Research in Learning Technology
Vol. 22, 2014

COACTION PUBLISHING

RESEARCH ARTICLE

Questions of quality in repositories of open educational resources: a literature review

Javiera Atenas[a,b]* and Leo Havemann[c]

[a]*Department of Science, Technology, Engineering and Public Policy (STEaPP), University College London, London, UK;* [b]*PhD candidate at Universitat de Barcelona, Barcelona, Spain;* [c]*IT Services, Birkbeck, University of London, London, UK*

(Received 30 April 2013; final version received 19 June 2014)

Open educational resources (OER) are teaching and learning materials which are freely available and openly licensed. Repositories of OER (ROER) are platforms that host and facilitate access to these resources. ROER should not just be designed to store this content – in keeping with the aims of the OER movement, they should support educators in embracing open educational practices (OEP) such as searching for and retrieving content that they will reuse, adapt or modify as needed, without economic barriers or copyright restrictions. This paper reviews key literature on OER and ROER, in order to understand the roles ROER are said or supposed to fulfil in relation to furthering the aims of the OER movement. Four themes which should shape repository design are identified, and the following 10 quality indicators (QI) for ROER effectiveness are discussed: featured resources; user evaluation tools; peer review; authorship of the resources; keywords of the resources; use of standardised metadata; multilingualism of the repositories; inclusion of social media tools; specification of the creative commons license; availability of the source code or original files. These QI form the basis of a method for the evaluation of ROER initiatives which, in concert with considerations of achievability and long-term sustainability, should assist in enhancement and development.

Keywords: open educational resources; open access; open educational practice; repositories; quality assurance

Introduction

The technological affordances of computers and the Internet have made the production of learning resources easier, leading to a proliferation of resources that may be shared between institutions and individuals, therefore enabling the possibility of open educational resources (OER). According to proponents of OER such as McGreal, Kinuthia, and Marshall (2013), 'the free and open sharing of educational resources is essential to the building of ubiquitous learning networks and reducing the knowledge divide that separates and partitions societies' (p. xviii).

Indeed, prominent educators, institutions and international organisations have identified the need to 'open up' educational resources as a crucial next step in the evolution of education. This position is summarised in point A of the Paris OER Declaration, which recommends that States

*Corresponding author. Email: j.atenas@ucl.ac.uk

Citation: Research in Learning Technology 2014, **22**: 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

> Promote and use OER to widen access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education. Improve both cost-efficiency and quality of teaching and learning outcomes through greater use of OER. (UNESCO 2012, p. 1)

For Hylén (2006), OER is a means to promote the dissemination of knowledge more widely, increasing the pace of development and, additionally, increasing the quality of education and reducing social inequalities. According to Butcher (2010), the sharing of quality open resources unleashes the power of resource-based learning and, for Tosato and Bodi (2011), reusing and remixing teaching materials produced by others can unleash the creativity of educators, encouraging them to rethink the ways in which they deliver their teaching and encouraging collaboration in the scholarly community around resource improvement and adaptation.

Ferguson and Shum (2012), however, sound a note of caution, contending that while OER can 'greatly improve the quality of material available online to learners . . . this wealth of resources can leave learners adrift in an ocean of information, struggling to solve ill-structured problems, with little clear idea of how to approach them, or how to recognise when they have made progress' (p. 316).

Thus, discussions around OER (and the infrastructure which supports their storage and use) must take into account educational practice. According to Alevizou (2012), this is reflected in the fact that,

> while the origin of the OER movement is located on the emphasis of entitlement (of access to, and adaptation of, free pedagogical material), the new wave of policy and advocacy initiatives focus on transparency enabled by the adoption of open educational practices. (p. 3)

On the ground, opening up academic practice is a work in progress that requires a combination of solutions, including cultural change as well as better technologies. The sharing and 'reuse' of published research output (assuming referencing conventions and any copyright restrictions are observed) is considered to be normal and desirable – in other words, it is hoped that other scholars will read and cite one's papers, but one's teaching materials seem to be subject to a different set of criteria (Davis *et al*. 2010; Tosato and Bodi 2011). For Alevizou (2012), there is a 'lack of professional incentives and a culture (or expertise) in sharing and remixing openly'. Beyond these questions of culture and motivation, it is also the case that the reuse of teaching and learning resources is not straightforward when academics are unsure of the aim for which and context in which the resource was produced (Campbell *et al*. 2013; Koppi, Bogle, and Bogle 2005). Additionally, according to Petrides and Nguyen (2008), 'users may lack the confidence, capacity, or willingness to contribute changes to OER'.

