Supporting Teaching and Research in an Online Environment: Developing the University of London Library Model

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Founded in 1837, the University of London Library (ULL) is the central research library of the University of London with particular research strengths across the broader arts, humanities and social sciences. With the development of information and communications technology, it has become a hybrid library, offering access to electronic collections but also extending access to services and its physical collections through its website and online catalogue. Research libraries now face the challenge of supporting distance learning. The ULL has risen to this challenge by being a partner in the development of web-enhanced distance learning by the University of London External Programme's Virtual Campus Project. To do this, the ULL has initiated the Virtual Library Service (VLS) Project. Within the research-focussed University of London, the ULL has anticipated the potential research-support needs of its students. It is also leading a separately funded Virtual Research Environment (VRE) Project on behalf of the University Libraries Committee to address these needs and inform the University of London's activities in the virtual sphere. The University of London has created the Electronic Library Projects Team (ELPT) to undertake the VLS and VRE projects and ensure that they develop along complementary lines. This paper outlines how the ULL is supporting teaching and research in an online environment through the development of its VLS and VRE models.

INFORMATION RESOURCES FOR DISTANCE LEARNERS

The initial project undertaken by the ELPT is to develop a dedicated VLS model to support the information needs of students registered with the University of London's External Programme, many of whom are studying at a considerable distance from London. Once fully developed, the VLS will offer access to a range of information and learning resources and related services as

one of the principal elements in the External Programme's Virtual Campus Project.

The University of London External Programme

The University of London, established by Royal Charter in 1836, is one of the oldest universities in the United Kingdom. It is now a federation of seventeen self-governing colleges, all of which are members of the University by choice and are empowered to award the University of London degree. The University of London External Programme was established in 1858 to make University of London degrees accessible to students who were unable to come to the University to study. The degrees awarded to students on the External Programme are of the same academic standard as those awarded internally to students studying at one of the University's Colleges in London. Currently the Programme offers over 100 qualifications at undergraduate and postgraduate level to over 28,000 students in more than 180 countries. At undergraduate level over 65% of students are currently studying in the Asia Pacific region, whereas at postgraduate level, the students are more widely distributed, with 30% in the Asia Pacific, 30% in Western Europe and almost 30% from Africa and America combined. The University of London External Programme is a distinctly global programme with the majority of students studying at a considerable distance from London. Each qualification is led by a Lead College within the University, co-ordinated by the Lead Colleges Committee. Funded wholly from student fees, surpluses are reinvested in the Programme through new course developments and through major initiatives such as the Virtual Campus Project.

The Virtual Campus Project

In October 2000, the External Programme embarked on a period of significant investment to develop new and redevelop existing qualifications, the majority of which will be delivered wholly or partially online. In parallel with these academic developments, the External Programme is currently developing an online environment, the Virtual Campus. Anyone visiting the Virtual Campus from a computer anywhere in the world will be able to access a range of information, advisory, resource and support services as would be expected on a physical campus mirrored into a virtual context. The Virtual Campus Project is a collaborative initiative bringing together three central academic services of the University of London: The External Programme, The ULL and the University of London Computer Centre. Running from October 2000 to July 2003,

the aim of the project is to provide a common infrastructure to support the development, delivery and management of internet-based courses and services for the External Programme.

The Virtual Library Service

One of the central services within the Virtual Campus Project is the VLS, which is being co-ordinated by the ELPT. Running from October 2000 until July 2003, the aim of the VLS project is to: *„provide access to a range of learning and information resources and services for students registered with the University of London's External Programme from wherever they have chosen to study."* Primarily, the VLS will mirror the core resources and services found in a university library, however, as more courses are delivered online, the integration of library resources within Virtual Learning Environments (VLEs) will be explored. As well as providing learning and information services for the lifetime of the Virtual Campus Project, the VLS Project will develop a model for the delivery of a sustainable service. Appropriate definitions of service will be created, including recommendations of how such sustainability may be achieved.

The VLS provides a variety of online resources and services put together in liaison with each course development team participating in the Virtual Campus Project. The principal components in the VLS are:

- Online resources: electronic datasets and internet resources targeted at each course within the Virtual Campus Project. There will also be a reference collection enabling students to find rapid reference facts to support their studies.

- Enquiry service. Available by telephone, email or web form.

- Information literacy skills. Externally developed guides and tutorials are a part of the initial VLS. The VLS project will also provide quick start guides to the resources it offers and aims to develop its own tutorials tailored to suit the specific needs of the External Programme.

