

Linking Online Learning Environments with Digital Libraries: Institutional Issues in the UK

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This article discusses the institutional challenges and requirements involved in integrating online learning environments with digital and hybrid libraries within the framework of INSPIRAL's (INvestigating Portals for Information Resources And Learning) research. It concentrates on the key issues that were identified as being of institutional significance in the integration of new learning environments and digital library resources. Issues of institutional infrastructure and politics, inter-professional communication and collaboration, resources and funding, pedagogy, staff development,

access and content are discussed in the light of INSPIRAL research. The article concludes that, interested parties view integration of online learning environments into digital library resources and services as an area of importance within the UK education sector. The prime barriers continue to be located within individual institutions and their approach and attitudes to integration. However, there is a general consensus that improved collaboration and communication at all professional levels with adequate training and staff development could be the answer to many of these problems.

Introduction

This article provides an outline of the initial work of the INSPIRAL (INvestigating Portals for Information Resources And Learning) project which is based at the University of Strathclyde's Centre for Digital Library Research (CDLR) and Centre for Educational Systems (CES), and also, briefly, sets the project in the context of wider issues and developments in the field.

The aim of the INSPIRAL project is to investigate, identify and critically analyse the issues that surround the linking of online learning environments and digital libraries, focusing on the Higher Education learner. However, the analysis will be informed by parallel developments in the Further Education sector. The project emphasis is on institutional and end-user perspectives rather than on learning technologies themselves. The

analysis will identify priority areas for JISC strategic planning and investment.

Background to the Project

Along with the recent changes in higher education over the last decade, there have been two key developments relating to e-learning infrastructure in UK universities and colleges:

- Adoption of Virtual Learning Environments (VLEs);
- Implementation of digital libraries.

Virtual Learning Environments are, in effect, resources supporting e-learning through provision and integration of web-based materials. This includes links to other resources, synchronous and asynchronous communication tools and assessment tools. When such environments are

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integrated into other information systems and processes of the institution the resultant system is generally referred to as a Managed Learning Environment (MLE).

Digital libraries, in most UK universities and colleges, currently offer their catalogues online, many through a standard web browser. University libraries also offer increasing numbers of subscriptions to electronic journals and other on-line information sources. The library thus becomes the entry point to the collections, both physical and virtual, for the institution. This hybrid library draws together the on-line and physical collections presenting them to the user in a seamless and integrated manner, supported by middleware that handles aspects such as authentication and cross-searching.

However, the convergence of Virtual Learning Environments and digital libraries creates challenges to be solved, not only at a technical level but also at the institutional and end-user levels (JISC 2001a). Therefore, Joint Information Systems Committee (JISC) has identified a need for thorough investigation and analysis of the relevant issues in order to proceed with strategic planning and investment in this area and agreed to fund INSPIRAL (2001) for six months for the period of May–October 2001.

The overall aims of INSPIRAL are to:

- Identify stakeholders who will be affected by issues regarding the linkage of Virtual Learning Environments and digital libraries, and encourage those stakeholders to raise and debate these issues;
- Identify the relevant issues pertaining to the interaction (both perceived and possible) between Virtual Learning Environments and digital libraries;
- Critically analyse identified issues, using the collated experiences of stakeholders and current practise, the output of previous and current projects, and the increasing amount of research undertaken into these issues;
- Report on the issues to both the funding body and the wider communities on whom these issues impact

Setting the scene

To date various authoritative bodies and projects have produced details of the institutional barriers and benefits of integrating Virtual Learning Environments with digital libraries. Some of these include JISC (2001b), through initiatives such as

JTAP (Britain and Liber 2001), which aimed to provide a framework for the effective evaluation of the teaching and learning requirements of Virtual Learning Environments, and JCIEL (Patal and Franklin), with the production of a summary briefing paper highlighting the current areas of work and discussion in integration of technologies across Further/Higher Education to support Life-long Learning. Others such as BUILDER, an institutional Hybrid Library project and now a fully operational teaching and learning facility at the University of Birmingham, and TILT (1997), a project funded by four UK higher education funding bodies, which ended in 1995 and aimed to establish how information technology could be used more effectively in teaching methods, especially in the support of more independent learning (Boddy and Tickner 1999). Projects such as these have concentrated on the impact of Virtual Learning Environments integration at institutional and staff levels, an example of this can be found from BUILDER's investigations of its own service provision (Hampson 1999, Hewett 1999). From these investigations various barriers and benefits to integration have been identified and summarised below.

Barriers

- Integration of systems and the issue of interoperability;
- Liaison, or rather lack of it, between librarians and those who develop Virtual Learning Environments;
- Liaison, or rather lack of it, between librarians, academics, Information Technology Departments, and learners;
- Ineffective guidelines and standards in areas such as authentication, security, intellectual property, and copyright;
- Institutional structure and attitudes towards the management of change in the education sector.