Assuming that adopting Open Educational Practices (OEP) represents a significant and desirable cultural shift for many academics, there is at the same time a fundamental requirement for appropriate tools to enable and support such practices. For the OECD (2007), 'the rapidly growing number of learning materials and repositories makes the issue of how to find the resources that are most relevant and of best quality a pressing one' (p. 100). Indeed, the success of the OER movement hinges on both the ability and possibility of educators to effectively create, share, discover and reuse quality resources. Repositories have come to be regarded as a key link in this chain (Currier *et al*. 2004; Downes 2003; McGreal 2011), as evidenced by

Citation: Research in Learning Technology 2014, **22:** 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

the development of a wide array of OER repository initiatives worldwide in the decade or so since the term OER began to gain currency (Marcus-Quinn and Diggins 2013).

Repositories of OER (ROER) have been defined by McGreal (2011) as

> digital databases that house learning content, applications and tools such as texts, papers, videos, audio recordings, multimedia applications and social networking tools. Through OER repositories, [resources] are rendered accessible to learners and instructors on the World Wide Web. (p. 1)

However, repositories matching this definition are quite a diverse and non-standard group (Armellini and Nie 2013; Geser 2007; McGreal 2011; Nikoi and Armellini 2012; Tuomi 2013). It seems therefore to be an opportune moment to build on the considerable work that the OER community has put into the development and use of such repositories, and consider how they might best be implemented or enhanced going forward.

In order to identify the most relevant literature for this study, 122 peer-reviewed journal articles, conference papers and books were reviewed and analysed. A subset which specifically discusses repositories was identified. Within this subset we identified mentions of good practices and elements lacking in the design of ROER. The literature reviewed was obtained from relevant articles in the field of OER, learning objects and repositories, from both Open Access and paywalled journals. The timeframe of the literature review is from 1996 to 2014 and the articles reviewed were in English, German and Spanish.

The objective of this study is therefore to contextualise and to describe a method for evaluation of ROER. Through this literature review we will define key themes in the ethos of ROER and distil a set of quality indicators (QI) for repositories, in order to ultimately derive an evaluation model.

Understanding openness

The first World Congress on OER was held at UNESCO in Paris in June 2012, and this generated the first World Declaration on OER. The declaration is based on Article 26.1 of the Declaration of Human Rights (1949), which states that:

> Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.

The concept of OER was first introduced in 2002 at a UNESCO conference in which participants identified a need for 'provision of OER, enabled by information technology and communication, for consultation, use and adaptation of these by a user community for non-commercial purposes' (UNESCO 2002). This was echoed by the OECD (2007) who also called for OER, defined as 'digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research' (p. 11). More recently UNESCO (2011) have provided a more nuanced description, understanding OER as

> any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have

> been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees. (p. 5)

The philosophy of the OER movement has consisted from the outset of two fundamental concepts: free and open access to knowledge, and the capacity to adapt and reuse to create new materials (Abeywardena, Tham, and Raviraja 2012). For Smith and Casserly (2006),

> At the heart of the movement toward Open Educational Resources is the simple and powerful idea that the world's knowledge is a public good and that technology in general and the Worldwide Web in particular provide an extraordinary opportunity for everyone to share, use, and reuse it. (p. 8)

The OER movement aims to facilitate the democratisation of knowledge by increasing the circulation and reuse of free, quality content in a variety of formats, without economic or legal barriers (Andrade *et al*. 2011; Downes 2007; Gourley and Lane 2009; McAndrew *et al*. 2012).

The most defining, common feature across the multitude of resources described by the umbrella term OER is therefore *openness*, which crucially indicates 'openly licensed' rather than simply 'freely available'. As the Paris OER Declaration indicates, OER must

> reside in the public domain or have been released under an open license, such as creative commons licence (CCL), that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work. (UNESCO 2012)

The OECD (2007) have also cited open licensing as a legal driver of OER, with specific reference to 'new legal means to create and distribute open tools and content through licensing schemes such as Creative Commons' (p. 59). It seems that although OER could potentially be released under some other type of open license, in practice it is Creative Commons that is discussed in the literature. Released in 2002, the Creative Commons licensing (CCL) scheme aims to facilitate the transfer, sharing, use and adaptation of academic and creative content, while protecting the intellectual property rights of the authors. CCL is often regarded as at the heart of OER openness as it facilitates the adaptation and modification of the resources (Bissell 2009; Downes 2007; Jacobi and van der Woert 2013; Rolfe 2012; Willems and Bossu 2012).