- Authentication. Exploring various methods of authenticating users will be of high priority to ensure a seamless experience within the Virtual Campus.

- Web-based portal with tailored entry points for each External Programme course.

IMPLEMENTATION

Online Resources: Acquisition and Integration

One of the most significant tasks in the development of the VLS has been working closely with the academic programme development teams to determine which resources will best support the delivery of their courses. Initially, during the lifetime of the project, the VLS will provide library support for approximately fifteen courses across a wide variety of subjects including business, dentistry, economics, education, finance, healthcare, history and law. Some of the resources will be specialised, such as those for dentistry, and will only be applicable for one programme. However, other resources may be applicable to several programmes, due to the overlap between the disciplines, such as in the areas of business, finance and economics. It has been necessary to maintain a map of the resource requirements across the entire project to ensure that they are most cost-effectively acquired. In addition to paid-for resources, which so far mainly focus on subject specific databases and e-journals, the academic programme development teams have been keen to provide relevant websites and subject gateways, which are being collected and organised as part of the VLS.

The increase in both electronic resources and the online course delivery is providing the opportunity for a closer relationship between library resources and academic content. Such integration increases the necessity of the library and academic staff working closely together throughout course development. In the UK, nationally funded projects such as INSPIRAL (INveStigating Portals for Information Resources And Learning)[1] and ANGEL (Authenticated Networked Guided Environment for Learning)[2], are already working closely on how such integration can be best achieved.

Support Services: Quick Start Guides and the Enquiry Service

Support for the use of the resources in the VLS is essential. Many of the External Programme students are studying both on their own and at a distance and may not be familiar with online study and electronic resources. Information about the resources and services offered is sent to each student who has access to the VLS, including Quick Start Guides explaining the basic functions of each the resources. However, it is important that an opportunity to ask questions is made available in addition to the information they receive.

The VLS enquiry service was launched in September 2001 to support the resources for the Laws Programme. Enquiries are answered, within two

working days of receipt, by the Electronic Library Projects Assistant with the support of an experienced team of information and subject staff. Having a main contact person for the VLS will help to reduce the isolation experienced by students who are studying at a distance, as they will regularly contact the same person. In addition, contact details and areas of responsibility for the whole ELPT, including photographs, will be added to the VLS website to further increase the personal tone of the service. Although this is a *virtual* library service, it is important that students can choose the way they prefer to communicate with the library; either by email, telephone, fax, letter or perhaps even face to face if possible. Furthermore, in order to provide a dedicated service, a separate telephone number has been set up for enquiries from External Programme students. In the first instance queries are only answered between 09.00 and 17.00 (Monday to Friday) UK Time. However, due to the range of time zones in which External Programme students are studying a voice mailbox has been set up so that the library can receive telephone enquiries, as with email, 24 hours a day 7 days a week. Questions received via the VLS are recorded and analysed in order to influence the future development of the enquiry service. Already, an electronic help desk has been developed which provides answers to Frequently Asked Questions (FAQs) that have been received through the VLS enquiry service. Students are advised to consult this helpdesk before they ask a question. Since its launch, usage of the enquiry service is increasing clearly demonstrating that the students need it.

Authentication

Once a student has logged into the Virtual Campus she should not be aware that any other authentication is taking place; she should not have to enter her username and password again. Any further authentication required, such as for electronic library resources, will be done *behind the scenes* using data exported from the External Programme's student registry. In the case of the VLS, it is essential that only authorised students have access to the resources to ensure compliance with licensing agreements. Ultimately, the VLS will provide access to a comprehensive range of resources, from a wide variety of suppliers, many of which will have different methods of provided authenticated access to their resources. A service-wide authentication is therefore a necessary component in the delivery of the service.

In the UK, the problem of multiple passwords for electronic library resources has been to some extent bridged by the development of the Athens[3], an access management system for UK Higher and Further Education. Athens provides

off-campus access to a range of electronic library resources with the input of a single username and password, however, at this stage, not all resource providers will allow their resources to be authenticated by Athens. In addition, it is also not possible to integrate Athens with the authentication system that is being used to provide access to the VLEs as part of the main Virtual Campus Project. In this way, currently students are not able to login to the Virtual Campus and have access to all their resources and service without having to type in additional usernames and passwords.