Benefits

- To the academic the benefits are noted as; more time for individual learners, research, and professional development;
- To the institution the benefits are recorded as; progressive image in a competitive market, more cost-effective in time, and better Quality Assessment ratings;
- To the learner, benefits include the ability to cater for more learning styles, access to improved learning resources, and better communication.

One of the main issues underlying a vast majority of the literature in this area is the recognition of a need for effective and efficient management of a changing UK education system. While it is generally acknowledged that the impetus of the change in the traditional concepts of teaching and learning is the advance of technological innovation, Foster et al. (1999) have identified the prime motivator in the acceptance of this technology into the educational system as being the “external forces”, which have the power to affect institutional decisions. Significantly, Edwards (1997) while noting that change is inherent in many areas of society today and not specific to educational institutions, has stated that within the educational sector the environment most prone to technology dictating change is in fact Library and Information Services.

Institutional change and the impact of technology on the educational system have been widely accepted as indicated by various research studies, such as ANGEL (2001), PELICAN (2001), HERON (2001), EEVL (2001) that have been carried out to identify problem areas and provide quality electronic resources to the education sector. JISC (2001c) has also produced numerous briefing reports, which aim to explain Virtual Learning Environments and various institutional aspects such as collaboration, networks and pedagogy.

The need for a more forward thinking leadership from senior management was identified in the Dearing Report (JISC Assist 1998), which stated:

The full exploitation of C&IT by higher education institutions will require senior management to take an imaginative leap in devising a strategy for their institutions, which can bring about this change.

Mogey (1997) has stated that along with it being essential that pedagogy is a more important factor than the technology, senior management should also be aware that the inclusion of a Virtual Learning Environments should not be done on the basis of, presumed, immediate financial gain. Agre (2000) discusses the potential dangers to the institutional infrastructure, if the implementation of networked services is not fully realised. Issues such as choosing the right linkage approach to meet user and professional needs, implementation of the correct standards to suit institutional needs and not to be a vehicle for

control by outside agencies, and providing motivation and encouragement for staff, all of which require good leadership abilities and long term strategic planning. Furthermore, Pollock and Cornford (2000) have described that a bottom up, course-by-course or departmental adoption of Virtual Learning Environments, is likely to be a labour intensive exercise, time consuming, and prone to failure.

The literature would suggest that effective and efficient linkage of Virtual Learning Environments and digital and hybrid libraries needs to be recognised by senior management in the long term strategic planning of the individual institutional mission, identifying their own specific cultural, social and educational requirements.

Kovel-Jarboe (2001) concentrates on the potential for the linkage of Virtual Learning Environments and digital libraries to produce additional and innovative ways to enhance the teaching and learning experience. However, as a result of the change in teaching and learning methods, there is a potential likelihood for the blurring and uncertainty over professional roles within an institution.

Due to the fact that the integration of digital library resources into the teaching environment is likely to draw heavily upon the experience of library staff, authors such as Davies (1997) and Edwards (1997) have explored the changing roles within the information sector. Increased responsibilities of library staff may mean they are required to teach new information retrieval skills, as well as provide content development and input, deal with legal matters, maintenance and evaluation of the new learning materials. Edwards (1997) uses evidence from eLib's IMPEL2 Project, carried out between 1996–1997 at the University of Northumbria, which suggests that uncertainty occurs when institutions had or were undergoing organisational change. Davies, (1997, 383) has highlighted how library staff may either feel confused or threatened as learner skills develop, or alternatively, staff in institutions with well established electronic resources, found that learners developed new demands in the search for quality learning materials, effectively increasing the demands on their professional requirements.

As for the teaching methods and reaction to change, Jaffee (1998) has commented how “in

academia, obstacles to change are closely associated with the established practices and cultural traditions of the teaching faculty." Similarly, Browne (1999, 32) has identified how "academics are likely to recognise conceptual shifts within the subject, [while] support staff will be most alert to IT developments. "

What is more, Edwards (1997) has reported how library and information staff held the perception that many academics appeared to be unhappy with their involvement in the provision of course materials, and that their status was viewed lower within the institution. Different dynamics and concerns such as this, over the changing professional roles between library, academic and Information Technology staff within institutions, could prove to be potentially dangerous to the success of linkage. Within the literature there is once more a consensus that collaboration and communication at all professional levels could provide the answer to this, with adequate training and staff development playing a lead role in alleviating professional confusion.

