Information systems integration in virtual learning environments

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Abstract

This work seeks to present an analysis of the methods used for integrating information systems within a managed learning environment. The research is based on a series of online surveys and interviews with FE and HE institutions in the South West of England conducted during August and September of 2006. The results of the research indicate that whilst interconnectivity between information systems within MLEs does exist, it is on a principally ad hoc basis and differs from institution to institution. Likewise, the full range of integration methods and technologies currently available are not being used to their full extent.

Keywords

MLE, VLE, MIS, library management systems, integration, JISC, interoperability, RSC, student records, information systems, education, e-learning.

1. Introduction

A longitudinal study undertaken in 2005 on behalf of UCISA (Universities and Colleges Information Systems Association) found that out of 85 HE institutions surveyed 95% currently used Virtual Learning Environments (Jenkins et al, 2005). With the implementation of VLEs approaching a state of near ubiquity within the HE/FE sector a great deal of focus has now turned to the examination of MLE (Managed Learning Environment) implementation within UK educational sector. In particular the government advisory body JISC (Joint Information Services Committee) has funded many studies into the area of MLEs. This study intends to add to the existing research by providing a technical review of how FE/HE organizations have chosen to integrate their information systems with regards the provision of an MLE.

The term MLE refers to the information systems whose combined actions enable the provision of an integrated electronic learning and administrative platform. Rather than a single application or product an MLE should be viewed as a collection of individual information systems whose combined interactions provide the functionality attributable to an MLE.

"Managed Learning Environment (MLE) refers to the whole range of information systems and processes of an institution (including its VLE if it has one) that contribute directly or indirectly to learning and the management of that learning."
Social Informatics Research Unit et al (2003)

Typical functionality one might expect from an MLE consists of;

- Access to course material and a variety of differing learning resources through user centric single point of entry.
- Tracking of learner progress and learner utilization of above resources.
- Simple management of above resources administrative and academic staff.
- Electronic assessment and coursework receipting.
- Provision of learner and institutional information to staff members and learners.
- Electronic enrollment of learners and suitable provisions for electronic payment.
- Widening of access and participation.
- Access and management of various I.T resources such as internet, email, print and network storage.
- Access to library services both on and off-site.

2. Research Method

The research that informs this study was undertaken during August and September of 2006. It is comprised of a series of interview based case studies of four FE/HE institutions, and an online survey distributed through mailing lists run by the South West RSC (Regional Support Center). The RSC is a JISC funded body that offers support to FE/HE institutions on a regional basis.

The online survey presented a series of questions focused on six information system deemed to be commonplace in most MLEs.

- Virtual Learning Environments
- Management Information systems or Student Record Systems
- Library Management Systems
- Timetabling Systems
- Intranets
- Computer Networks

Each section requires respondents to identify if integration occurs between the different systems, and if so, what method was employed. In tandem with this survey four HE/FE institutions were directly interviewed to gain a more detailed understanding of what integration methods were being employed.

3. Results

The research indicated that all information systems reviewed can be considered both consumers and producers of information to other information systems. However, MIS systems were found to output significantly more information than any of the other information systems. This has led to the view that most MLEs can be characterized as being MIS centric, in that where data exchange does take place the highest instance is from the MIS to the other information system.

Networks were classified as the next highest producer of exchanged information. In the context of the case studies this can be characterized by their role as provider of authentication services via network directories. In the case studies all of institutions interviewed used network directories to provide user credentials to other information systems – usually VLEs or intranets. In most instances this revolved around the VLE or Intranet employing LDAP lookups to verify user identity against a network directory. Contrary to what one would expect from the case studies, the online survey indicated that networks were lowest consumer of resources from MIS. In the case studies all the network directories received their user information from MIS. The response from the online survey did not reflect this indicating only 45% of institutions surveyed passed information from MIS to the network.

Overall Intranets were the largest consumers of information across the range of systems reviewed. This can be attributed to the wide range of services associated with intranets. Unlike MIS, timetabling, or library management systems, intranets are not as function specific. In addition the usage of intranets as a portal or gateway to different resources supports the survey results in indicating they consume the most information.

