

AIMING FOR THE STARS: CHALLENGES IN MANAGING THE DEVELOPMENT OF SHAREABLE ONLINE LEARNING OBJECTS

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Aims:

Increasing numbers of students, student preferences for “anywhere, anytime” learning, and more demand for information literacy sessions requires libraries to explore new ways to effectively sustain information literacy programmes. This paper explores some of the challenges that were highlighted during the creation and distribution of shareable online learning objects for students at the University of Western Australia. The learning objects were designed for a range of students and courses.

Methods:

The results of user surveys and reviews informed content areas of online learning objects. An environmental scan and literature review were carried out to determine design criteria, suitable software for learning object creation, optimum size of learning objects (based on pedagogical evidence). In order to make these decisions it was also necessary to carry out an organisational audit which considered areas such as technical expertise, subject expertise, local requirements on accessibility, integration with local systems and strategic directions.

Results:

A number of issues were identified throughout the process e.g. gaps in the skill base of librarians and how the transfer of knowledge can be done if work is outsourced. Design criteria for shareable learning objects were developed based on findings of the needs analysis, environmental scan, literature review and organisational audit.

Conclusion:

Aiming for best practice in managing learning objects presents library managers with a number of complex challenges such as the balance between pedagogy and technology. Decisions need to be made with a long term broad view and a deep understanding of the organisational culture and priorities.

Introduction

Developing appropriate research skills is integral to the success of postgraduate students. All postgraduate students negotiate a complex research path. At the University of Western Australia (UWA) research skills are part of a wider group of generic skills that all postgraduate students are expected to acquire and develop during their candidature. In recent years there has been increasing focus by government, employers and universities on the work-related learning of postgraduate students and the types of generic skills that they develop during their study (Borthwick & Wissler, 2003). This has led the learning support areas of UWA to review their scholarly literacy support programs.

For a number of years the UWA Library and the Graduate Research School (GRS) have held sessions to enable postgraduate students to acquire generic research skills. Until the 1990's these sessions were ad hoc and individual one-off sessions (Cooper &

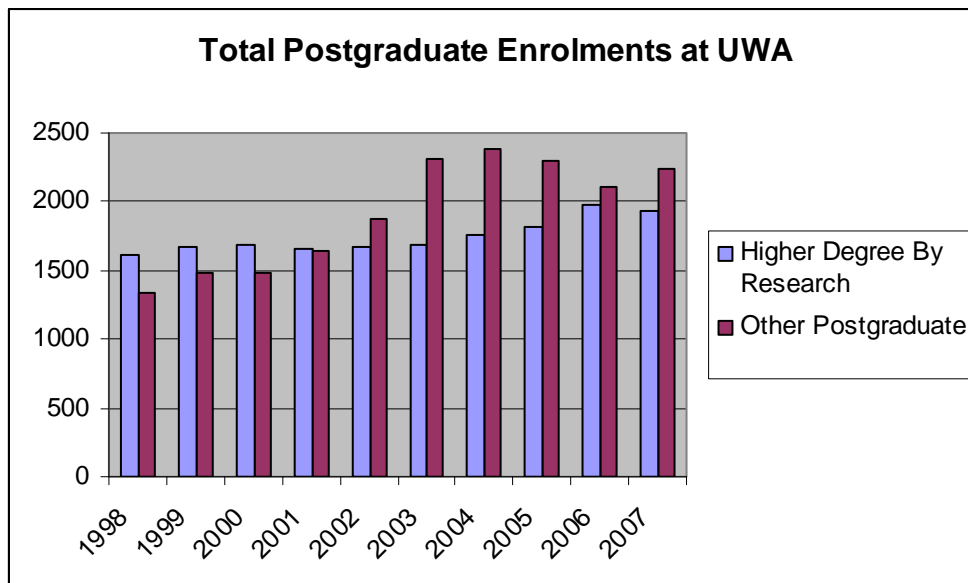
Juniper, 2002). From 2000 onwards both the GRS and the Library designed and delivered systematic programmes to match the perceived needs of postgraduate students. These sessions included topics such as:

- Literature searching and reviewing
- Development of research writing skills
- Publishing an article
- Introduction to EndNote

In addition, the University runs a Postgraduate Research Training Programme (PRTP). This consists of two courses aimed at postgraduates who are at either the beginning their research or the completion stage.