The case for ROER is reflected in point I of the Paris OER declaration, which calls on states to

> Facilitate finding, retrieving and sharing of OER. Encourage the development of user-friendly tools to locate and retrieve OER that are specific and relevant to particular needs. Adopt appropriate open standards to ensure interoperability and to facilitate the use of OER in diverse media. (p. 2)

The value of ROER is thus in relation to the need to open and democratise access to teaching resources, promoting the growth and dissemination of knowledge as a free resource, and removing the traditional copyright barrier, thus aiding in the

Citation: Research in Learning Technology 2014, **22:** 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

transformation of the teacher's role from a content producer to 'user-producer' (OECD 2007; UNESCO 2011).

McGreal (2011) argues that ROER can be important resources for students and academics, dependent on the quality of the resources stored in the repositories; however, according to Butcher, Kanwar, and Uvalić-Trumbić (2011), in the OER environment, resource quality will 'be assisted by the development of such repositories, which will provide at least first levels of quality assurance' (p. 2). Housing resources within ROER is advantageous because the centralisation of resources facilitates retrieval, and widens access; furthermore, if a social layer is included, it encourages collaboration as users feel part of a community of practice (Browne *et al*. 2010; Jacobi and van der Woert 2012; Petrides and Nguyen 2008).

Reviewing the literature: themes and QI

Drawing from our analysis of the literature, we would argue that the ethos underlying the creation of ROER can be said to comprise four key themes, which we refer to as **Search**, **Share**, **Reuse**, and **Collaborate**. The purpose of ROER is to support educators in searching for content, sharing their own resources, reusing and evaluating materials, and adapting materials made by or in collaboration with other members of the community.

The four themes can be understood in greater detail as follows:

(1) **Search**: As Google tends to be the first reference point for many people, it can be considered a 'living index and repository for enormous content' (Atkins, Brown, and Hammond 2007). Although the internet has among its archives billions of documents and multimedia materials that can be found by using search engines, it is a more complex task to ensure that the materials and documentation discovered in such searches are appropriate to a specific educational field and context. For Wang and Hwang (2004), it is difficult for educators to build and maintain personal collections and is 'very time consuming to locate and retrieve distributed learning materials'. For Rolfe (2012), searching for OER in repositories facilitates the non-commercial reuse of content with minimal restrictions.

(2) **Share**: According to Hylén (2006) one of the possible positive effects of openly sharing educational resources is that free trade fosters the dissemination of knowledge more widely and quickly, so more people can access resources to solve their problems. For Windle *et al*. (2010) the quality assurance and good design of OER can enhance the reuse and sharing of OER, as 'evidence suggests that those who feel empowered to reuse are more likely to themselves to share and vice versa' (p. 16). According to Pegler (2012), if OER are not shared or reused, the main objective of the OER cannot be accomplished; also, the number of times in which a resource has been shared can be considered a measure of resource quality, as it provides an indication of the impact a particular resource has had.

(3) **Reuse**: A key concern of educators regarding the reuse of OER relates to the contextualisation of resources; to adapt, translate or reuse materials for use in different socio-cultural contexts could potentially be more difficult or costly than creating new resources. To alleviate these challenges, the main impetus

must come not from technologies but from pedagogical communities where academics and teachers are both, content producers and users (Petrides and Nguyen 2008). The practice of reusing content has in the past been considered 'a sign of weakness' by the academic community, but this point of view has been changing as the OER movement is increasingly embraced by academics which are willing to share their content with others (Weller 2010).

(4) **Collaborate**: OER repositories, if well designed, can serve to facilitate different communities of users who collaborate in evaluating and reusing content and co-creating new materials by encouraging the discussion around improvement of resources (Petrides and Nguyen 2008). Though traditionally teaching materials were produced within the context of a classroom, OER can be created collaboratively in virtual spaces (McAndrew, Scanlon, and Clow 2012). ROER have potential as a framework in which 'various types of stakeholders are able to interact, collaborate, create and use materials and processes' (Butcher, Kanwar, and Uvalić-Trumbić 2011).

Assuming these four themes together make up the ethos of OER repositories, it is also worth distinguishing between the technical and social characteristics of a repository, and how these are transformed by openness. For Tuomi (2006),

> Whereas openness in the social domain is fundamentally motivated by the expected social benefits and by ethical considerations related to human freedoms, openness in the technical domain, in contrast, is motivated by technical interoperability and functionality. (p. 9)

Based upon our review of the literature, there are certain indicators of quality in the design and implementation of ROER, which, taken together, constitute a range of social and technical characteristics, and provide a support structure for the four themes. The 10 most recurrent QI identified in the literature are as follows:

(1) **Featured resources**: Featuring (highlighting) certain resources held in a repository can benefit educators by exposing them to additional materials that can be either interesting, original or novel, or by showcasing resources indicated as high quality by peers (Hylén 2006; Pegler 2012; Petrides and Nguyen 2008).

