

Digital Repositories and their Associated Services: From capacity building to sustainability

Ann Marcus Quinn, University of Limerick

Corresponding author: Ann.Marcus.Quinn@ul.ie

Introduction

The National Digital Learning Resources Service

At the time of writing this chapter the Irish National Digital Learning Resources (NDLR) service may be incorporated into the National Forum for the Enhancement of Teaching and Learning in Higher Education. The capacity for a service such as the NDLR has been proven; now it remains to be seen how it can be sustained. The NDLR was established as a collaborative pilot service project in 2004 largely by the University sector with little representation from the Institutes of Technologies. By 2006, the NDLR had grown considerably as 21 of the Irish institutions of higher education became involved. By 2010, many members were registering from organisations outside of the 21 main institutions of higher education in Ireland. These organisations included other educational institutions and bodies in the wider public sector. This chapter will provide an overview of Open Educational Resources (OERs) and the NDLR service in the context of the role that OER services can play in teaching and learning at higher level. It will also explore the legacy of the NDLR and the issues around its sustainability in a changing higher education landscape.

Defining Open Educational Resources and the Need for Such Services.

There are many definitions of digital learning objects and OERs. An early definition by Wiley (2000) states that digital learning objects are ‘small (relative to the size of an entire course) instructional components that can be reused a number of times in different learning contexts.’ In a later paper, Caws, Friesen and Beaudoin (2006) cite Harman and Koohang’s (2005) definition for learning objects used in education: ‘learning objects are digital resources of any kind that can be similarly combined, shared and repurposed in different educational contexts.’ The notion of OERs is not a new concept. Educators across all sectors have been using multimedia in the classroom for as long as such technologies have been available. Until recently, however, these materials could not be easily shared and could only be accessed in the classroom, greatly reducing the possibility of reuse. In addition, every teacher who wanted to use such materials had to build their own portfolio of resources.

Open Content: How and why

In 1998, David Wiley announced the first open content license. This license was based on the premise that educational content should be freely developed and shared ‘in a spirit similar to that of free and open software’ (Wiley, 2002). The idea that content should be free and openly available became popular quickly. In 2000 Stallman announced the Free Documentation License (GNU FDL) and in 2002, Creative Commons released their first set of copyright licenses that helped content producers license their content for reuse (Creative Commons, 2007a). Since then, the Open Educational Resources movement has gained significant momentum. One notable project in 2001 saw the launch of MIT’s OpenCourseWare, a project where lecture notes, exams and related teaching material from a significant number of MIT courses was made available online. In October 2002, the Massachusetts Institute of Technology (MIT) began an initiative to make available online, without any subscription fee, all of the educational materials from its undergraduate and postgraduate courses. These materials, including learning objects and lecture content of all lectures were available to anyone. The project was jointly funded by the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and MIT. While MIT was not the first institution to make such resources available without charge to the public, it was significant in terms of its size, comprehensiveness and level of coordination, as well as its free global access. This project is now taken as an example of best practice for the development and sharing of high quality learning objects.

The progress of OERs in the early 2000s notwithstanding, higher education professionals wishing to develop OERs still encounter issues. One fundamental and still long-running controversy is the doubt around whether technology used in education impacts positively on the achievement of learning outcomes or not. This is neatly summarized in Conger (2005). She also makes the point that many media comparison studies (MCS) that examine the question of significant difference are methodologically flawed and lack a theoretical basis. Conger concludes, citing Sener (2004), that ‘Rather than continuing to perform MCS, then, we should move towards developing teaching pedagogies that make best use of current technologies.’ Oblinger and Hawkins (2006, p 14) go so far as to query the usefulness of the question itself: ‘we need to ask: ‘Difference in what?’’. They go on to summarize their vision of learning as follows: ‘Learning occurs as a result of motivation, opportunities, an active process, interaction with others, and the ability to transfer learning to a real-world situation.’ The remainder of their article demonstrates that technology has a positive role in education as a means to a clear pedagogical end and that use of technology is social: ‘Being with others is now multimodal involving face-to-face *and* online communication, often simultaneously’ (Oblinger and Hawkins: 2006, 15). They conclude that it is crucial to exploit the full the range of opportunities afforded by technology in education.

