Macquarie University

A case study in the use and production of open education resources and open source software

Prepared by Nicolas Suzor, July 2006

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.Background

Macquarie University was established in 1964 in Sydney, Australia. There are approximately 31,000 students currently enrolled, including nearly 18,000 undergraduate students. The majority of students come from Sydney and surrounding areas, but over 30% of students come from outside of Australia.

Macquarie University was chosen for this report because of its commitment to the development and integration of e-learning initiatives. The Macquarie E-Learning Centre Of Excellence (MELCOE) is a recognised leader in e-learning research, development, and implementation in Australia. MELCOE is one of the most visible producers of open source learning and teaching software in the Australian tertiary education sector. While the production of open education resources at Macquarie is limited, the development of supporting open source software and open standards is unparalleled within Australia.

.Production of open education resources

There is no institutional policy in place at Macquarie University towards the production of open education resources. A very small proportion of individual lecturers make some material available to the public, but there is no broad trend of publishing material in an open manner. While there is no institutional repository for open access publishing, some academics do self-archive their work.

Macquarie makes a large proportion of its educational material available to its students for online delivery. Lecture notes, study guides, readings, and other resources are available to download from internal webservers. All of this material, however, can only be accessed with a university username and password. It is not likely that this material, although already created, will be made available to the general public at any time in the near future. There are significant barriers to opening access to this material. Firstly, the student access websites often include discussion boards and potentially sensitive information pertaining to students, which lecturers do not wish to make available to the public. This problem is a technical one, and could of course be resolved by separating sensitive information from educational resources. A more concrete objection stems from a general feeling amongst some lecturers that their material shouldn't be shared publicly – the material provided by lecturers is a large part of what differentiates them as academics, and there is some reluctance to make their hard work available to others without compensation.

Even where a lecturer may wish to make material available to the public, copyright often poses a significant problem. Universities in Australia operate under a blanket statutory copyright licence, and pay a blanket fee for all enrolled students to the Copyright Agency Limited (CAL). This licence fee provides the Universities with the ability to make portions of print and graphical material available to its students. The licence does not, however, extend to making material available to the wider public. Because the materials provided by lecturers may include a proportion of material that the university or the lecturer does not hold copyright in, it is impossible to openly distribute those materials directly. It would require significant time and effort on the part of the lecturer to separate materials which could be distributed from those which could not.

Because there is no formal institutional support for the publishing of education resources in an open manner, the lack of incentives and the costs imposed by copyright create significant barriers to open access publishing. Before open access publishing can occur, it is likely that a faculty or university wide policy would have to be in place to clear copyright issues and encourage lecturer participation. There has not yet been much support for such an initiative.

.The LAMS Community

One notable exception where educational materials have been made available to the public is the LAMS Community. LAMS is an open source e-learning tool developed by Macquarie University, which provides an open infrastructure to create sequenced learning plans. Staff members use LAMS to develop sequences of activities, which students complete online. The LAMS Community website provides a place where educators can share their sequences, and build off the sequences that have already been created. There are already approximately 100 unique sequences available under Creative Commons licences (typically BY-SA-NC). The Creative Commons licences were chosen because of their generally high level of popularity and awareness among educators.

While the LAMS Community grew very quickly since its release in late September, 2005, and LAMS continues to grow in popularity, only some sequence authors are now making their sequences available through the LAMS Community. While educators are generally happy to share their sequences upon request, only some take the additional steps required to upload their materials to the LAMS website.

Again, there is little incentive for authors to make their work available to the public (other than the public recognition of their contribution). Particularly, there is no formalised peer-review of sequences. It is also difficult for some educators to relinquish control of sequences by allowing modified versions to be made.

The LAMS Community is supported by the non profit LAMS Foundation and the open source services company LAMS International. Both LAMS organisations are supported by Macquarie University. There is no official policy encouraging the creation of open education sequences.

.Use of open education resources

While there is a great deal of sharing of educational materials within individual faculties and departments, there is no evidence of widespread use of open education resources at Macquarie University. There are no institutional or faculty/school based policies concerning the use of open access material. There is an assumption that some individual lecturers may use open access material in their courses, but the proportion of lecturers who do so is not large.

There is growing interest in the re-use and copying of LAMS sequences made available at the LAMS Community. Educators within Macquarie and elsewhere are beginning to appreciate the ease with which digital lesson plans and learning tools can be copied and adapted to suit their requirements. As noted above, however, the LAMS Community remains relatively small (as at June 2006 it included 1300 members across 85 countries) and use of open access learning sequences has not been widespread.

Most educators within Macquarie University either develop new courses from scratch or are asked to continue and adapt an already established course. There are notable examples of lecturers refusing to share their course materials even within their faculty or school – there is a lot of duplication of educational resources attributed to the perceived importance of creating one's own content.

