Can they show register interest in / actually sign up to new modules within the system?

Part 3: The Programme

1. Can you see the whole degree or programme within the system as a coherent entity rather than just a collection of unrelated modules? In other words can you obtain a view at programme level? If so what can you do at this level?
2. Does the system allow specification of programme rules for delivering a module? Does it permit or provide a space for negotiation between programme managers and module tutors on resource questions?
3. Can the performance of a module be monitored by the programme manager? What facilities are provided for this? Can guests be signed up to allow QA examination or peer observation of module activities?
4. Can the programme be adapted from within the system? Does the system provide tools for new modules to go through design, development and validation and then be added to a programme?
5. How does the system support teachers working on different modules to coordinate their activities and assist each other?

Part 4 Anything Else?

There may be attributes your system has that you feel are not covered by the questions above and that set it apart from other systems. We will ask you to tell us about these in the interview.

Appendix 2: The relationship between interview questions and the tables of responses

Module	
1: presentation and re-presentation of key concepts and ideas	
	<p>These questions encapsulate the basic workflow in the conversational framework:</p> <ul style="list-style-type: none"> ▪ What tools does the system provide for teachers to present/express their ideas to students? ▪ What tools does the system provide for students to articulate their ideas to teachers and other students? ▪ Can teachers and learners extend/change their presentations during the module's time period?
2: coordination of people, resources and activities	
	<p>These questions are about the model of teaching and learning interactions that forms the basis of the system:</p> <ul style="list-style-type: none"> ▪ Can a module be structured sequentially and / or hierarchically over time? ▪ What facilities are there to organise learners in a variety of ways in the module (whole group, small groups, individuals)? ▪ What types of learning activity are supported by the system? ▪ What underlying pedagogical model(s) or approach(es) does the system encourage?
3: resource negotiation and agreement	
	<p>How are the 'rules of the module' expressed and made evident to the student? By this we mean such things as the learning outcomes, the obligations of the learner and the mutual commitment teacher and student make (e.g. the amount of time a teacher will spend messaging each week, the number of assignments a learner will be expected to complete, etc.)</p>
4: monitoring of learning	
	<p>What facilities are there to monitor how well learning is progressing on the module?</p>
5: self organization amongst learners	
	<p>What can learners do on their own, outside of the purview of the teachers?</p> <ul style="list-style-type: none"> ▪ Can they find and manage resources – do they have their own file stores or repositories? ▪ Can they talk to other students (other than in the main module discussion), create their own discussions, create their own learning activities involving peers? ▪ Can they locate people with similar interests outside of their own module, course, year or institution? I.e. is information about people available?
6: adaptability of module and system	
	<p>To what extent is it possible for the teacher to adapt the module structure once teaching is underway?</p> <ul style="list-style-type: none"> ▪ Can you add / change / delete resources? ▪ Can you add / change / delete fragments of module structure ▪ Can you add / remove people? Can you split them into different groups? ▪ Can you create and assign resources or learning activities to individuals?

Learner	
1: Learner-centredness	
	How is your system student-centred?
2: coordination of people, resources and activities	
	Can the student get a view of current and completed modules? Can they drill down into their completed modules and view a record of work they completed?
3: time management / planning	
	Does the system provide time management / planning / organisation tools for the individual student to organise their work?
4: monitoring own learning	
	Can students monitor their own activity? For example can they obtain statistics on what they are spending most time on, whether their time is being evenly shared or not? Can students provide feedback on the quality of the module?
5: adaptation / reflection	
	How are you thinking about PDP? Can a student do Personal Development Planning (PDP) within your system? Are there module-maps they can use to choose modules from? Can they show register interest in / actually sign up to new modules within the system?

Programme / Institution	
1: Extensibility and integration	
	**There was no specific question that covered this topic but it was a major theme of responses in a variety of ways
2: coordination of people and activities	
	Can you see the whole degree or programme within the system as a coherent entity rather than just a collection of unrelated modules? In other words can you obtain a view at programme level? If so what can you do at this level?
3: resource negotiation and agreement	
	Does the system allow specification of programme rules for delivering a module? Does it permit or provide a space for negotiation between programme managers and module tutors on resource questions?
4: monitoring of modules	
	Can the performance of a module be monitored by the programme manager? What facilities are provided for this? Can guests be signed up to allow QA examination or peer observation of module activities?
5: self organization of teachers	
	How does the system support teachers working on different modules to coordinate their activities and assist each other?
6: adaptability of programme	
	Can the programme be adapted from within the system? Does the system provide tools for new modules to go through design, development and validation and then be added to a programme?