The Rationale for Such Services

An ongoing healthy debate around how learning might best be facilitated and how technology can best contribute to that goal is desirable. In this regard, a growing number of academics believe that OERs are crucial to the effective delivery of educational material (UN Millennium Educational Goals, 2010). In recent years, there has been a large increase in the number of third level courses delivered online where courses are delivered either entirely online or using a blended approach of online and face-to-face learning. This change in delivery has necessitated a change in course materials. Many lecturers facing the challenge of developing materials for online delivery have had to evaluate their own teaching materials and in some cases have either had to design, or develop teaching resources that match this new cohort’s learning expectations and needs. Digital

resources can meet these needs (Mohan, Greer and McCalla, 2003) and Kim and Shih (2004) are among the many practitioners in higher education who believe that one of the greatest challenges for distance learning is the creation of high quality course materials (lecture notes, references, tests, etc). They stress the importance of sharing and reusing well-developed learning objects to 'reduce the load on instructors, and to make them available across a wide variety of platforms' (p 27). International best practice indicates that the successful development of high-quality learning objects is collaborative, where sufficient resources are available in terms of expertise and money and where the objects can easily be shared. James Taylor from the University of Southern Queensland Australia, located in an area with a long history of distance education and consequently an international leader in off-campus education, asserts that the growth in the field of instructional design and technology has led to a marked increase in collaboration. He advocates '...a multi-disciplinary team approach, wherein a wide range of specialist expertise is applied to the generation of training programs' (Taylor, 2008). Taylor states that the necessary level of expertise for the development of technical teaching and learning systems is usually beyond the skill set of individual teachers and appears to demand the deployment of an expert teaching team, with a wide range of specialist skills. These include specialists in instructional design, systems design, electronic information systems, database design, graphic design, student administration, electronic publishing and project management working alongside subject matter experts. Taylor advocates this structured collaborative method of design and development of content in preference to what he terms 'random acts of innovation'. These random acts are the result of many individual lecturers spending time and money developing similar learning objects; if they shared their resources, for example, in a repository, they could see where gaps needed to be filled rather than constantly reinventing the wheel.

Closer to home, 81 Centres for Excellence in Teaching and Learning in the UK and Northern Ireland were funded from 2005 by the Higher Education Funding Council for England (HEFCE) and the Department for Employment and Learning (DEL) in Northern Ireland. These centres developed high quality learning objects and made them available online to the wider teaching community. Similarly, the Joint Information Systems Committee (JISC) is 'funded by the UK HE and FE funding bodies to provide world-class leadership in the innovative use of ICT to support education and research.' Both of these initiatives have access to enviable levels of expertise and money resulting in rapidly-produced high quality learning objects. JISC also funds JORUM, the UK's digital learning repository which was officially launched in 2006. A national digital learning repository here is both more economical and more efficient than the alternative which is each institution funding, hosting and populating its own repository.

Thus, much of the literature on OERs encouraged the development of digital learning objects; there had been real successes and a serious engagement in the issues around OERs. Nevertheless, in tandem with the enthusiasm and growth from 2002 to the present, a number of concerns continued to be discussed which were seen to prevent the academic community from both developing and sharing OERs. These included the following: concern about cost; lack of time; access to expertise; and anxiety about the perceived quality of shared learning objects (Boyle, 2003; Marcus-Quinn and Geraghty, 2009). Concerns about copyright also hampered sharing. While many of these issues still persist it is generally acknowledged that the argument in favour of OERs has been largely won where the appropriate application of OERs is to the benefit of teaching and learning. Now the focus is on how best to deliver the required services as was discussed in depth at the UNESCO World Congress in Paris (Daniels, 2012).

What was the NDLR Service?