Library Systems and Timetabling had the most limited range of integration with other systems. In fact library systems had interactions almost only with MIS. Similarly timetabling showed limited interactions with any systems other than MIS. With regards library systems one might assume this is student information being passed from MIS to library system. However, in the case of timetabling there is also a 45% instance of information being passed back to MIS.

The rates of interaction and average consumption of information are summarized in the two tables below.

Output >	**MIS**	**VLE**	**Intranet**	**Network**	**Timetabling**	**Library**	**Average**
MIS	NA	51%	43%	56%	56%	60%	53%
VLE	6%	NA	6%	18%	6%	6%	9%
Intranet	6%	0%	NA	18%	6%	0%	6%
Network	25%	25%	47%	NA	13%	6%	23%
Timetable	56%	0%	18%	12%	NA	0%	16%
Library	8%	8%	16%	8%	0%	NA	8%

Figure 1: Summary of interactions

	MIS	**VLE**	**Intranet**	**Network**	**Timetabling**	**Library**	**Average**
Average Consumption	20%	17%	26%	22%	16%	14%	19%

Figure 2: Average consumption

With regards the information systems used by the targeted institutions it is very easy to identify the market leaders. The area of library management systems is principally the domain of two products – Heritage and OLIB. ebs and UNIT-e are the most widely used MIS systems, whilst for networks and servers Microsoft is definitely the most commonplace. Once again Microsoft enjoys a wide share of database usage with Oracle and MySQL following closely. In the context of this study MOODLE is the most used VLE, though taking into account a previous UCISA longitudinal study (Jenkins, 2005) it would be foolhardy not to acknowledge the popularity of Blackboard and WebCT (which subsequent to that particular work is now owned by Blackboard).

Of the respondents that confirmed integration took place the methods used are indicated below.

Method of Integration	
Automated export feature of this System	2%
Manual	2%
Automated Export Feature	4%
CSV	4%
Third Party Integration	10%
Shared Data Source	10%
Manual export feature of this System	14%
Automated data transfer	25%
Direct Data link between this and target System	29%

Figure 3: Integration Methods

Automated data transfer and direct data link are the two most widely used techniques accounting jointly for 54% of the methods used. In the context of the case studies, and additional information supplied by institutions via the online survey it is evident that the actual implementations of these techniques are developed in house and on a generally ad hoc basis.

4. Conclusions

Other than provision for the manual import or export of standardized data formats vendors do not seem to have put in place any explicit functionality for data exchange with other specific information systems within a MLE. Or if they have this functionality is not being used by educational organizations. Given the limited number of information systems that exit within the MLE sector it would seem that vendors have overlooked a valuable opportunity to gain a commercial advantage by partnering with other providers of related systems. By including this sort of functionality into proprietary products interactions within MLEs would benefit from a higher degree of consistency and a reduction in the need for bespoke developments to be undertaken from department to department.

The research also indicates that despite the many methods that exist to facilitate system integration, SQL and LDAP are used almost exclusively as the sole means of transferring information. Likewise the many data aggregation and management

services and applications used in industry do not appear to have penetrated significantly into the FE/HE sector other than for the provision of authentication services.

This may be that the organizations surveyed are too small to benefit from these applications, or lack the technical skills or financial resources to implement them. However further investigation may be merited to examine to what degree FE/HE organizations would benefit from the implementation of industry level integration technologies.

With regards authentication there does appear to be an uptake of third party applications to manage these services. Three of the organizations in the case studies and one in the online survey have indicated that they intend to, or currently implement a centralized authentication method with regards their MLE. Though this is still a relatively small number, as the range of systems and resources included in MLEs increase, so too is it likely will the need for centralized management of user identity.

There is ample evidence to indicate that integration within MLEs is very much active within the FE/HE sector. However many organizations do not appear to be using the full range of methods and services currently utilized outside of this sector. Likewise vendors do not appear to engaging with other suppliers of products that would typically be used in conjunction with their own. Obviously there are many constraints both with regards vendors and educational institutions, a study of which is not within the scope of this work. However, as previously stated investigation into bringing information systems together through vendor supported development would be a major step in increasing both the consistency and usability of MLE system integration.

5. References

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