In 2005 both the GRS and the Library identified that many of the sessions offered to postgraduate graduate were not well attended. However, significant time was spent with postgraduate students on a one-to-one basis assisting them both face-to-face and via email. A marked increase (13% over two years) in the number of students requesting information literacy sessions at the UWA Library brought into focus the need to take more immediate action on developing a sustainable approach to information literacy. UWA postgraduate student numbers are continually increasing. The numbers have increased 42% in the last ten years (Figure 1). Clearly postgraduate students needed assistance with research skills, but the nature of their enrolment and progress meant that it was difficult to meet this need via scheduled small group classes.

Figure 1: Postgraduate enrolments at UWA 1998-2007



Postgraduate students at UWA had traditionally worked primarily on campus, but the changing higher education landscape and advancing technologies mean that students may now be located in regional areas or overseas, or may choose not to spend vast amounts of time on campus. It seemed appropriate to investigate what type of training and in what format UWA postgraduates wanted. Other studies (Abbott & Selzer, 2002;

Schmidt, 2002?) confirmed that in other Australian universities information skills courses were not adequate, however little research appeared to have been done at this stage into the precise skills needed or the preferred format for delivery.

The GRS and the Library recognised the difficulties postgraduate students experienced in identifying the resources for skill development available to them in different areas of the University. Both bodies realised that there was overlap in the content they offered to research students. The Library and the GRS anticipated several benefits from taking a collaborative approach to providing research skills training. Not only might efficiencies be gained by staff in the Library and GRS, but students would also benefit from a reduction in the confusion over where and how they might gain support for the development of research skills. Peacock has also identified these benefits for Library and academic study services at QUT (Peacock, 2008).

As a first step, in 2006 the Library and Graduate Research School collaborated to develop and administer an online user needs survey. The survey aimed to discover what types of scholarly literacy skills postgraduate students were seeking to develop, what content they were interested in and their preferred mode of delivery.

Respondents represented all discipline areas of the University (Figure 2) and accounted for 23% of enrolled postgraduate students. Respondents were overwhelmingly research students (PhD or Masters by Research), rather than coursework students, reflecting the high proportion of research students at UWA.

Figure 2 – Responses to Postgraduate Needs Survey by Faculty

	<i>Number</i>	<i>Percentage</i>
Architecture, Landscape and Visual Arts	7	1.4
Arts, Humanities and Social Sciences	101	20.1
Business School (Economics and Commerce)	35	7.0
Education	32	6.4
Engineering, Computing and Mathematics	59	11.7
Life and Physical Sciences	115	22.9
Law	7	1.4
Medicine, Dentistry and Health Sciences	74	14.7
Natural and Agricultural Sciences	73	14.5
Total	503	100.0

Analysis of the survey highlighted several key findings in what type of sessions students want:

- 52% of respondents were very interested in completing a course on keeping up to date with developments in their field of study.
- 40% said the same for managing citations and other research information through EndNote.
- 44% felt the same about learning more advanced applications of EndNote.

Other areas of interest to the students included how to write a better thesis, use of metrics in deciding where to publish and effective searching of electronic resources.

In addition to identifying needs for particular content, written comments from postgraduate students indicated that for many, online access to materials relating to these skills may be the only realistic option for them. Students who identified flexible delivery as beneficial included:

- UWA postgraduate students who are based in remote areas or regional centres
- Externally enrolled postgraduate students who are based overseas.
- Postgraduate students who are in paid employment either full or part-time.
- Postgraduate students who juggle family commitments, including childcare.
- Culturally and linguistically diverse postgraduate students who have time-consuming cultural and/or religious obligations to fulfill.