In conclusion, it remains to emphasise how the recent literature recognises that whatever internal institutional issues exist to hamper linkage, the particular institution considering linkage must firstly identify their own unique problems and assess whether or not they are ready for linkage. Research at the University of Sheffield into ICT-(Information Communications Technology) based open and distance learning highlighted this point when it was indicated that Universities have to be realistic when considering whether or not they are ready to invest in a linkage initiative to provide improved online teaching and learning resources (Computer Based Collaborative Group Work Project 2001). Thus, the next move may be for institutions to identify the specific issues and recommendations for long term strategic planning and incorporate these into university mission statements, all led by effective leadership.

INSPIRAL investigates the aforementioned institutional issues in depth through stakeholder consultation and desk research.

Methodology

INSPIRAL's research which is broadly qualitative in its focus consists of five stages:

- Defining the scope of the research and developing the research methodology;
- Identification of stakeholders, stakeholder groups, and stakeholder forum and dissemination points;
- Identification of institutional and end-user issues;
- Analysis of the issues;
- Dissemination.

A common theme of the methodology adopted was iterative consultation with a wide range of stakeholders. The issue capture stage involved stakeholder interviews, two forums, identification of appropriate case studies, and an extensive literature review. In the course of the analysis stage a further two workshops and a learner focus group were held with an emphasis on analysing and prioritising issues. At the time of writing case studies are being undertaken and exemplars of best practice are being identified. The results of the study will be published in the final report.

Stakeholders

The stakeholders identified in the early stages of the study were from the following interest groups:

- HE Learners;
- Educational staff, i.e. academics and other teachers, library and information resource provision staff, research staff, administrative staff, systems support staff, staff developers and educational developers, institutional managers, educational funding body managers, staff of e-learning projects and services;
- Commercial organisations, i.e. commercial providers of online content and systems.