In many ways the NDLR itself tracked the later global history of the development of OERs, entering into the frame in 2004. The NDLR was initially established as a repository service which also sought to foster a culture within the academic community in Ireland of sharing materials relating to teaching and learning. The NDLR supported this collaboration through structured and planned activities at institutional and community of practice level and by engaging potential users through workshops, conferences and one-to-one advice. The NDLR recognized that these supporting activities were crucial to the achievement of engagement by academics in the new service. Initially, UK-based world leaders in the area of OER (for example, Boyle and Cook) provided workshops for the NDLR which was established in the first instance as a three-year project (2004-2007). In 2007, funding for the NDLR was extended for a fourth year to allow for further engagement with the repository services and activities. An evaluation was carried out during 2008, with reporting and evaluation continuing into 2009; NDLR has thus been described as having a 'four-year pilot' (NDLR, 2008). By 2010, the NDLR acronym had shifted from National Digital Learning Repository to National Digital Learning Resources service. At this point, for many stakeholders the activities of the NDLR service had become as prominent as the repository.

The overall objectives of the NDLR at the end of 2010 were as follows:

- To support individual, group and community HE sector staff in the sharing of digital learning
- To provide resources and associated teaching practices
- To provide access to storage, search and retrieval facilities for shared resources
- To promote sharing across HE sector through events and training
- To support open access digital rights management.

Strengths of the NDLR Service

The Core Team

The NDLR service had a team of people in place tasked with implementing the overall objectives and the day-to-day running of the service. These appointments began in 2007 when a project manager was recruited; subsequently, in 2008, a system administrator was appointed. In 2010 the team grew to five with three full-time members and two part-time members. They were:

- A Project Manager (Trinity College Dublin)
- A NDLR Open Educational Resources Advocate (University of Limerick)
- An Educational ICT Policy Advocate (University of Limerick)
- An OER Communities Advocate (University of Limerick)
- A NDLR Training Coordinator (Dublin Institute of Technology)

It is the author's opinion that the core team was crucial to the success of the NDLR service. Members of the NDLR core team had experience in teaching at higher level, and expertise in the design and development of OERs. As part of the work the team engaged in collaboratively developing multimedia resources with staff across the sector. For example, core team members were involved in the design, development and usability of

OERS for Physiotherapy, Languages, Law, Education and History. The range of experience and expertise on offer from the core team encouraged academic staff faculty at many of the participating institutions to collaborate with them. The team also participated in individual projects at a local level which were recognized as having a high quality output and which won awards including a European Language Label (2007) and a People's Choice Award (2012). This active engagement in and contribution to the OER movement by the team helped them to secure the trust of the wider community and academics were confident that their resources were safe within the NDLR. Indeed, academics frequently sought advice on projects from the NDLR team. In addition, the core team was research active and completed projects were presented at international conferences and events and published in peer reviewed research journals and relevant books (see <http://www.ndlr.ie/artefact/file/download.php?file=19196>).

Continuity of Funding

The NDLR was funded from 2004 through the Irish Higher Education Authority. The continuity of funding from 2008 helped NDLR to achieve its objective of building a relationship with the partner institutions, and the Irish Higher Education Authority (HEA) endorsed this project as an effective model of inter-institutional activity (Quinn, 2012). Without the continuity of funding many of the activities including the annual symposium, activities for the Community of Practice (CoP) coordinators, external events, regional events and videoconference events, would not have been possible. These and other NDLR events and workshops were publicized by the Irish HEA and the partner institutions as part of a wider national programme supporting higher education activity. In parallel to the centrally-organized activity, each Community of Practice provided support and a focal point for disciplinary discussion and networking (Pegler, 2012; McAvinia, 2011; Dundon, Diggins and Exton, 2012).

Institutional Coordinators

Many of the 21 institutions of Higher Education involved with the NDLR had an institutional coordinator in place between 2006 and 2012. The role of these coordinators was critical to the success of the NDLR service at local level. These coordinators liaised with the core team to ensure that their institution was aware of all NDLR activity and formed a steering group that meet quarterly at cluster meetings to exchange information and expertise across local learning initiatives. The representatives were university and institute of technology staff (generally located in the teaching and learning centres and research support areas). Their work with the NDLR included coordinating Learning Innovation Projects (LIPs), conducting research in the area of technology enhanced learning, local event/workshop promotion and raising awareness of the NDLR learning resources for development, use and reuse in student programmes. In addition, they performed an advisory role (with the core team) on associated teaching practices. These local NDLR representatives ensured that NDLR was closely aligned with the teaching and learning strategy of the Institutions and provided a link to ensure regular operational feedback to NDLR.