This is not unique to UWA and is reported in the literature by Gardner & Eng “They expect convenient, one-stop shopping when it comes to research” (Gardner & Eng, 2005). While many academic institutions have provided online learning opportunities for students for a number of years through external studies units, UWA has primarily delivered teaching and learning opportunities face to face. However, UWA recognises the requirement to offer various modes of study to ensure that learning opportunities fit the needs of individual students.

Based on the findings of the survey the Library, the GRS and the Learning, Language and Research Skills (LLRS) Unit within Student Services jointly applied for and obtained a UWA Teaching and Learning Grant. The grant aimed to fund the Postgraduate Online Scholarly Literacy (POSL) project to develop online training materials specifically designed to equip beginning postgraduate students with the scholarly skills to enable them to study effectively, and to enhance communication across the University. This would allow postgraduate students to be aware of the many training and learning opportunities available to them. Other Universities such as the University of Melbourne (Larcombe & McCosker, 2005) have taken a more didactic approach in developing a compulsory online transition program for commencing PhD students. However UWA recognizes that research students commence their studies with a diverse portfolio of existing skills and so determined to take a more eclectic approach.

This paper describes some of the challenges that have been faced in the development of online learning objects for postgraduates at UWA. The challenges come from a number of areas:

- Project management approach
- Strategic directions
- Pedagogy
- Technology
- Professional development

Similar challenges are identified by McPherson who reports that critical success factors for organisations in e-learning can be categorised as leadership, structural and cultural issues, design issues, technological issues and delivery issues (McPherson & Nunes, 2006).

Challenges

Project management approach

The UWA Library uses the PRINCE2 methodology to manage projects. PRINCE2 requires a Project Board as the overarching decision making group. The Project Board includes representation from the various stakeholders including those responsible for funds, representatives of the end-users, representatives of individuals or groups who will supply products such as storyboarded content or software. A Project Manager coordinates the various activities and provides administrative support.

As the POSL Project was a joint initiative of the UWA Library and the GRS, members of the Project Board included the Manager of the GRS, the University Librarian and the President of the Postgraduate Students' Association. The varied perspectives of the Project Board ensured decision making was based on strategic principles of sustainability and reusability as well as consideration of the requirements of UWA postgraduates such as high level content and sophisticated design. The Project Manager was a librarian who worked on the project in a part-time capacity.

There are a number of advantages to this project methodology:

- The high level project board allows a more strategic view that reaches beyond the individual project and can better inform other strategic priorities
- Cross-organisational input is assured if Project Board membership is well considered
- Consultation with stakeholders at appropriate times is assured
- Allocation of budgets and resourcing is done by senior management and considers competing needs.

The challenges of this approach can be that:

- At UWA, all project members are working on this project in a part-time capacity while trying to balance other workloads.
- Reporting lines in the organisation may differ from the reporting lines in the project. The Project Manager may not know/control the workloads of many contributors, especially those that are outside their immediate work team.

The Project Board is the decision making body but Graduate Education Officers and Librarians developed content for the learning objects. The Project Manager needed to carefully manage communication between the Project Board and content developers.

Strategic Directions

Identifying and understanding an organisation's strategic priorities in the early stages of project design can be a key to obtaining funding and support for any initiative. One of the challenges in fully understanding the organisation's strategic priorities is ensuring that those carrying out project work are appropriately advised and directed.

The UWA Strategic Plan identifies "high quality, technological innovation and responsiveness" as defining characteristics and "to improve the student experience

through delivery of generic skills training...such as the Higher Degree Research student” as an operational priority.

