Implications of COLIS for course development: The need for secondary usage meta-data

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The second iteration of the Collaborative Online Learning and Information Systems consortium project (COLIS), called the Interaction of IT Systems and Repositories Project (IIS&R,) is an Australian Department of Education, Science and Training (DEST) funded initiative. During this new phase of the project, research is to be conducted into the useability of the COLIS Demonstrator as a testbed for a standards-based, e-learning environment of the future. Part of the research funding is to support investigation of teachers' and learners' evaluation of the system: its viability as, amongst other things, a means of improving interoperability between Learning Object Management Systems (LOMS) and information search gateways, between creators of learning objects and teachers wishing to purchase or exchange learning objects. Associated with learning objects will be digital rights (DR) and meta-data.

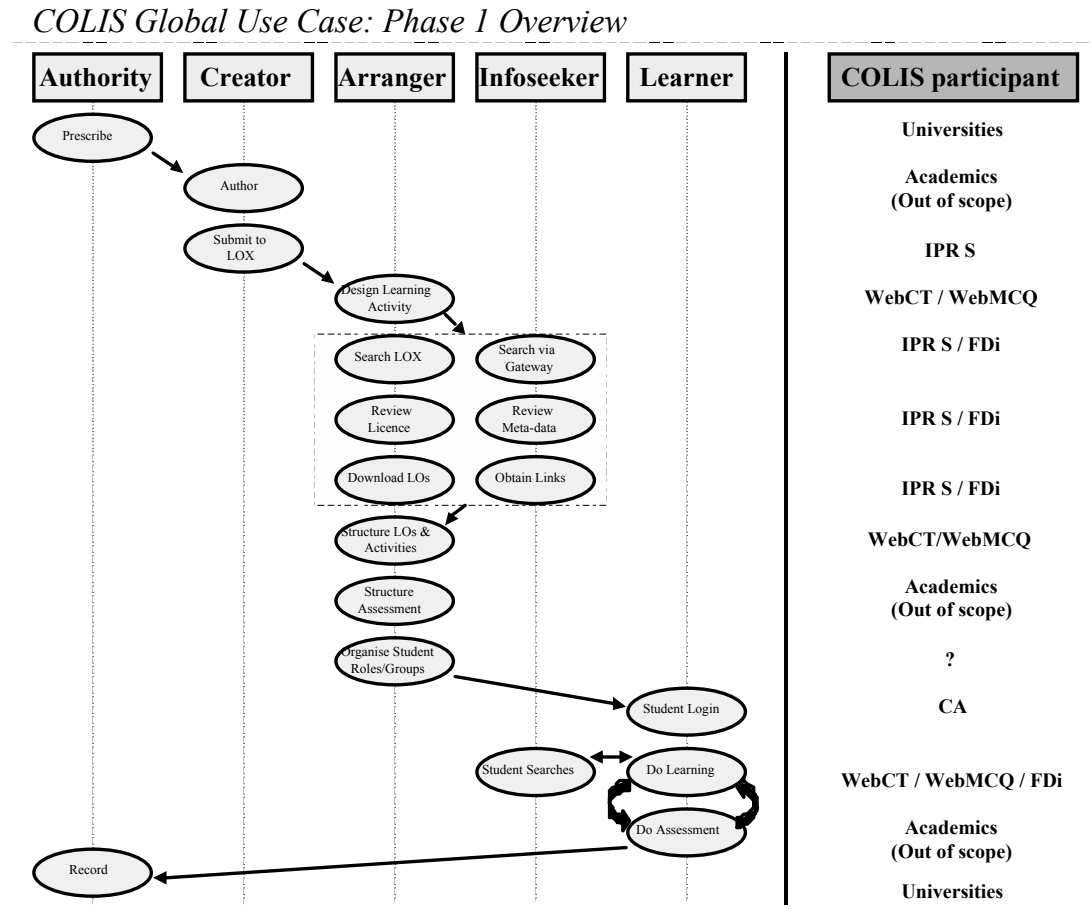
In relating the COLIS Demonstrator to teaching experience in the real world, this paper raises some of the issues that educators now face when setting up the learning context, assembling learning resources and sequencing learning activities. Reflection on the contextual situation of staff raises issues which potentially affect the development of an integrated system such as COLIS.

Background

The COLIS project (see http://www.colis.mq.edu.au) demonstrates an open standards approach to the integration of e-learning and information systems. The 'Demonstrator' environment created for the COLIS project incorporates a Learning Object Trading Exchange, a Learning Object Management System, a Learning Management System, a Federated Search Gateway/E-reserve, and Portal/Single-Sign-On/Directory services. The purpose of the project was to examine interoperability issues as they may arise in this example of a potential future integrated e-learning/information environment.