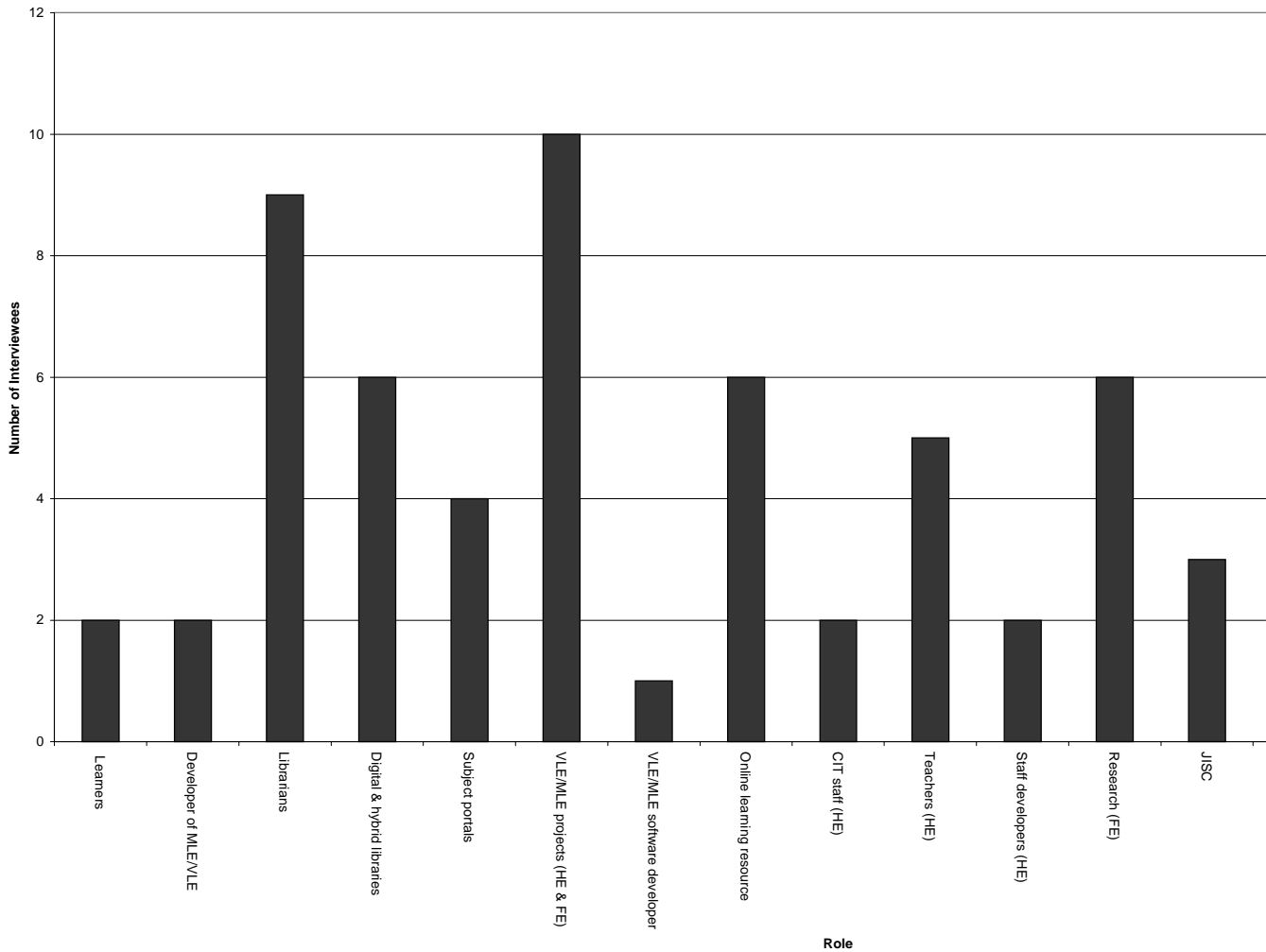
Stakeholder interviews

INSPIRAL Research Fellow Sarah Currier designed, piloted, revised and implemented three semi-structured interviews for educational staff, commercial organisations and learners, highlighting the main areas considered to be relevant to INSPIRAL's research.

All three interviews followed the same basic format, aiming to find out about:

- The interviewee's present occupation, project or course;
- Any relevant prior posts or courses undertaken;
- Whether they are currently involved in any linkage between digital libraries and Virtual Learning Environments, and, if not, whether there are any plans afoot;

Figure 1: Role of the interviewees



- What they see as potential benefits and drawbacks to Virtual Learning Environment/digital library linkage;
- What their vision for the future is with regard to Virtual Learning Environment/ digital library linkage;
- What they believe the barriers are to achieving that vision.

Interviews were conducted with the stakeholders identifying issues from an institutional and end-user perspective over a two-month period from May to June 2001. Nineteen stakeholders were interviewed in seventeen interviews. Eight interviews were conducted face-to-face (one interview with two participants and the other with three); five were conducted over the telephone; and the remaining four were carried out by sending the interviewee the interview plan to fill out as a questionnaire.

All those interviewed ranged from an administrator for an online service, through project

workers, project managers, research assistants, lecturers, subject librarians, systems librarians, and managers, up to a JISC Programme Manager. Actual responsibilities in present jobs and prior experience included the full range within e-learning in Higher and Further Education. As Figure 1 illustrates most interviewees fell into more than one occupational category.

Of the fifteen people who gave a response as to their prior experience, eleven had at least five years experience in e-learning or electronic library/information services. Both learners interviewed took part on the basis of having participated in online staff development courses in Higher Education (Currier 2001).

It is worth noting here that all those interviewed already had some involvement in online teaching and learning. There is no input from any member of the stakeholder groups who choose not to take part in online learning developments.

Forums

Two half-day forums were held in Glasgow (June 12, 2001) and London (July 10, 2001). Detailed reviews of both forums are covered in the forum reports (Brown 2001) and (Brown and Currier 2001) respectively.

The aim of the first forum was to discuss, identify, and gather information on the issues surrounding the linking of Virtual Learning Environments and digital libraries. A specific topic for this forum was to investigate barriers, problems, and the possible potentials, with specific reference being given to the considerations of the learner and the institution.

The second forum was planned to build on issues raised in the initial stakeholder interviews, online discussions, and the outcome of the first forum. Essentially, stakeholders were asked to think about the pros and cons of integrating Virtual Learning Environments with library resources and services, to imagine what could be achieved, and to identify where they thought the (non-technical) barriers lay.

Workshops

Two workshops were then held in Leicester (August 21, 2001) and Birmingham (September 4, 2001) to capture issues, and to discuss problems and potential solutions pertaining to these issues. The details of both workshops and the findings are covered in the workshop reports (Brown and Currier 2001) and (Brown and Ekmekçioğlu 2001) respectively.

The aim of the first workshop was to analyse the key issues raised in INSPIRAL's stakeholder consultation to date and to suggest possible solutions and ways forward for the integration of Virtual Learning Environments and digital libraries.

The twenty-three workshop participants (including the three guest speakers) were from Further and Higher Education institutions throughout the UK. They included three JISC managers; nine librarians; two information science researchers; five learning technology specialists; and three teachers. Eleven were from Higher Education, eight from Further Education, and four from mixed organisations (JISC programmes and mixed Higher/Further Education institutions).

The Birmingham workshop was essentially the last INSPIRAL event to analyse the main issues that had already been identified and determine solutions to these issues, with the prime focus of providing JISC with recommendations in the key areas of concern for future research and investment in Virtual Learning Environments and digital library integration.

Participants included representatives from three Further Education institutions, two commercial vendors, and twenty-two from the Higher Education sector, the majority being library and information resource provision staff and systems support staff.

The two major outcomes of these workshops were the prioritisation of the main issues and recommendations to JISC for future study and strategic investment. The key deliverable arising from the project will be a learner-oriented report on the institutional and end-user issues relating to the linkage of Virtual Learning Environments and digital libraries. The report will be published and disseminated at the end of November 2001.