The UWA Library’s 2005-2007 Strategic Plan “Re-placing the Library” emphasised, among other things, responding to our users, communicating knowledge and fostering collaboration. For 2008-2010 the Library’s Strategic Plan “Learning Together” has three themes – supporting learning communities, supporting flexibility and supporting collaboration. The Library’s Information Literacy Strategic Directions Statement (developed in 2007) is also a driver for how information literacy training is designed and delivered. The Statement identifies best practice and sustainability as key directions for information literacy development at UWA.

The objectives of the POSL Project meet the strategic direction of both the University more broadly and of the Library. Consideration of these objectives helped to provide a broad framework for the general approach to project planning and, in particular, assisted with the funding proposal. The project management approach and the makeup of the POSL project board ensures that broad institutional strategic directions are considered.

Pedagogy

The POSL project aimed to produce online training materials, and intended to make use of UWA’s Learning Resource System to manage the learning objects created. One of the early challenges for the content developers involved in the project was coming to a shared understanding of what a learning object was in the context of this project. Learning objects are commonly referred to as small, re-usable digital objects. Depending on one’s perspective, they may be extremely granular and presumably re-usable in a wide variety of circumstances, or they may be larger, more complete and more contextualized, and consequently suitable for a more limited range of uses. The Lego block analogy is often used when discussing learning objects – teachers may construct a learning experience from a series of tiny “objects” which take on a meaningful form when used together.

UWA’s content developers decided that learning objects created in this project needed to be complete learning tools able to be understood and used in isolation. The team resolved to create learning objects for the known audience (postgraduate students at UWA), rather than creating extremely generic and granular objects which could be used in a wider variety of contexts. For UWA’s project team, it was important to marry the characteristics of high quality and technologically innovative online learning with content and method(s) of delivery that were suitable for the specific cohort that they were aimed at.

Kickul and Kickul report an association between students with positive learning goal orientations and proactive personalities, and satisfaction with e-learning (Nora & Snyder, 2008). Given the characteristics of the target audience, project team members were confident that students who reach the postgraduate level at a research intensive university such as UWA are likely to respond well to the learning objects developed.

The major pedagogical difficulty with learning objects is that they are, by their nature, de-

contextualised to some extent. Wiley makes the point that instructional design is in many ways, simply *context* design. The role of the instructional designer is to create a context in which to facilitate learning (Wiley et al., 2004). When we attempt to create re-usable learning objects, their re-usability comes about primarily because the designer has *removed* the context. There are several risks in removing context from a learning experience. Students could lose the context altogether and thus have a poorer learning experience, teachers may need to compensate by moving the context into the sequencing of multiple learning objects, or they may have to re-capture the context via additional learning objects.

One of the dangers inherent in attempting to introducing context by carefully sequencing multiple learning objects, is that the learning outcomes will to some extent depend on the sequencing being retained. Quite often the purpose for using learning objects (and repositories for learning objects) is to allow teachers to pick and choose which objects they use. Wiley warns that sense comes not only from what is presented now, but also what precedes and what follows. A student may understand a concept, until a mis-sequenced learning object causes them to question all that they had previously thought they'd understood (Wiley et al., 2004). Boyle proposes that educational multimedia design should rely on context as the central explanatory concept (Boyle. 2004).

One of the drivers for the POSL project was the unique situation that research students find themselves in. They are not typically part of a "cohort". They may begin their studies at any time of the year, and for many, their research is solitary and unconnected to the research projects of their peers. They may not need or want to spend time on campus, and they often juggle other family or work commitments. This made it increasingly difficult for the learning support areas of the university to treat research students as group, and also meant that as research students, collaborative learning in the traditional sense was unrealistic. Like many other universities, UWA attempts to re-introduce a sense of community for research students via its MyResearchSpace which has high level support and is well used by research students. In addition, face to face classes run by both the Library and Graduate Research School, writing retreats, and other activities continue to be offered. The online learning objects created in the POSL project complement and support a variety of other, more collaborative and community based activities. The flexibility of the POSL offerings mean that they can be used as self-paced introductory material, as support or more detail for a class, or as one of the tools used in a virtual learning environment.

