

8 Reusable Learning Objects for Medical Education: Evolving a Multi-institutional Collaboration

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Abstract

In early 2002 a number of UK HE institutions founded a collaborative project to produce a bank of high quality e-learning resources to support and enhance teaching in the traditionally difficult area of statistics, epidemiology and research skills. Creation of these resources is very costly; typically amounting to more than one institution can afford to fund. Yet many of these resources are generic and can be used, re-used and shared between institutions. So the collaboration was proposed to produce and share these resources in a cost-effective manner.

Reusable learning objects offer a number of educational advantages compared with more traditional course-based approaches. Because they are stand-alone resources that encompass a single “chunk” of learning, they can be used in many different ways and across disciplines. Entire courses may not be appropriate for re-use in different institutions (the “not invented here” syndrome) but individual learning objects can be selected and re-used as components of a much wider course. Resources may be presented in different formats within customisable virtual learning environments to suit individual learning styles and address disability issues and technological constraints. Material can be kept up to date more readily; it’s much easier to update a single resource than an entire course. Web-based materials can be indexed and stored in a fully searchable database and can thus be retrieved and downloaded directly to the user’s desktop.

This paper outlines the approaches adopted during the first phase of the collaboration to develop e-learning resources to support teaching and enhance learning. Some of the problems faced by the collaborators in the early stages are described along with the decisions and strategies for effective progress.

Keywords: reusable, learning objects, collaboration

1. Background

The Universities’ Collaboration in ELearning (UCEL) was founded in April 2002 by four collaborating institutions: the UK universities of Cambridge, Nottingham, Manchester and East Anglia. Schools of medicine, nursing, midwifery, health visiting and health and behavioural sciences were all represented.

The collaboration was borne out of a common need to produce and share high quality e-learning resources to enhance teaching and learning in what were perceived to be broadly ‘difficult’ subject areas; epidemiology, statistics, research skills, communication skills, ethics and the sociology of medicine. (These also comprise the more marginalized subject areas of the medical curriculum and whilst they are both vital and compulsory, they are often neglected due to other curricular pressures). The high cost associated with these resources, which are very labour intensive to produce, puts them beyond the reach of individual departmental budgets. Yet students and teachers alike clearly value these resources and would welcome their increased availability.

An obvious strategy to produce and share these resources in a cost-effective manner was to work collaboratively. In addition, if the resources could be reused across different disciplines this would offer added value. However, a multi-institutional, inter-disciplinary collaboration is neither easy to initiate nor is it a trivial task to achieve consensus and thus keep it productive, on target and moving forward. But invention is the daughter of necessity and the early stages of the project had the benefit of a focused, enthusiastic and committed group of collaborators with high expectations for the project.

The model proposed and adopted was a self-funding one with each institution committing a proportion of the project funding and individual collaborators pledging a modicum of their time (typically a few days per year) to work their subject matter into e-learning resources. The bulk of the annual fee paid for time buy-out for a developer to create the resources. This was of

the order of £10,000 (€13,500) for the first year, which meant that although this was by no means an insignificant contribution it was eminently affordable. Despite this, there were still budgetary problems to be overcome however, as institutions had no automatic provision for a project of this nature and funds had to be negotiated or grants applied for. Fortunately for the project, these problems were temporary and were overcome.

The collaboration is overseen by a steering group which meets bi-monthly and is composed of representatives from each of the collaborating institutions. Which resources are to be developed are decided by the steering group and collaborators offer their areas of expertise to create content which is then developed into digital resources by an e-learning developer. The strategies for achieving this are outlined in section 4 below.

2. E-learning strategies

The temptation when considering the implementation of any new teaching method is to adopt an “all-or-nothing” policy. A common inference is that if e-learning is introduced in a wholesale fashion then all teaching will subsequently be conducted remotely; indeed, the sheer expense of it may make this appear a desirable outcome. Yet the history of media teaches us that new forms tend to add to rather than displace: cinema has not been replaced by video or DVD; television never replaced radio; the internet has not replaced books, as was commonly feared. The sheer hype generated by a new medium can also result in fairly wild claims which cannot be achieved in reality. Consequently, as each new hope is dashed, the bubble bursts (as happened with the nineties dot.com start-ups which rapidly came to be seen as up-starts in the cold light of the new century) and early proponents quickly lose faith in something they perhaps should not have accepted so credulously in the first place.

Clearly, there are many forms of teaching and learning activities. Equally, it is apparent that there is no technological solution. “Teaching and learning are not problems that require solutions – they are processes”, argues Gilbert and if a single solution is sought it will inevitably fail. Successful education involves multiple forms of teaching and learning in order to engage, stimulate and extend the learner. The UCEL project called for a balanced and appropriate approach, where there is no single answer, rather a whole raft of them. Elearning resources have the power, if developed and deployed appropriately, to significantly enhance the learning experience but one message is clear; teachers will always be needed.