In addition to the Demonstrator environment, a range of conceptual topics were tackled in the COLIS project such as the nature of the 'Learning Object Lifecycle' and the definition of a Learning Object (Dalziel, 2002). Figure 1 illustrates the different roles and steps in the Learning Object Lifecycle. Of particular interest to this paper is the role of the Arranger—the person who designs the learning process experienced by students, including the selection and arrangement of learning objects.

Figure 1: The COLIS Global Use Case or 'Learning Object Lifecycle'



In the next phase of the COLIS project, four research projects will be supported and undertaken by staff in universities around Australia. Some of this research will investigate the value of a repository such as the COLIS Demonstrator to teachers and course developers. Questions arising from the research may include definitions of the meta-data learning objects placed in the repository should contain, and the useability and functionality of such repositories in practice. More evidence may surface about the information that the Arranger (see Fig. 1) needs before selecting digital assets, objects and activities, created by others, for incorporation in their own programs of study. It is some of the surrounding contextual issues that are raised in this paper.

Gathering data

In the increasingly fragmented and commodified world of higher education, sustainability of resourcing becomes increasingly difficult. Alongside this, it is surprisingly difficult to easily obtain information about what has already been created online, and, from a teaching perspective, course outcomes and developments in general. Yet we have the means to log, track and record teaching and learning transactions in ways not possible in the recent past. What can be done in the higher education teaching context to improve dissemination of 'lessons learned', as there is potentially so much information available?

Those within the system are aware that there can often be a dislocation between the first offering of a course which incorporates new online technologies, and its subsequent iterations. Casualisation of the workforce may be one of the contributing factors here, as increasingly universities look towards short-term contracts with staff to improve flexibility of courses offered, or to engage staff with specialist knowledge to meet the needs of more narrowly focused degrees. Given this trend, it would seem important, as a quality assurance measure, to ensure there are mechanisms within the system to retain information about course outcomes and developments from the pedagogical point of view.

The tension between the need to be more accountable in higher education and the traditional culture of academic freedom is well understood by lecturers and tutors. However, in order to capture some of the contextual, pedagogical and technological changes taking place, and learn from them, there is a need to at least pass on documented experiences to colleagues and preferably to future staff, not yet employed. The latter are staff who may well have little time to prepare their courses, and could well benefit from the experience of their predecessors. Kenny (2002) points to the tensions inherent in university staff accountability, and in terms of project management of innovations suggests that reporting be flexible, but include information on what the participants set out to do, what was achieved, what was learned and what was planned for the next phase. This sort of reporting could well be adopted by teaching departments as a model for documenting incremental change across units of study and courses. Arguments against such practices are that it is time consuming, it is an infringement on the authority and academic freedom of staff, and that it exposes the teacher to public scrutiny, especially when they may not be there to defend their evaluations after the event. However, if such reporting is kept brief, but focused, evaluative data of this kind, quickly assembled and disseminated, would be invaluable. It would help support new staff, and the ongoing development and reflective practice that underpins quality teaching and learning, and sustainable resourcing of innovation.

Implications for COLIS

So what has this need to record staff evaluations of teaching programs and innovations to do with the development of learning object repositories and a learning object exchange with digital rights associated, in a system like COLIS? Firstly, there is a need for dissemination of contextual and evaluative information on the use of technology in the everyday teaching and learning environment, whether that context refer to on-campus or distance/flexible learning mode. Equally, there is a need to disseminate similar information about digital assets, learning objects or activities, in order for 'Arrangers' (academics and developers) to make informed choices about the reusability of learning objects or activities. How should that information be communicated?

The Distributed National Electronic Resource and Learning Objects (DNER & LO) study in the UK (Currier & Campbell, 2002), has documented the difficulties in establishing even the first level of data about digital resources. Evaluation criteria in this study included:

- granularity and aggregation level - the way the components, activities and resources were combined
- reusability - technical format, contextual and technical dependency
- subject specificity - how generic the learning objects were

- horizontal/vertical reusability - the educational level at which it could or could not be reused.

While project participants were enthusiastic about the aim to classify and evaluate learning objects in general, and felt that it was a necessary part of the whole process of moving towards reuse, some found the terminology, the Learning Object Meta-data (LOM) totally inadequate for the task of defining the complexities of learning resources and activities.

So what kind of meta-data should a repository such as COLIS store and associate with e-learning objects and learning activities? Is it enough to associate meta-data, even of the kind being developed in the DNER & LO study, with an object and place it in the repository and expect reuse, or do we need to include a great deal more evaluative information about potential usability and contextual issues? Further information on exactly what data a teacher searching for resources needs, before they will purchase or contract to use another's resources, may well come to light in the studies conducted during phase two of the IIS&R Project. This higher level information, often called 'secondary usage meta-data', has been absent from most discussion of Learning object meta-data to date, and yet seems to be of crucial importance to the practical issues of using learning objects at the 'coal-face' of current teaching.