Content alone does not make for a meaningful learning experience. "If good content were enough to support learning and human interaction were unnecessary, libraries would never have evolved into universities" (Wiley et al., 2004, p. 511). At their worst, learning objects that are stripped of their context become "glitzy information dumps" (Wiley et al., 2004, p. 509). Boyle argues that the key to e-learning is the design of virtual context for learning – in essence ensuring that learning objects are *not* de-contextualised (Boyle, 2002).

UWA's project team addressed these issues in several ways.

- First, as mentioned previously, they decided against an extremely granular approach, and created larger learning objects that were clearly targeted at postgraduate students at UWA. This retained a certain amount of context, and consequently reduced the potential for wide spread re-use of the objects, but

made it easier to design a satisfying product. In determining the optimum size of a learning object for this project, the content developers followed the Wiley model (Wiley et al., 2004) and repeatedly asked whether a part of a topic could be taught on its own, and if so, split the learning object until the point was reached that each learning object was a stand-alone teachable topic which would not benefit from being further divided.

- Second, the content developers determined to provide teacher's notes with each learning object, in order to assist lecturers who used the learning objects in WebCT courses or other situations. This allowed lecturers to create their own context for the learning objects, and to use them as supporting material for experiential learning. In this way, the learning objects themselves are not central to a student's learning experience, but the context designed by the lecturer is. This approach to using learning objects is not new, having been suggested by a group of Italian researchers in the context of robotics education (Busetto, Dettori, Forcheri, & Ierardi, 2007). By encouraging appropriate use of the learning objects in the context of a larger learning experience, the learning objects themselves cease to be "information dumps" and take on a more meaningful purpose. Lecturers can create a problem based learning scenario, for instance, and students can use various learning objects, along with other material, in the course of solving the problem.
- Thirdly, part of the project included the design of a website and communication plan for the learning objects. This in effect introduced sequencing and created an environment in which the learning objects could be used as a complete set.
- Lastly, by linking the POSL learning objects to the University's online discussion space for research students, and by designing them for use in a variety of contexts, they are able to be used as tools in collaborative learning.

Content Development

Content areas were determined from the responses to the survey of needs analysis. Fourteen areas were identified and with subsequent analysis combined into six content areas.

Weekly meetings were held to discuss content development and to ensure that work was not being duplicated. The content developed by the Graduate Education Officers' was previously used in face to face tutorials and had to be made suitable for an online environment. This required consideration of many pedagogical issues. The content developed by librarians was unique to the POSL project. A group of five librarians initially developed content and this was then developed further by two librarians with support from senior library staff. All work was undertaken on a part-time basis. One of the challenges faced was in managing resources and deadlines for content development.

Technology

Challenges inherent in the application of technology to learning objects are reported in the literature (Harman & Koohang, 2007). Some relate to pedagogical requirements and others to individual institutions. The POSL learning objects had several specific requirements that were both drivers and challenges for the technology that was used.

Delivery method

One of the early decisions for the project team was to determine the primary method of delivery for the learning objects. UWA uses WebCT as its content management system for teaching and learning. However, WebCT is designed for use with individual logins that are generally matched with course or unit enrolments. As previously discussed, postgraduate research students at UWA can begin their studies at any time during the year and are not generally aligned with a particular course or unit. This meant that administration of logins for this group would have proved inefficient and time consuming.

Due to the limitations of access to WebCT by research students, the project team decided against compiling the learning objects into a WebCT course. However, they saw an advantage in making the learning objects available for use in other WebCT courses. For example, an academic teaching in the Master of Business Administration may have a WebCT course for her students. She may want to use one or several of the POSL learning objects that relate to content that the students are currently learning. As discussed above, this in-context approach to research skills has been indicated as best practice.