Analysis of the results

The following analysis examines the responses to the interview questions according to the three groups of stakeholders: educational staff, commercial organisations and Higher Education learners. For the purpose of this paper analysis is focused on the following headings: current situation, the vision (ideal interaction), barriers and recommendations to JISC. The outcomes of the forums and workshops are also summarised in below.

Current situation

Of the fifteen interviews (excluding two learners), nine respondents said that they were not currently involved in any way in linking or integrating online learning environments with digital libraries or library services.

Of the remaining six, the two respondents who each oversee a number of JISC funded projects mentioned three current projects which are including content and repositories in their investigations, and three student portal projects looking at linking to library services.

Two respondents (one Further, one Higher Education) said that their institutions provide superficial linking from their Virtual Learning Environment to library services. The Further Education institutions' Virtual Learning Environment (which use off-the-shelf packages) simply link to their library's OPAC and homepage. The Higher Education institution developed its own Virtual Learning Environment (which is now commercially available), and includes librarians in decision making about what resources were to be included in a given course.

Two respondents were directly involved in projects which integrate library resources and services into their learning environments. One is director of a project developing software specifically for this purpose, while the other has had close involvement in piloting a Virtual Learning Environment that integrated digital library resources and services. This pilot is now being turned into a mainstream service.

Neither of the learners interviewed took part in an online course with linkage or integration with library services or resources, although one completed a couple of courses that linked to externally held papers for reading.

The one commercial organisation (apart from the above-mentioned Higher Education institution which now sells its own Managed Learning Environment software) that took part does not currently offer any product related to integrating learning environments and libraries.

Seven respondents mentioned plans to develop some kind of linkage between digital libraries and learning environments in their institution or project. These ranged from the very informal to the formal (Currier 2001).

One of the questions asked was whether interviewees believe linking or integrating Virtual Learning Environments with digital libraries would be of benefit to institutions, staff and learners. Ten interviewees answered "Yes" to this question. Enthusiastic answers such as: "Essential", "Hugely important", "Definitely", "Absolutely" were given by four interviewees. However, while one respondent said:

Believe it could be, can't say it will be. Would have to be careful to avoid various pitfalls.

Another respondent said:

Something of a cynic. Yes, if implemented properly.

Yet another stated:

VLEs [Virtual Learning Environments] will be using information resources of one kind or another so it must be of benefit.

The vision

Interviewees were then asked whether they had a personal vision as to how the ideal interaction between Virtual Learning Environments and digital or hybrid libraries would be. Themes included a focus on how would it look, how would it work, how would it enhance teaching and learning, how would it enhance organisational effectiveness.

Seamless, one-stop access

Six interviewees agreed that the ideal interaction should be seamless, one-stop access, i.e. the library environment should be fully integrated into the online learning environment. One academic expressed an enthusiastic view:

One seamless interface where you could access all relevant resources for staff and students. Courseware, course programmes, timetables, exam programmes, learning resources, student records, move records between institutions, part of course in one institution, part in another.

Seamless information architecture from when a student comes into the institution until they die! Lifelong learning.

All resources required to facilitate learning; group work, sharing resources; chat rooms, etc.