For on-campus *behind the scenes* or *quiet authentication*[4] access to resources is often provided by Internet Protocol (IP) recognition. For this method, the library registers the IP addresses of all the library computer terminals with the resource provider. When a student tries to access the resource from a computer with a registered IP address then they get immediate access to the resources without the necessity for any further authentication. However, for a VLS, with potential 28,000 students, it would be impractical, and not secure, to register the IP addresses of all the students. Resource providers initially have provided *remote* access to such resource by authenticating students by username and password, however this will not create the seamless experience we are aiming for.

The ELPT is currently investigating a variety of authentication solutions including the use of proxy servers, which work in a similar way to IP address recognition, but without the need for the registration of student IP addresses. Attention is also being paid to the development of a second generation of Athens access management system[5]. As Athens is a national access management system and is often seen as a de facto authentication standard, its use as the ultimate authentication solution for the VLS, if possible, would be preferable. However, while this investigation is in progress, most of the VLS' resources will be authenticated via the current Athens with the input of a single username and password wherever possible. In this way, *fairly quiet* authentication can be provided.

Integrating Access to the Virtual Library Service

The aim of the VLS is to provide seamless access to electronic library resources and services as part of the online courses. The VLS is also a coherent website providing access to electronic library resources and services independently from any online courses. When designing the VLS, a flexible infrastructure was therefore needed to satisfy two seemingly incompatible criteria. The prototype VLS was launched in September 2001. At this stage, the online

course developments were still in their infancy and therefore the VLEs were not available for testing. It was therefore important to keep the design of the VLS website as open as possible to allow the pages to be integrated within the various VLEs once they had been developed. In order to increase the flexibility of the website it was decided that it should be partially database driven. Constructed in Access, the database contains the URLs (Uniform Resource Locators) for all the resources provided in the VLS. The webpages are published dynamically, using a combination of SQL (Structured Query Language) queries and ASP (Active Server Pages). This solution allows the same resource to appear on different webpages from a single URL within the Access database. The resources can therefore appear on a page within the coherent VLS website, but at the same time appear on a separate resources page within an online course. By Summer 2002, several VLE prototypes will have been developed and will therefore be available to prototype the integration of the library resources. In addition, the Electronic Library Projects Assistant will carry out an evaluation of the current site in terms of standards and good practice in web design and feedback from site users. This evaluation will take into account issues such as usability, accessibility, scalability, usage patterns and site maintenance and be used to further improve the current site. Wherever possible the feedback of the users of the VLS will input into the redesign of the website, which will be launched in time for the beginning of the new academic year in September 2002.

Issues for the Future

During the initial stages of the VLS project, considerable work has been achieved, particularly on the development and realisation of the VLS model. As 2003 approaches, the majority of the courses will be registering their first cohorts and so with the resources in place the real test of VLS will begin. With the VLS in place, appropriate definitions of service will be created, including recommendations of how a sustainable service may be delivered beyond the lifetime of the project.

SUPPORTING RESEARCH ONLINE

The Virtual Research Environment Project

A complementary project undertaken by the ELPT is the Virtual Research Environment (VRE) project, supported by a grant from the Vice-Chancellor's Development Fund to the University Libraries Committee. Running from De-

cember 2001 to November 2002, the aim of the VRE project is to: „*develop and test an integrated web-based research environment to support the needs of the e-researcher.*" This project builds on the work that is currently done to provide online library services for the University of London External Programme's Virtual Campus Project, as outlined above.

Although considerable work is being undertaken in the field of online teaching and learning, online research support is currently relatively unexplored. As a research-led university, the University of London is well aware of this disparity and has begun to develop online support for both research elements of taught-course dissertations, in addition to support for research degrees online.

Technology already exists to support the taught elements of online degree courses, both at undergraduate and postgraduate level. VLEs may be used to support a range of learning contexts from conventional classroom delivery to distance and online learning. Such software has been evaluated through the Virtual Campus Project and elsewhere. However, in order to support academic research, online software (such as groupware) must be examined for its suitability in satisfying the needs of the e-researcher.

The VRE Project is grounded in a review of current research support provision within the academic community and an analysis of the needs of the research community within the University of London. Currently a user survey is being prepared with the aim of establishing which functionalities are needed in a VRE. As the strengths of the ULL are in the broader arts, humanities and social sciences, the VRE will focus on the needs of the research communities in these areas. However, the differing needs of researchers in the physical sciences will be explored in the Research Support Review.