.Production of open source software

Much of the infrastructure used within Macquarie University uses open source software (predominantly

webservers and other network software), and there is necessarily some level of customisation and production which occurs in order to maintain and develop that infrastructure. This work is often done on an ad-hoc basis by the technology support and development divisions at the university level. This type of development occurs primarily for integration reasons, and where modifications do not result in software that is distributed to other organisations, the changes are not necessarily released outside the university. There are no formal institutional incentives for individuals within Macquarie to participate in the development of open source software. Partly for this reason, there is little grass-roots or individual based development of open source software.

.*Macquarie E-Learning Centre of Excellence (MELCOE)*

The most significant source of free and open source software production and release occurs at the Macquarie E-Learning Centre Of Excellence (MELCOE). MELCOE is a research centre established specifically for research and development in e-Learning, including the development of free software and standards to facilitate e-learning and IT infrastructure for the education sector.

MELCOE is formally established at the university level, with the majority of funding to date received from Australian Federal Government grants. While research at MELCOE involves a number of other universities and interested commercial partners, the research and development is predominantly based or directed at Macquarie University. The two main areas of production of open source software within MELCOE are the LAMS (Learning Activity Management System) and MAMS (Meta Access Management System) projects.

.LAMS

As introduced above, LAMS provides a system to help educators build and use sequences of learning activities. These sequences can be thought of as workflows for educational tasks. It also provides a structure for students to progress through the educational sequences, and engage in collaborative online learning and discussion. Sequences of activities can be designed to complement tutorials, for independent learning contexts, or for external students to participate in class based exercises.

LAMS is designed to be easy to use for educators to create and implement a wide range of flexible learning activities. It is open source software which provides intuitive visual tools to create sequences of activities, the infrastructure for students to progress through those sequences, and a management interface to direct and evaluate student participation.

The release of LAMS as free software was instituted on a university level – a high level decision was made to release LAMS as free software for the public good. It is hoped that LAMS will transform the process and development of online learning, and releasing it as free software is designed to increase its uptake in the educational sector.

LAMS is licensed under the GPL. Non GPL licences can be negotiated for institutions who wish to build upon LAMS without an obligation to redistribute modifications (for example, a closed source Learning Management System that wishes to bundle and distribute LAMS), but to date no "dual licensing" of LAMS has occurred. All current users of LAMS acquire the software under the GPL licence. The GPL was chosen because it was the most common licence. This is seen as important in order to encourage community support and development. The copyleft GPL was specifically chosen over other OSI-approved licences because of the opportunities it afforded for potential dual-licence commercialisation.

.The Meta-Access Management System (MAMS) Project

The Meta-Access Management System (MAMS) project aims to provide a middleware component to increase the efficiency and effectiveness of Australia's higher education research infrastructure. MAMS was funded by the Australian Federal Government under the Systemic Infrastructure Initiative of "Backing Australia's ability". MAMS addresses the need for middleware to enhance access to information and services, such as scholarly information and journals, large datasets and grid computing facilities.[1] The MAMS project is designed to provide infrastructure for cross-institutional authentication and authorisation, combined with additional technical services for basic digital rights management, search and retrieval, and metadata management.

MAMS provides core infrastructure designed to increase the sharing of information between higher education research institutions. MAMS software is released under the Apache licence. The Apache licence is used because the MAMS software sits on top of Apache-licensed software called "Shibboleth" (not the Apache webserver itself). The MAMS software is directly shared between approximately 50 partner institutions.

.Release of research results and co-operation with other institutions

LAMS and MAMS are developed through institutional level funding from the university and the Australian Commonwealth Government through the Department of Education, Science, and Training. For Government funded work, it is a requirement of the funding that research results be disseminated to the benefit of other institutions (which MELCOE achieves by releasing software under open source licenses). MELCOE also awards grants from its funding to other institutions to carry out related work outside of the centre.

For both LAMS and MAMS, detailed proposals were drafted as part of the formal grant application. The decision to release LAMS as open source software is partly based on the importance of the dissemination of the results of research to other educational institutions for the public good of education. The creation of a services company to support open source LAMS (LAMS International) was part of the university's strategy both to support the adoption of LAMS, as well as to explore potential commercial benefits arising from an open source services model of university software commercialisation. However, the commercialisation potential was balanced with the public good interest (and the associated reputational benefits to the university)Both LAMS and MAMS attempt to remain standards-compliant where possible. MELCOE has a large focus on compatibility, but there is no institutional level policy regarding interoperability. Because learning management systems like LAMS are are still relatively young, compatibility is difficult to achieve. The use of open XML formats to store LAMS sequences is expected to aid integration into other products as the market matures.

.Standards and Interoperability – the COLIS Project

The COLIS (Collaborative Online Learning and Information Services) Project was started in 2001 with funding through the Commonwealth Government's Department of Education, Licence and Training (DEST), with Macquarie University as the lead institution. Four other Australian educational institutions are involved in the COLIS project: University of Newcastle, University of New England, University of Southern Queensland and the University of Tasmania. The COLIS Project was developed to investigate a standards-based approach to integrating learning and information systems of educational organisations. A key outcome of the first stage of the COLIS Project was a 'Demonstrator' environment, which provided a test bed to "demonstrate how the

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1   See MELCOE, *Meta-Access Management System (MAMS)*
    <http://www.melcoe.mq.edu.au/projects/MAMS/>.

seamless sharing of online learning and information resources could be managed technically".[2] The Demonstrator provided a Single Sign On access and identity management system, an example national learning object repository, a local learning object management system (with both learning object systems considering DRM issues), a federated search system, and a learning management system. This suite of systems highlighted the possibilities afforded by a smooth e-learning integrated solution, in order to solicit responses and suggestions from students and educators.