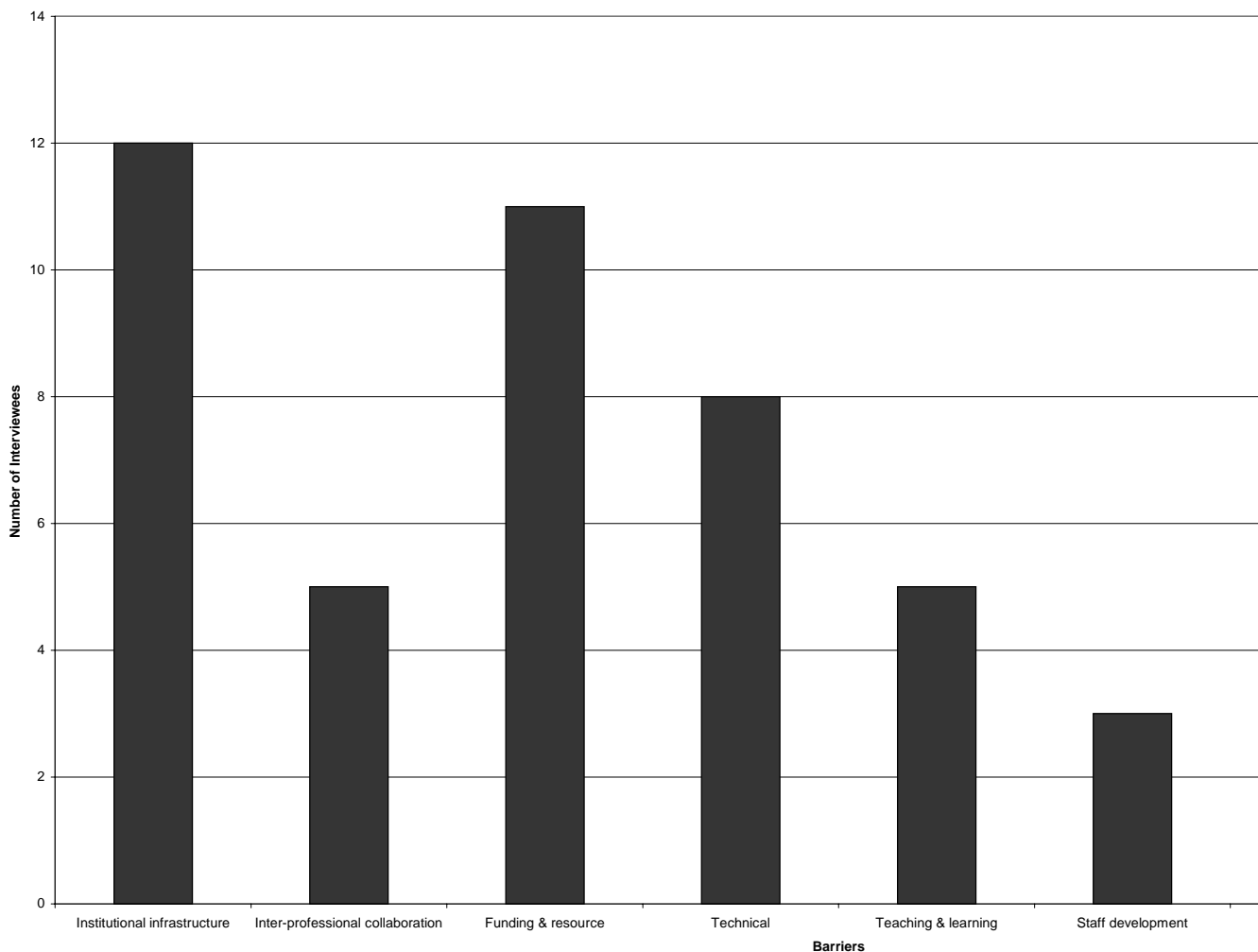
All done in a standard manner. With bells on!

However, some interviewees expressed concerns about problems such as interoperability of search vocabularies, danger of spoon-feeding and information overload.

Universally accessible

Six interviewees pointed out that it should be easily accessible by users with different physical abilities, any time anywhere, with one password and standard hardware/software, and should accommodate different learning styles.

Figure 2: Barriers to integration



Easily customised by the user

Four interviewees said that it should be easily customised by the user, i.e., easily individualised by the student and flexible for the teacher. Students should be able to tailor it to their educational level and interests. Several interviewees mentioned the idea of the personalised student portal. However, some respondents felt this could be taken too far and might even be restrictive. One respondent stressed:

Portals can be at different levels – undergraduate/post-graduate. But should things be tailored to the learner’s level? May not be good to restrict people in the learning process. Need a balance between spoon-feeding and not giving too much/wrong information to them.

Teachers on the other hand, should be able to adapt or update courses anywhere, any time, and use their own pedagogical approach. However, some respondents pointed out that this would

require forward planning and therefore would be time consuming.

Interoperable

Two interviewees said that the systems should be interoperable. One respondent stressed that both learning resources and Virtual Learning Environments must be interoperable using IMS (Instructional Management Systems) standards. Another respondent said:

Data about resources students are using should all be completely interoperable, based on open standards, so that anyone who wants to take something out of the system and use it, it will work.

Four interviewees raised other issues such as the importance of security, speed, simplicity, clarity and a user-friendly interface. One respondent said:

Simplicity, clarity, speed and choice are the key factors in my view to how the ideal interaction would look.

Another respondent emphasised the importance of the user interface by saying:

User-friendly interface. (I don't know what that would look like!)

The Barriers

The respondents were finally asked to identify the barriers to achieving the vision. Barriers associated with institutional infrastructure and politics and with resource and funding were the two main categories that most interviewees commented on (see Figure 2).

Institutional Infrastructure and politics

A majority of the interviewees (12) raised institutional infrastructure and politics as an important barrier to the integration. Some of the points made by the interviewees included:

- Competition and territoriality; e.g. library systems, information systems
- Resistance to change;
- Resistance to new technologies;
- Reluctance of staff to engage in online learning;
- Fear of change and evolving new roles.

A Higher Education librarian said:

Barriers are caused by the traditional academic infrastructure which is inflexible when it comes to these things. Huge amount of territoriality; e.g. library systems, information systems. Whose responsibility is it to implement these things: is it the library? The educational systems people? the Principal? How are all these different factors/factions going to learn to work together to implement these systems and to support staff once the systems are in place?