Evolution of the NDLR

From Repository to Resources Service

The initial focus of the NDLR project was on populating the repository. A number of strategies were employed to yield as many OERs as possible. The first of these was to take

existing content, populate the repository with it and provide access to existing users. The second was to develop *bespoke* content for intended use by individual users, to provide access to the intended users and to support their intended use. The third was to support the intended communities of users in populating the repository themselves with new (bespoke) and existing resources. The Communities of Practice (CoPs) were central to all of this work (Bruen and Wade, 2008).

Twelve communities of practice (CoPs) of various subject disciplines were established in 2004:

- Applied Social Studies (ASSCoP)
- Bio-Technology (BioTech CoP)
- Chemical and Physical Sciences (CPSCoP)
- Computer Science (CSCoP)
- Education (EDUCoP)
- Library Information Skills
- Mathematics and Statistics Service Teaching in Higher Education (MSHECoP)
- Mechanical Engineering (MECoP)
- Modern Languages (ModLangCoP)
- Nursing and Midwifery (NMCoP)
- Technology Enhanced Learning (TELCoP)
- Veterinary and Bio-Environmental (VETBIOCoP)
- Art & Conflict
- Apprentice-based Learning
- Student Retention

The development of CoPs was based on the theories of Wenger (2002, p11) who described a community of practice as a group ‘who share a concern or a passion about a topic’; these community members are often intrinsically motivated to ‘deepen their knowledge’. The aim of NDLR CoPs was to plan and develop necessary e-learning resources or reusable learning objects (RLOs) for specific subject areas which would be made available through the NDLR for the Irish higher education community. The 2008 evaluation mapped a picture of the CoPs and how they were experienced by those participating in them. A key finding was that the CoPs were instrumental to the primary success of the NDLR project, not least because of the work of the coordinators, and essential to the future sustainable development of the project. However, the report suggested restructuring the communities of practice to become SMART (sustainable, manageable, active, relevant and reflective, targeted) CoPs. As the project progressed, innovation in learning object development within the CoPs was continued through the release of timely funding to them (O’Keeffe, 2009). In addition, the NDLR provided assistance for CoPs by:

- Creating and encouraging collaborative links between academics in other institutions, especially in the early stages of Communities of Practice;
- Organising community events for raising awareness of the benefits of the NDLR service;
- Providing training workshops on using the NDLR;
- Assisting with identification of learning resources that might be of use to the various communities;
- Liaising with the communities and the NDLR board;
- Providing support, guidance & training in the use of technologies by these Communities.

The NDLR CoPs tailored benefits and activities to their communities, emphasising the positive contribution of the *preparing to reuse* process, rather than focusing on reuse itself. For example, leaflets publicising the Biotechnology CoP which were circulated at the 2008 NDLR symposium suggested that engagement with this CoP offered these advantages:

- The chance to discuss your teaching and learning ideas with enthusiastic peers;
- Recognition of the quality of your own resources by others;
- A chance to increase your reach in terms of learning object distribution within the HE sector in Ireland (NDLR Biotechnology CoP, 2008).

These were immediately achievable short term benefits, in contrast to the longer term less certain prospect of time saving, institutional brand building, or cost saving, which have often been suggested as the advantages of reuse activity (Pegler, 2012). The Biotechnology CoP list also related these benefits to the needs of individual educators rather than the institution. Similarly, these were outcomes which were attainable without the requirement from participants to change their teaching practice or to adopt specific technologies. This emphasis on immediate rather than longer term incentives to engage with reuse was designed to appeal to the potential users of the CoPs, who would also become the users of the repository.

As Pegler notes, unlike many similar OER projects where the focus was primarily on the repository, the support, continuity and emphasis on disciplinary community offered by NDLR created a national environment in which sharing and reuse was more likely to occur (Pegler, 2012). The benefits to individuals, and their institutions and disciplinary communities, were not dependent on reuse. Within the NDLR the number of CoPs continued to grow and in 2012 there were 25 established CoPs.