The teacher's context

There are certain imperatives that teaching staff must address once they have been assigned to teach a new course, or scheduled to redevelop an old course. They must be able to quickly identify and understand the needs of the student cohort; define the curriculum content; assemble appropriate and engaging resources; determine the degree to which elements of the course can be changed (eg the assessment regime); and customise the course to their particular teaching and facilitation style. The recent experience of the first author as a contractual teacher for a Communication Studies course raised some interesting and parallel issues for consideration on this matter. In searching for resources, learning objects (in particular, relevant and culturally specific examples for practice and amplification of basic concepts), and in reviewing licence arrangements, downloading and arranging the learning objects and activities, structuring assessments etc. (compare with column three, Fig. 1), the author was reminded of the importance of context when making choices about whether to reuse learning objects or create new resources. Seemingly simple contextual factors needed to be accommodated first before 'core' teaching activities could be completed. For example, the teacher had to find the location of technical support, overcome a recalcitrant photocopier, learn the process for sending readings to the printery, find the location of teaching rooms, and identify the method by which students received passwords for their online learning management system (a WebCT unit). If the Arranger of the learning sequence (the teacher in this case) can spend less time on the 'Arranging' and 'Infoseeking' (see Fig. 1), *and* surmount the contextual issues, then there is more time for developing learner engagement and facilitating process. Additionally, if the 'Infoseeker' has information about how others have used the learning object/activity on offer in a repository like COLIS, then they are in a better position to determine its use or otherwise for their own situation. As McNaught, Burd, Whitlear, Prescott, & Browning (2003) have found, knowing that the resource exists is one thing, and knowing how to use it effectively in a real context is another.

It is important to remember too, that teaching and learning sequences generated in one culture may not transfer to another cultural context. This may have implications for learning repositories, given the trend towards a more global approach to course provision.

This cross-cultural issue is very important to a course such as the Communication Studies unit referred to above. This course forms a single semester unit of study within an Indigenous Health Sciences degree. It is offered to students in 'block mode', which means students come to the campus three times per semester. For the rest of the semester, students study at a distance. The aim of trialling online resources in this course was to encourage the development of information and communication skills amongst students while they were on campus, and to providing opportunities for self-assessment and online reflection, either during the on-campus period or at home. Resources required for this course needed to support the key learning areas of reading, writing, listening, speaking and information literacy. To do so effectively and to promote rich student engagement, well sequenced and contextually appropriate examples were necessary. The examples provided practice, and development of subject matter knowledge, and might include written and visual texts for analysis, activities for promoting good writing skills, and content for quizzes. Many tailored degrees and diplomas offer foundation communication courses because the generic skills, knowledge and attitudes students learn in the course underpin their whole degree program. However, quickly finding culturally appropriate resources for an Indigenous Health Sciences Communication course was problematic, but extremely important to avoid the 'cultural discontinuities' that authors such as Wilson (2001) have discussed.

Communication Studies is the sort of course where a repository of online objects or practice learning activities, especially self-assessment items, would be of advantage to the teacher, particularly if the objects or activities were associated with relevant practice examples. Those examples could be built up over a number of years, as learning objects and/or activities were added and amended by each user. It is a mistake to think of these repositories as stable warehouses gradually amassing stocks. Teaching and learning is an iterative process. Resources need to be updated and customised regularly. In terms of COLIS, this implies that the descriptive meta-data associated with these objects needs to be developed and extended over time, based on experiences of use and adaptation. The lack of appropriate standards to support this process indicates a significant need for more practical implementations of Learning objects, and applied research into their use.

Consider a very simple example. One could begin with an HTML page with text about approaches to Indigenous health care in Australia (a digital asset). It could include questions and answers about the content making the foundation for an online quiz (a learning object). As a text on its own the web page could be used for analysis of paragraph structure, as an example of academic writing, or as the basis for an online reflection on primary care, or a bulletin board discussion on authorial perspective. Each time the resource was used, if information about its use were logged, its value as a reusable resource would be expected to increase. Not only information about who used it and where, but information about its effectiveness, the context of its use and ideas about how it might be used differently could be added to the searchable database. This users' log detailing usability and suitability would be expected to improve a learning object or learning activity's potential relevance to others, and therefore its reuse.

The complexity of the learning object may well have an effect on its reusability. The HTML page mentioned is a very simple example. Where complex sequences of learning objects are aggregated, the cost to a new user to create a similar object, product or learning activity, may well be prohibitive, so purchase or licensed use of a learning object 'off the shelf' may be a preferable option. Therefore, feedback about past implementations of the learning object (secondary usage meta-data) may prove to be some of the most compelling information in decision making about acquiring a licensed object, and yet the

standards to support this information in conjunction with current Learning Object Meta-data and Digital Rights meta-data are absent to date. This suggests a need for changes to current thinking about learning object meta-data.