Reluctance of staff to engage in online learning, for more complex reasons than just the lack of time and recognition was raised as an issue by several interviewees.

The integration of the Virtual Learning Environments and digital library resources requires collaboration, co-operation, and sharing of resources. The traditional culture within Higher Education was seen by many to be disadvanta-

geous to this, forming a serious barrier to successful implementation in many institutions.

Resource and funding

Eleven interviewees raised resource and funding issues as an important barrier.

Top management need to understand that developments in e-learning are not cost savers, and may require additional resources to implement effectively. One Further Education/Managed Learning Environment Project Manager said:

All too often senior managers at universities see these developments as money savers but actually they involve a good deal of time and effort. I don't think they save money, but they will enhance teaching and learning.

Other resource issues such as staff time, content provision, and student access to technology, were raised by some of the interviewees. Several respondents mentioned the amount of time and staff development resources that would be required.

There is a need for coherent vision and adequate resources from a high level, responsive to the demands and needs of the learners and the expertise of educational staff. Although this is a common problem in Higher Education, it becomes more obvious in this area because the nature of the proposed integration requires collaboration between groups with different priorities and attitudes.

Inter-professional communication and collaboration

This could be included under institutional infrastructure and politics, but since it was raised by five interviewees as an important barrier to integration the authors have decided to treat this as a separate issue. Some of the issues identified by the interviewees as inter-professional difficulties included:

- Communication and collaboration between libraries, academia and systems;
- Cultural barriers;
- Mutual misperceptions;
- Differences in priorities and visions.

A Further Education/Managed Learning Environment Project Manager stressed:

"[The] simple bit is getting computers to talk to one another. Cultural barriers are the difficulty – bringing to-

gether two sets of expertise, people don't understand each other's cultures. Got to learn, lock 'em up in a room together! Communication being the key, they have to talk to each other."

There was a consensus among the respondents that collaboration and communication at all professional levels is the answer to the successful linkage.

Technical issues

Although some of the interviewees said that technical issues are not the most significant barriers, eight interviewees raised technical issues as a significant barrier to integration. It is worth noting here that INSPIRAL's research is concerned with institutional and end-user issues rather than technical aspects of the integration, therefore INSPIRAL is not analysing technical issues in depth but touching upon them where necessary. Technical aspects of integration are being investigated by ANGEL (2001), another JISC funded project aiming at developing middleware to enable integration.

Staff development issues

Three interviewees raised the issue of staff development. Some of the points raised were:

- Support and training for staff needs to be ongoing, and means more than just teaching them to use the technology;
- Pedagogical issues need to be incorporated, to ensure the academic validity of teaching and using information online;
- Staff development must be applied to all staff, not just teachers;
- Some kind of incentive such as accreditation must be offered.

A Higher Education librarian expressed a common view:

Academic staff don't get the same recognition for developing teaching materials as for research.

Staff development was acknowledged as an important step towards a successful integration of the digital library resources and Virtual Learning Environments.

Teaching and learning

Five interviewees raised teaching and learning issues as a significant barrier to the integration. The issues they raised included:

- Differing learning styles;
- Potential for spoon-feeding;
- Information skills and literacy;
- Information overload.

Many respondents expressed concerns over the potential for spoon-feeding students information versus overwhelming them with information overload. Training not only students but also teaching and support staff in information skills was raised as another important issue. Some respondents also touched on the issue of differing learning styles.

Content

Two of the interviewees expressed major concern over the content issue focussing on the following points:

- High quality content and information resources;
- Who develops the content?
- Who chooses it?
- Content sharing.

A lecturer said:

Ideally, content would be produced by professional publishers, rather than being a kind of home made stuff that you have, so the academic concentrates on the process of t&l [teaching & learning] There are specialist areas where that won't be possible. The problem with that is that universities would then have to work collaboratively. From my point of view that would be the main aspect and I still think academics, senior management, everyone, when they think of online learning, they think of creation of stuff and I think a small amount of creation of high quality stuff is good, but not the Encarta idea (all primary schools had that and it was "The world according to Encarta"); you need more than one resource.

The major concern was about the development and availability of high-quality content. Other issues such as how much time and effort teachers should spend developing their own content versus commercial production of content, and who should choose the content were also mentioned.

The sharing of content was considered as the ideal with its own problems.

Access

A fair number of interviewees (6) mentioned access issues as an important barrier. Authentication, IPR and copyright, privacy, and plagiarism were mentioned as common concerns. INSPIRAL is not analysing these issues in depth since they are being investigated by other JISC-funded projects.