International Links

As noted previously, the NDLR's development could be mapped against global trends in the area. The NDLR was aware of the international OER community and followed best practice as well as contributing to the growing body of literature in the area. Both NDLR and Jorum initially used intraLibrary as the basis for their repository system although both later adopted different systems for open educational resource delivery. As part of a wider evaluation of the service in 2008, experts were also invited to participate in evaluations of a sample of learning objects using the Learning Object Attribute Metric tool (LOAM) developed by the Centre for Excellence in Teaching and Learning (CETL) in Reusable Learning Objects (RLOs), RLO-CETL. A keynote speaker at the 2008 NDLR conference was Ahrash Bissell, then Executive Director of ccLearn, part of the US-based Creative Commons organisation. By 2008 NDLR were already moving towards becoming an open repository, a move which Jorum was also considering. During 2009, the NDLR moved to open access using a Creative Commons license. The NDLR also co-hosted a European Thought-workshop aimed at bringing together representatives from the European and wider Teaching and Research repository and data infrastructure communities for the purpose of demonstrating the feasibility and potential benefits of linking research and teaching repositories within Europe. One of the outputs from this workshop, to publish the findings, is ongoing. A draft policy document that will identify and discuss a number of common challenges, and propose a set of policy recommendations to support the further development and potential for more harmonisation or cross-fertilization in an open Research and Higher Education e-infrastructure, will be circulated in 2013/2014.

Lifetime of Similar Projects

While the area of Open Educational Repository services is still relatively new the movement is growing exponentially. The Commonwealth of Learning in conjunction with UNESCO held a World Open Educational Resources (OER) Congress in Paris on 20-22 June 2012. This event aimed to produce a declaration (referred to as the 'Paris Declaration') that includes a clear definition of open licenses and would be used to encourage governments to support the principle that the products of publicly funded work should carry such licenses. The Paris OER Declaration received approval from the Congress of experts and government representatives on 22 June. This initiative seeks to advance the ideal of making educational resources developed with public funds freely available for reuse and repurposing. This event was a milestone on the route to a further conference on OER and the Millennium Development Goals scheduled for 2015.

It is important that whatever investment has been made over the lifetime of such projects delivers a return. The outputs and structures that have been put in place from existing services should be exploited to their full before any new incarnation of a dissolved project is set up. In the case of the NDLR the elements of the service that were highly successful should be maintained if at all possible.

The following strategic aims set out by a previous UK project (BECTA) are also worth noting for any national service aiming to deliver an effective service to facilitate the sharing of digital material to enhance teaching and learning:

- Improve learning and teaching through the effective and embedded use of ICT
- Increase the number of educational institutions making effective, innovative and sustainable use of ICT
- Improve the availability and use of high quality educational content
- Develop a national coherent, sustainable and dependable ICT infrastructure for education

Achievements of the NDLR and conclusion

It is the author's opinion that the NDLR will be most remembered for the work that it supported and funded through the following schemes:

- National Learning Innovation Community Support Projects (LInCS)
- Local Innovation Projects (LiPs)

In 2010, building on the early success of the activities of the CoPs, the NDLR service launched the Local Innovation Projects and LInCS projects. Institutions were encouraged to collaboratively apply for funding to generate OERs that would be uploaded to the repository and made available to the wider academic community. This level of inter-institutional collaboration was highly desirable in the higher education landscape and was a very positive outcome of the NDLR service.

In 2011 the Higher Education Authority requested a response from the wider academic community to the establishment of a National Academy for the Enhancement of Teaching and Learning. In its submission in December 2011 the NDLR response agreed that this was a positive and timely development. The NDLR Chair and core team suggested that this new body, to be called the National Forum for the Enhancement of Teaching and Learning in Higher Education, would be an appropriate body to support and reinforce the successful models which the NDLR had put in place to enhance Teaching and Learning at third and fourth level in

Ireland. These include:

- Collaboration with existing national and international teaching and learning networks
- Communities of Practice (CoPs)
- National Learning Innovation Community Support Projects (LInCS)
- Local Innovation Projects (LiPs)
- Annual showcase of teaching and learning outputs from the Irish academic community.