Therefore UCEL adopted the pragmatic view that resources should be created to support teaching and learning rather than replace them; that they should be used, reused and shared to maximise cost-effectiveness; and to these ends they should be as generic and as reusable as possible across the broad medical and health professional educational landscape. In

order to achieve this last aim, emergent metadata and interoperability issues had to be addressed.

Reusable learning objects (RLOs) present a number of educational advantages compared with more traditional course-based approaches. Because they are stand-alone resources that encompass a single “chunk” of learning, they can be used in many different ways and across disciplines. Entire courses may not be appropriate for re-use in different institutions (the “not invented here” syndrome) but individual learning objects can be selected and re-used as components of a much wider course. Resources may be presented in different formats within customisable virtual learning environments to suit individual learning styles and address disability issues and technological constraints. Material can be kept up to date more readily: it’s much easier to update a single resource than an entire course. Web-based materials can be indexed and stored in a fully searchable database and can thus be retrieved and downloaded directly to the user’s desktop. Their use can also be monitored. And, importantly, by engaging a focused and enthusiastic group of collaborators in the production of these resources, a sense of ownership is engendered which also makes uptake and reuse much more likely.

3. Metadata and interoperability

“There is a need within any community which expects to share resources to agree a common practice.” (Duncan et al, 2002).

A consistent pattern that emerges from a scan of the current literature on reusable learning objects is that no consensus on standards yet exists. Whilst no-one disputes the power of metadata schema to enhance retrieveability, and thus enable reuse, there is considerable disagreement as to how exactly this can or should be achieved. There are a number of nascent schema:

- ADL/SCORM – Advanced Distributed Learning Network/ Sharable Content Object Reference Model (US federal government)
- ARIADNE - Association of remote Instructional Authoring and Distribution Networks for Europe (EC framework 3 programme)
- BSI IST/43 – British Standards Institute
- CEN/ISSS – Centre de European Normalisation / Information Society Standardisation System
- DCMI - Dublin Core Metadata Initiative
- IEEE LTSC – Learning Technology Standards Committee
- IMS Global Learning Consortium
- ISO – International Standards Organisation

Increasingly, these various bodies are not all working in isolation, although as they all have slightly different aims

there is some way to go before universal agreement on metadata standards can be reached. In the meantime, how should development proceed, given that the first collection of resources is required in time for the new academic year? To wait until standards emerge is merely to postpone the problem; there will be further and unforeseen interoperability issues down the road which will require further spells of waiting until they in turn are resolved. And so on.

4. Collaborative development benefits

The collaborative development of learning objects requires consideration of a range of issues which warrant individual analysis. Plewes and Issroff (2002), Hammond et al (1992) and Bennett (2001) describe the low level of use of networked learning resources within teaching programmes; the reasons for this can be ascribed to three general themes i) lack of funding ii) lack of technical knowledge iii) development time. Issroff et al (1997) identifies the need to link resources to assessment in order for them to be fully utilised. Daniel (1998), reflecting on his experience at the OU, highlights evidence that team approaches to course development are more effective than individual efforts. Weil (1996) explores the influence of changing practices in education on the lowering of barriers that demarcate content. Couple this with the employment of a pedagogy that encourages the use of an object-oriented approach, and the concept of reusability becomes a reality.

The project attempts to address these areas and in particular create an environment where collaborative working becomes the norm. Detailed consideration given to reshaping the educational structure of courses creates additional benefits. We have found that commonalities between modules can be explored and developed at School, Faculty and cross institutional level. Similar content within different courses can allow joint development in the form of RLOs. The use of a VLE can allow the reuse of these objects and the creation of an object in one subject area may open routes into other specialist areas and provide a thematic approach to cross module learning.

5. RLO development strategies

Wiley (2000) defines a learning object as ‘any digital resource that can be reused to support learning’. Whilst this is a broad and useful definition, the UCEL project found it necessary to define a RLO more precisely for its own particular purposes.

A powerful aspect of the project is its ability to collaboratively draw out individual expertise in order to re-deploy it for the common good. Lecturers commit a certain amount of time to work on an outline specification for the RLO to be created. Whilst the actual development of the RLO is carried out by a multimedia developer; the lecturer is required to organise their material in such a way that this development process is simplified. This requirement has led to the evolution

of a “Reusable Learning Object Specification”, a template document with a number of fields into which the lecturer can slot their material. The specification has accompanying support notes which begin by defining a learning object (specifically for the purposes of this project):

Definition: “A reusable learning object (RLO) is based on a single learning objective, comprising a stand-alone collection of three components:

1. Content: a description of the concept, fact, process, principle or procedure to be understood by the learner in order to support the learning objective
2. Interaction: something the learner must do to engage with the content in order to better understand it
3. Assessment: a way in which the learner can apply their understanding and test their mastery of the content”.

It is fully expected that this definition, will evolve and change with use and over time yet it was clearly felt at the outset of the project that some form of helpful definition and template were required; there are few things less conducive to the creative process than a blank sheet of paper, and lecturers were keen to accept help and guidance to introduce them to these new working practices.