The second phase of the COLIS Project (2003-2005), called "Interaction of IT Systems and Repositories" (IIS&R – funded under a Higher Education Innovation Program grant from DEST), conducted research into the potential for substituting the original Demonstrator environment with compliant vendor provided systems, and educational research into issues arising from the use of the COLIS environment. The substitutability project drew significant interest from many software vendors, who participated at their own cost. These vendors include Oracle, HarvestRoad, Novell, Blackboard, WebCT, Microsoft, Endeavour, ExLibris and others. The focus of this project was to illustrate the open standards approach taken by the COLIS framework, and demonstrate the interoperability of all modules of the framework by replacing existing components with those supplied by new vendors. Importantly, this project highlighted the strength of open standards, and encouraged future standards compliance amongst the software vendors involved.

The COLIS Project provided an important example of the way in which various e-learning and information technologies could be used together. The COLIS framework specifies how different systems can be combined, and the research showed both the current state of the art and the direction in which further development must occur to create interoperable specifications and standards in e-learning systems. Through the COLIS project, Macquarie University has established itself as a leading institution for research into the interoperability of e-learning systems.

.Use of open source software

Much of Macquarie University's core infrastructure makes use of open source software. This includes software such as the Apache webserver, MySQL database server, and Sendmail email servers. The percentage of free software use in infrastructure is quite high. For example, nearly all of the webservers used by the university are Apache servers. These systems are installed and maintained by instiution level development teams, and are usually acquired in a formal process.

Desktop and end-user use of open source software, however, is not very widespread. Some individual employees download free software on their own initiative, particularly the Firefox web-browser and the OpenOffice suite, but also a range of other tools and applications. There is no institutional policy or incentives provided for the use of these end-user applications, and their use is often unsupported by the university. There is no open source Standard Operating Environment. It is estimated that less than 5% of end-user software used is free software.

Because most open source software at Macquarie is used in infrastructure, most staff members are not aware that they may be using free software. For example, because most faculties use online delivery for a large portion of their material, many of these educators are using the free Apache webserver in their courses, often without being conscious of its use. It is accordingly quite hard to estimate the actual proportion of free software that is used at

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2   James Dalziel, Robyn Philip, Jonathan Clare, "Preface" in James Dalziel, Robyn Philip, Jonathan Clare (eds) "The COLIS Project" (2005)
    <http://www.colis.mq.edu.au/COLIS_CD/content_book/COLIS_V02_050830_CD.pdf>.

Macquarie university.

.LAMS use

The LAMS @ Macquarie Project University Implementation Project has been established to encourage and support the use of LAMS at Macquarie University. The project is led by MELCOE, with support from the Centre for Flexible Learning. The project aims to integrate LAMS with the existing e-learning and online delivery infrastructure at Macquarie. It is expected that this project will stimulate the use and production of LAMS sequences within Macquarie University. During the first year of the project, 43 courses used LAMS with their students (30 unique courses, 13 repeats), and 101 different staff had LAMS accounts (during the first year, many staff explored the use of LAMS for deployment in courses in the future).

.Conclusions

The production of open education resources is not widespread at Macquarie University. A small number of e-learning sequences are made available, by the individual teacher creator, to the public under Creative Commons licences, but there does not appear to be any other significant official release of educational resources. Similarly, there appears to be little use of open education resources within Macquarie, although any such use is much more difficult to quantify. There is no institutional policy in place towards either the creation or use of open education resources.

Macquarie University, through the Macquarie E-Learning Centre of Excellence (MELCOE), is a leader in the production of open source software and open standards for the support of e-learning in Australia. The Learning Activity Management System (LAMS) is a significant open source platform for the creation and electronic delivery of educational activities. The Meta-Access Management System (MAMS) provides essential middle-ware to facilitate the integration of e-learning systems. Both of these projects are important for the adoption of e-learning initiatives in Australian and international universities. There is an expectation that as more institutions adopt compatible e-learning systems, at least the technical barriers to the production and use of open education resources will be substantially lessened. In this regard, it is possible to view the research and development that is taking place at MELCOE as a necessary precursor to further open education initiatives in Australia.

.Appendix – List of interviewees

The interviews for this report were conducted onsite at Macquarie University, and by followup email discussions in July 2006. The principal interviewees were:

- Professor James Dalziel, Director, Macquarie E-Learning Centre Of Excellence;

- Ray Warouw, Research Centre Manager, Macquarie E-Learning Centre Of Excellence;

- Robyn Philip, Education Research Coordinator, LAMS Project.