To enable students who were not aligned to a particular course to access POSL resources, an approach was needed that allowed students to 'pick and choose' learning objects at a time and place that suits. To meet this need, learning objects were linked from the GRS web site. Links to the learning objects were placed alongside information about other training opportunities that are available for postgraduate students at UWA.

To provide for use in both WebCT and on the open web, learning objects are stored in the UWA Learning Resource System (LRS). This management system is designed to allow teaching and learning content to be shared across UWA. The LRS had not been widely used for learning objects prior to the POSL project and one of the challenges that the project team faced was in being an early adopter of the LRS for storing learning objects, including the development of file name conventions, metadata and rights statements.

E-Learning software

A wide variety of software is available to create learning objects. These include rapid e-learning template driven software such as Articulate and Raptivity as well as more free form approaches using, for example, Adobe Captivate and Flash.

The best approach is to match the software with the learning outcome. However, this can be challenging for several reasons:

- License restrictions can be prohibitive. One of the software packages considered for POSL required it to be licensed to an individual named person on an individual machine.
- The organisation may have specific requirements for storage of the learning objects e.g. in a digital repository. The repository may only accept particular software packages.
- Expertise may need to be developed in using the software.

- The cost of software can be prohibitive.

The POSL project team assessed various software packages against a set of functional requirements based on pedagogy, accessibility, and UWA's technical requirements. Suggestions were also sought from individuals external to the Library and GRS who were developing learning objects in the UWA environment. Trials, evaluations, and testing took months of project time, but gave project team members opportunities to fully explore the options. The decision making process was lengthy as this was the first time the UWA Library and GRS had considered learning object software and it was also the first time the UWA Learning Resource System was to be extensively populated with learning objects. The high level membership of the POSL project board assisted in ensuring that institution wide priorities were considered in this process. Other projects will now be able to build on the work of the POSL project team in software analysis and selection.

Professional development

The dilemma the project team faced in the skills area was whether to develop skills in-house or call in experts from outside. There were two areas identified in the project where content developers lacked skills: online instructional design and the technical development of learning objects. Originally in the project brief these were areas that were designated as requiring outside expertise (from within or beyond the University).

The project team was also mindful that librarians needed to be upskilled to ensure the ongoing development of the learning objects. However, because of the tight timeframe, it was decided to seek advice from specialists in best practice online instructional design. The project team had scoped the content, and asking other experts to develop the learning objects would be the most effective method to ensure that the project's timeline was achieved. Difficulties soon arose in finding such expertise as the area of learning object design and development is a new area. As Peacock points out both librarians and academics have traditionally been expected to develop their learning and teaching skills within their employment and this can result in patchy development of expertise across the University (Peacock, 2004). Librarians are often early adopters and can themselves be seen to be leading the expertise development. The project team found they needed to be more flexible in their approach and use a mixture of inhouse upskilling and outside expertise.

In the area of content development, librarians were up-skilled using outside expertise. The project team was fortunate in finding an academic online learning expert in the School of Education who was willing to run an e-learning course for librarians (Pegrum & Kiel, 2009) and participate in the Project User Advisory Board. A group of librarians were selected to design the learning objects using a storyboarding technique and two librarians were chosen then to develop the storyboards to their final draft.

Advice was then sought on the best practice instructional design for use with the chosen rapid e-learning software, Raptivity.

Conclusion

"It is better to aim for the stars and hit the moon, than to aim for the trees, and hit the ground." (Oggenfuss)

Aiming for best practice in managing learning objects presents managers with a number of complex challenges such as the balance between pedagogy and technology. Decisions need to be made with a long term broad view and a deep understanding of the organisational culture and priorities. Developing content in a cross-disciplinary team has involved both logistical and managerial challenges, as well as opportunities for developing better understandings across the sections involved.

Keeping the focus firmly on user needs, strategic priorities, pedagogy and appropriate technology has ensured the development of best practice learning objects for postgraduate students at the University of Western Australia. With a high profile project board overseeing the project, the POSL project team has been able to proceed confidently, and address a range of complex issues.

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