Recommendations to JISC

The issues raised at both forums and the workshops supported the views and concerns expressed by the stakeholders who were interviewed at the early stages of the project. Throughout the forums and the workshops the same issues were raised repeatedly. The most commonly mentioned broad issue was that of communication within and without institutions, particularly between teaching and library staff, but also with senior management, Information Technology staff, publishers and learners, followed by institutional infrastructure and politics, role and status, and staff development. Other issues raised were:

- Information Technology skills and training for both students and staff;
- Learner needs;
- Higher/Further Education collaboration;
- Copyright/IPR issues;
- More resources;
- Standards;
- Problems with publishers;
- All library functions online.

Solutions to the most of the above-mentioned problems were identified as being an institutional issue and it was noted that the best way for institutions to alleviate these barriers is to make best use of time, staff, and money in a system of ongoing staff development

Also, the two workshops were important in that the participants as well as prioritising the issues suggested ways forward for JISC. The most common recommendations were that JISC should:

- Put more effort into the effective and innovative dissemination of findings;
- Liaise with academics as well as academic services;
- Identify priority areas where standards/guidelines/best practice need to be set;
- Target various levels within the institution with their findings, projects etc.;
- Provide more funding to turn projects into services;
- Fund studies/research which will investigate learner needs in terms of library/Virtual Learning Environment integration;
- Implement guidelines to help academics as well as academic services to see through the sales pitch of Virtual Learning Environments vendors;
- Use its authority to persuade commercial outlets to make systems easier to link with other systems, by using standards such as XML (Extensible Markup Language)/IMS (Instructional Management Systems);
- Improve interoperability between projects and institutions.

The participants also noted that JISC might:

- Work with senior managers to influence the culture of institutions;
- Target academics to raise the awareness of JISC's role in the changing need for educational provision.

Areas for further study by JISC were identified as:

- A Higher Education-funded projects portal, providing an overview of the past and present projects, and a mechanism to link similar projects together.
- Who is using Virtual Learning Environments, what Virtual Learning Environments are they using, and why?
- What do the learners themselves want and need in terms of Virtual Learning Environments and library integration?
- What are the visions that librarians have for Virtual Learning Environments? Collating this type of research may encourage institutions to work more closely with librarians.
- The developments in Australia, where experiences and developments may be of great use.

Conclusion

In this article the authors have reviewed the issues that surround the linking of Virtual Learning Environments and digital/hybrid libraries, focusing on institutional perspectives.

At the time of writing the project team is analysing the end-user issues and these will appear in the INSPIRAL final report which will be published and widely disseminated at the end of November 2001.

To date, INSPIRAL's research has indicated that in the opinion of INSPIRAL's stakeholders, the integration of online learning environments into digital library resources and services is a worthwhile aim to pursue. However, it should be acknowledged that there is a continual need for authoritative funding and investigations at institutional level, and that some barriers to linkage need to be addressed within the particular institution. Collaboration and communication at all professional levels could provide the answer to this, with adequate training and staff development playing a lead role in alleviating professional confusion.

Glossary

Chat (rooms): This rather generic term has come to describe one of the more popular activities on the Internet. Using special software, Internet users can enter chat areas or "virtual spaces," where they can communicate in real time. While most chat software only lets users talk by typing, more advanced products assign avatars, 2D or 3D characters, to each participant. These avatars may even have expressions selected by the chatters. The most advanced products not only use avatars, but also let users with sound cards speak to each other.

e-Learning: Electronic Learning or Technology-Based Learning. Covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio/video tape, satellite broadcast, interactive TV, and CD-ROM.

IMS (Instructional Management Systems): An instructional management system is sometimes known as a course management system or a learning server, or a CBT system or even an integrated learning system. IMS is concerned with standards for learning servers, learning content and the enterprise integration of these capabilities.

Interoperability: The ability of various combinations of hardware and software to work together. In an e-learning context interoperability relates mostly to content working with Learning Management Systems (LMS).

Portal: A specific view into a Web site. The view identifies available offerings that match a person's request. In this context, any Web site that offers learners or organisations consolidated access to learning and training resources from multiple sources. Operators of learning portals are also called content aggregators, distributors, or hosts.

User interface: The keyboard, mouse, and menus of a computer system. The user interface allows the user to communicate with the operating system.

XML: Short for Extensible Mark-up Language, a specification developed by the W3C. XML is a pared-down version of SGML (Standard General Mark-up Language), designed especially for Web documents. It allows designers to create their own customised tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organisations. For e-learning, XML provides an important way of structuring and labelling learning objects with precise descriptions making them highly searchable and also tells other technologies what the e-learning content means and how it is organised.

Source: e-Learning Centre: eCLIPSE. Library Resources – e-Learning glossaries. Available from World Wide Web: (<http://www.e-learningcentre.co.uk/eclipse/Resources/glossaries.htm>) [viewed November 28, 2001].

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