In the author's opinion these activities are crucial to the success of the National Forum. Participation and trust from stakeholders takes time to foster. The NDLR project was in place for almost a decade and was the first national project in Ireland to enable all 21 higher institutions to work together, to share their existing teaching materials, to create new teaching and learning resources, to collaboratively target and attract funding to create worthwhile teaching materials. The most challenging aspect of such transfers is to try to preserve the successes of such projects. Ideally, there should not be a period of time where the service being wound up is without moderation or the expertise to curate the service. Hopefully, the new National Forum will be able to engage with the activities that the NDLR had championed. However, timing is crucial and if the momentum is lost it may be difficult to reestablish engagement with such a national service.

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Response to

Digital Repositories and their Associated Services: From Capacity Building to Sustainability

by Dermot Brabazon, Dublin City University, Ireland.

This chapter details the development of the National Digital Learning Repository (NDLR), the provision of Open Educational Resources (OER) for third and fourth level and the sustainability of a service such as the NDLR within Ireland. Many countries have gone through similar development processes for national-based educational digital repositories. The fact that 21 Higher Education Institutions were actively engaged with the NDLR and the 12 communities of practice were established to drive forward this cooperation amongst academics across Ireland is a testament to the good work performed by the NDLR management team.

The benefits from such repositories and teaching and learning support networks are clearly indicated within this chapter. These include the sharing of resources developed by lecturers within one Higher Education Institution with the colleagues in another, the joint development of resources, the establishment of subject discipline areas of practice, training sessions on new software or resources tools for academic staff, the support for educational workshops and conferences, and the development of research projects to enhance pedagogical development of learning resources. The development of resources at a national level can be seen as a cost saving exercise where duplication of work to develop the same resources is avoided, as well as an enhancement of teaching and learning practice where the best resources can be selected by a lecturer for a specific concept or range of concepts to be taught. Communities of teaching and learning practice within twelve different discipline areas were established for the first time through the NDLR initiative. These benefits from the NDLR initiative are well highlighted in this book chapter.

Personally I was involved with the establishment of the Engineering Community of practice and chaired it for the last few years. The National Digital Learning Repository enabled the development of a community of Engineering Lectures throughout Ireland to interact, discuss pedagogy, and develop and share for the first time together reusable digital learning resources. Another significant output from the funding provided from the NDLR was the establishment of the International Symposium for Engineering Education which brought hundreds of international engineering lectures to Ireland over the last five years to discuss the latest developments in engineering education. This symposium attracted over one hundred participants at each conference since its initiation in 2007.

The valuable links to enhance international collaboration on this work which were established by the NDLR to UK JORUM and the Centre for Excellence in Teaching and Learning (CETL) were presented within this chapter. In the current international context, most countries with digital learning repositories and associated support for third and fourth level teaching are pressing ahead with these initiatives and expanding their resource base and academic staff support and engagement. Examples of such repositories include UK JORUM, MERLOT, National Digital Learning Resource Network, MIT's OpenCourseWare, and OPAL. Massive Open Online Courses (MOOCs) tapping into resources from such repositories are becoming increasingly common. It is noted in the chapter that there is an increasing trend for resources funded through public funds to be made available for free

to the public and academics that have funded these developments. An example of this is a requirement from some funding bodies for research papers to be made publicly available on open repositories. The Paris Open Educational Resources (OER) Declaration, signed in 2012 at the World Open Educational Resources (OER) Congress noted a clear definition of open licenses to support the principle that the products of publicly-funded work should carry such licenses. Without a National Digital Learning Repository, it may not be possible for the Irish government to meet the requirements of the Paris Declaration.

In summary, this chapter presents a comprehensive overview of the establishment of the NDLR, the provision of Open Educational Resources (OER) for third and fourth level and the sustainability of a service such as the NDLR within Ireland. It was enjoyable to read this well-written chapter as a clear summary of these developments and the current situation within Ireland. In order to provide a high quality education to the next generation of engineering students within Ireland a strategy from the National Forum toward sustainability of such services within Ireland is needed. These resources and supports for provision of education at a high level internationally are critical for Ireland remaining as a location known for its good third level education and well-educated population.



Section 4

Emerging approaches
and pedagogies