It soon became apparent that a significant amount of ‘hand-holding’ was also going to be required to kick-start the RLO creation process. A decision was taken about a third of the way into the project, for the lead e-learning developer to spend some time (typically a day or two) with each of the collaborators in their workplace, to focus intensively on a pre-selected portion of content and work this material into a RLO ‘on site’.

6. Evaluation strategies

As with all innovative and thus unproven teaching and learning projects, evaluation is key in ensuring improved ‘product development’ and also the viability and durability of the entire project.

Donabedian (1966) defines three classic principles in the evaluation of medical programmes: structure, process and outcome. Outcome is the most important because it enables assessment of the overall effectiveness of the project and its component parts. In the context of the UCEL project, the desired outcomes would be improved understanding and enhanced skills, resulting ultimately in better healthcare. Yet since RLOs will be used in many combinations and alongside other forms of teaching and learning, it may prove difficult to quantify a single RLO’s contribution. Individual qualitative responses to RLO use can be collected and analysed and quantitative evaluation can be achieved by comparing formal exam results ‘pre’ and ‘post’ RLO implementation.

Structure should be easier to evaluate; at its simplest it will be a description of the content (as detailed in the RLO

specification document., How closely content maps to curriculum can then be assessed. The structure of content may also change over time through the iterative development lifecycle.

Evaluation of process requires observation of how RLOs are actually used and this will be informative. It may be assumed that effective RLOs will be used more than others and this enables a evolutionary approach where the success of an individual object can be reinforced by regular updating of its content, structure and interactivity. Fit objects are thus identified and made fitter. Further insight may also be gained from an examination of how RLOs are used in sequence (as a collection), and how they are combined with other resources.

Leeder & Davies (2001) describe three main components of e-learning evaluation: content, human-computer interaction and learning preferences. They highlight the importance of evaluating each separate area in its own context to avoid confusion of disparate issues. For instance, if the content is set at an inappropriate educational level then the quality of HCI makes little or no difference. Conversely, if the e-learning resource is impossible to navigate then the level of content is irrelevant. The third issue of individual user preferences is important in understanding how users engage with both technology and content and also informs iterative future development.

7. Conclusion

“...because content counts” is UCEL’s motto. But it is no trivial task to drive forward a project with upwards of a dozen individuals in almost as many departments across four geographically, culturally and politically separate institutions. This requires persistent and consistent project management with regular communication by email, post and phone as well as face-to-face. This essential activity requires a considerable investment of time which should not be underestimated.

The very nature of RLOs lends them to ubiquitous use. Increasingly they will come to be seen as central resources to support and enhance teaching and learning across a wide variety of subject areas. Similarly, the nature of collaboration is that it tends to spawn further collaborations. The UCEL project and its collection of RLOs will grow over time as more collaborators join and the project may become a model to encourage collaborations in other disciplines.

Creative product development together with effective evaluation are central to the project’s success. But the great strength of the project is in its focussed, enthusiastic and committed core of members and it must never be overlooked that institutional collaborations succeed not because institutions collaborate, but because people do.

References

- Bennett, R. (2001) Lecturers’ Attitudes Towards New Teaching Methods. *The International Journal of Management Education* (LTSN Business, Management and Accountancy Centre),2,1,42-58
- Daniel, J. S. (1998) *Mega Universities and Knowledge Media*, Kogan Page, London
- Donabedian, A. (1968) *The evaluation of medical programs* Bull. N-Y-Acad-med: 44(2), pp. 117-24
- Duncan, C., Campbell, L., J. Slater & G. Graham (2002). *Using Metadata in Packaged e-Learning Content: Common Practice in the UK*. Presented to UK-MEG, 18 April 2002
- Gilbert, S. W. (2000) *A New Vision Worth Working Toward – Connected Education and Collaborative Change* [WWW document]. URL <http://www.tltgroup.org/gilbert/NewVwwt2000--2-14-00.htm> (visited 2002 Jul 02)
- Hammond N. *et al* (1992) *Blocks to the Effective Use of IT in Higher Education*. Computers and Education, 18,2,155-162.
- Issroff, K. *et al* (1997) From Cadaver to Computer: Incorporating Computers into the Topographical Anatomy Laboratory. ALT-J, 5,1, 55-59
- Leeder, D. & T. Davies (2001). *Delivering a web-based course for Cambridge medics: evaluation, issues and outcomes*. Presented to TET2001 conference, Prague, May 2001. [WWW document]. URL <http://www.medgraphics.cam.ac.uk/medsoc/evaluation.pdf> (visited 2002 Jul 02)
- Plewes, L. & K. Issroff, (2002). *Academic Staff Attitudes Towards the Use and Production of Networked Learning Resources*. Presented to Networked Learning 2002, 26th March 2002
- Weil, S. & I. McGill,, (1996) *Making Sense of Experiential Learning* OU, Bristol
- Wiley, D. A. (2000). *Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy*. In D. A. Wiley (Ed.), *The Instructional Use of Learning Objects*: [WWW document]. URL <http://reusability.org/read/chapters/wiley.doc> (visited 2002 Feb 20)