Principle Components

The VRE will identify and integrate principle components required for effective support of online research. This will be informed by the research support review and needs analysis. However, it is anticipated that principle components of the VRE may include:

Virtual Research Library Support

An integrated resources page within the VRE could provide software to store and compile the researcher's electronic bibliography. Personalised harvesting tools which can search both the internet and across various relevant library resources (e.g. e-journals, subscription services, even the library catalogue) on a regular basis using predetermined searches could also be included. The results of which could be added to the electronic bibliography. Furthermore, an online research skills tutorial which can be applied across a number of research scenarios could also be developed and included, for which a separate bid is being prepared.

Using the research proposal as a starting point, a subject specialist librarian from within the researchers subject area could provide a specialised gateway to relevant resources available through the library. In addition research-related questions could be answered using an electronic enquiry service and on-line information skills training also be developed. These services demonstrate possible synergies between the VRE project and the services delivered as part of the VLS project described above.

Research-related Information

Provision of general web-based research-related reference information, including University Research Guidelines; Citation Style Manual; Research Methods; Research Funding Sources within and outside the University of London.

Online Secure Research Repository (OSRR)

A secure environment where elements of the research, (e.g. research proposal; literature review; methodology) can be shared between researcher and supervisor could be included. In this context the VRE could contribute to the electronic infrastructure of distance research degrees that are currently being discussed within the University of London.

Online Research Support Mechanisms

The system could provide mechanisms to allow tutors and students to interact in synchronous and asynchronous modes. These mechanisms could include:

discussion boards supporting subject-based discussions; integrated electronic mail; video conferencing and real-time discussion. This could encourage the development of subject-specific research communities from across the University and the provision of online seminars and presentations.

Tracking of Research Activity and Achievement

Online research planning tools to track research activity and achievement could be included perhaps incorporating project management software.

Research Output Repository

Research Output Repository containing digitised or born-digital research output such as research articles, book reviews, electronic theses and dissertations could form a valuable element of the VRE.

Software Evaluation

In parallel with the identification of the principal components of the VRE, the evaluation of available software to form the VRE infrastructure is taking place. Currently a development environment to assess the suitability of Open Source software packages has been set up, although this does not necessarily anticipate the use of Open Source Software in the final implementation. It is anticipated that the principal components will be developed as modules that can easily be put together and customized by researchers. In this way it will be possible to set up different instances of the VRE for different subject areas. At present the first customized VRE-application is being set up in collaboration with the *International Portal for Manuscript and Book Studies* within ULL, a development of the RSLP funded project; *Palaeography: Developing the National Resource*.[6]

Researcher Involvement

The generic VRE model will be tested and evaluated with a VRE user group that is currently being formed from an appropriate sample of the University of London research community. This user group will have a role throughout the development of the VRE, such as in the identification of the principal com-

ponents, as well as in the testing and evaluation of the final model. A Strategic Advisory Group for the VRE project has also been set up to monitor and guide the progress of the VRE Project. The membership of the group is designed to ensure close harmonisation and exchange between the Virtual Campus Project, the Society of College, National and University Libraries' (SCONUL) E-University Task Force, the Consortium of University Research Libraries' (CURL) Task Forces on Teaching and Learning and Scholarly Communications and other relevant initiatives.

CONCLUSION

The work of the ELPT will potentially influence the ULL's future support of teaching and research in an online environment. The projects outlined above provide a test-bed for the development of new services that may be integrated into ULL's central service delivery.

RELATED WEBSITES

ULL's Electronic Library Projects Team <http://www.external.ull.ac.uk/elpt/>

University of London <http://www.lon.ac.uk/>

University of London Computer Centre <http://www.ulcc.ac.uk/>

University of London External Programme <http://www.londonexternal.ac.uk>

University of London Library <http://www.ull.ac.uk>

Virtual Library Service <http://www.external.ull.ac.uk>

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References

1   <http://inspiral.cdlr.strath.ac.uk>.

2   <http://www.angel.ac.uk>.

3   <http://www.athens.ac.uk>.

4   Stephen Pinfield uses the phrase *quiet authentication* in his article: Managing electronic library services: current issues in UK higher education institutions in *Ariadne*, Issue 29: <http://www.ariadne.ac.uk/issue29/pinfield/>.

5   <http://www.athensams.net>.

6   <http://www.palaeography.ac.uk/>.