A related issue is the problem of being forced to search multiple repositories to find an appropriate object. At this stage, there are far too many 'silo' repositories, each of which needs to be searched individually, potentially using different meta-data, different search interfaces, etc. The chances of time-poor staff being willing to search over and over again across many repositories seeking the 'ideal' object are low. The COLIS environment illustrates a potential solution to this problem through the use of a Federated Search Gateway. This gateway is capable of searching across multiple repositories, using multiple search protocols and meta-data schema, and yet returning a single 'Google-like' response to the user. This 'umbrella' approach to searching multiple repositories at the same time is likely to be an essential element of any successful practical approach to finding and choosing appropriate learning objects within the constraints of current teaching practice.

Change management

In considering the context in which staff search for resources, it is useful to note Scott's (1999) conclusion that there are two main ways in which education can be changed. Either the learning program itself can be changed, or the operating milieu. That is, the environment in which education is 'developed, delivered or supported' can be changed. If the operating milieu is important, what does this mean for staff searching for reliable and reusable online resources? How difficult will it be to find what is required? To be useful, trading learning objects should be no more difficult than finding the access code to operate the photocopier in the resource room. Yet those very simple tasks are often the ones that constrain teachers and bring them into conflict with the technology. Those familiar with the implementation of new educational technologies know that technological change brings with it not only the need to evaluate the technology itself, but may bring into question the whole learning curriculum. It forces re-evaluation of what is being taught and why, the educational environment and the context in which changes can be made. Consequently, there is an opportunity to rethink current practices and make positive amendments.

What changes might need to be made then, in the light of the discussion so far? Scott (1999, p. 9-10) lists a number of 'operating milieu' elements that can be changed, including: the 'culture and climate' of learning and teaching; the staff who are selected to work in that area and the supports they are given; leadership; the way in which good practice is identified and disseminated; the systems of communication; administrative focus, procedures and structures; approaches to monitoring and enhancing the organisational operation; documentation and statistics keeping; planning, decision making, and resource distribution—all of these can be changed. There is insufficient room here to unpack each of these changes. However, if institutions and educators are serious about reusing learning objects and activities, arguably to save the spiralling costs of technology, then they will need to focus attention on some of these elements. It will not be sufficient to say, 'Here are the repositories, here are some good learning objects, use them, you will no longer need to create your own'. To bring about a change of culture, effort will particularly need to be put into professional development and documentation of good practice within faculties and departments.

The duplication of similar distance education courses across Australia in the past illustrates the difficulty of making the changes that are probably required to encourage reuse of learning objects. Seldom were institutions or academics prepared to adopt

materials developed in another context, by another provider, when there were resources to tailor-make their own distance courses. Will this be the same situation with learning repositories?

If an institution is committed to quality teaching and learning then it will be looking at ways to remove impediments to quality teaching and promote sustainable practices (Biggs, 2003). Support and reward for reflective practice within departments is central to quality enhancement and sustainability of quality courses. Encouragement and rewards for staff who reuse online resources, log their experiences, and leave a trail for other staff should become commonplace. Time spent on this should be adequately remunerated and seen as an important part of using resources effectively and efficiently. Equally, if the teacher is to go into an environment like COLIS, they should be able not only to see what the object is, but who used it, and what they thought of it, and what changes they would recommend or have added. These requirements make clear the need for new conceptions of learning object meta-data, and new ways of using repositories—not just for search and retrieval, but as a living, growing body of shared practice.

Suggestions for future development

- Capture and document on a regular basis, the input (positive and negative) of all staff, including contractual and permanent staff, regarding the use of new technologies and their impact on teaching practice and learning outcomes.
- Build in mechanisms and rewards that facilitate the sharing and effective use of resources, and ideas about good teaching. Time will tell if a COLIS - like environment can be beneficial where there is a standards based approach, associated with digital rights and a Federated Search Gateway to facilitate easy search and retrieval of resources.
- Keep a log of experiences, ('Secondary usage meta-data'), anonymous if necessary, within departments and in systems like COLIS, for staff using learning objects and reusable, portable learning activities.
- Develop and broaden the concept of a re-usable learning process, ie portable learning designs, where a series of activities sequenced together form a pedagogical whole, into which content-based learning objects are inserted as part of the flow of activities. This may encourage more staff towards re-use of third party resources, especially if the activity sequences can be adapted to suit particular course needs.
- Reward and encourage reflective practice amongst all staff, embedding this into the strategic plans and practices of departments as an imperative for sustainable, quality teaching.
- Take more cognisance of the operating milieu or environment in which staff work and how it affects teaching practice, and ultimately the learning of students.

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