(2) **User evaluation tools**: Allowing users to evaluate resources promotes the successful development of OER user communities, and might facilitate content retrieval, as academics tend to trust scholarly opinions. Trusting users to evaluate content can help in gaining a critical mass of OER engaged users which support the quality control of resources (Clements and Pawlowski, 2012; Downes 2007; Richter and Ehlers 2010).

(3) **Peer review**: The literature highlights the value of evaluating OER through a formal peer review process, as it can improve the quality and usefulness of resources. A comprehensive way to assure quality for OER is to specify a series of standards for peer review instruments in order to evaluate the resources. This quality assurance of OER can thereby ensure the users' confidence in the materials (Larsen and Vincent-Lancrin 2005; Schuwer *et al*. 2010; Windle *et al*. 2010).

Citation: Research in Learning Technology 2014, **22:** 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

(4) **Authorship of the resources**: Attributing authorship to the resources can encourage academics to feel confident in making use of existing OER, and might also act to encourage others to share their resources with the full confidence that their intellectual property is recognised. As Timmermann (2014) notes 'The function of intellectual property rights is primarily instrumental: it is a societal tool to stimulate innovation' (p. 2). Ensuring authorship of the resources is recorded and displayed is key in motivating use, reuse and sustainability of OER (Browne *et al*. 2010; Butcher, Kanwar, and Uvalić-Trumbić 2011; Petrides and Nguyen 2008).

(5) **Keywords of the resources**: Contextual description in the form of keywords or descriptive concepts which are user generated (rather than standardised taxonomies) for OER can be provided on upload to the repository as this enhances opportunities for users to retrieve and evaluate the usefulness of a resource (Davis *et al*. 2010; Richter and McPherson 2012).

(6) **Use of standardised metadata**: For Butcher, Kanwar, and Uvalić-Trumbić (2011), ROER must have the 'ability to generate relevant and meaningful metadata for OER'. This can be in the form of metadata standards and specifications such as IEEE Learning Object Metadata (LOM) or Dublin Core. Metadata should be able to work 'across countries, languages and cultures' (OECD 2007, p. 101), and also should be interoperable between repositories, thereby maintaining OER pedagogical quality and objectives. In order to achieve quality metadata, it might be necessary to employ a team of information science professionals to improve the existing metadata in ROER to facilitate content retrieval across different disciplines (Barker and Ryan 2003; Currier *et al*. 2004; Smith and Casserly 2006; Wiley 2007; Wilson 2008).

(7) **Multilingualism of the repositories:** As suggested in point G of the Paris OER declaration (Unesco 2012), it is important to 'Encourage the development and adaptation of OER in a variety of languages and cultural contexts. Favour the production and use of OER in local languages and diverse cultural contexts to ensure their relevance and accessibility'. One of the biggest challenges of searching for OER is to find relevant resources that have been produced in other countries, particularly when the user does not possess a profound knowledge of the local language. Therefore, ROER must provide information in different languages to facilitate content retrieval (Richter and McPherson 2012). The critical point of creating multilingual ROER is the risk that language barriers and cultural differences may consign less developed countries to the role of consumers of OER rather than contributors to the expansion of knowledge (OECD 2007; Pawlowski and Hoel 2012; UNESCO 2012).

(8) **Inclusion of social media tools for sharing resources**: The advantage of integrating existing online practices such as social media use with ROER is to produce a single powerful environment where people can be part of a community (Jacobi and van der Woert (2012). For Alevizou (2012) and Butcher, Kanwar, and Uvalić-Trumbić (2011), one of the essential elements of OEP is social interaction; increased online access to OER and the use of social networking 'has created opportunities for pedagogical innovation' (UNESCO 2011, p. 2). For Petrides and Nguyen (2008), 'OER serves to facilitate – through accessible technology and alternative licensing – a community of users who collaborate, discuss, critique, use, reuse' (p. 100). Finally, the Paris

OER declaration, recognising the value of communities of practice sharing educational content, recommends that OER initiatives facilitate and encourage sharing via user-friendly tools (UNESCO 2012).

(9) **Specification of the type of creative commons licences per resource:** The use of CCL is implied in point D of the Paris OER declaration which aims to 'Promote the understanding and use of open licensing frameworks. Facilitate the reuse, revision, remixing and redistribution of educational materials across the world through open licensing, which refers to a range of frameworks that allow different kinds of uses, while respecting the rights of any copyright holder' (UNESCO 2012). CCL have become the standard licenses for the sharing of OER materials (Bissell 2009; Wiley, Bliss, and McEwen 2014; Wiley and Gurrell 2009;), as they provide accurate information regarding intellectual property and the terms for fair use of the resources (Jacobi and van der Woert 2012). This flexible licensing scheme affords 'opportunities to reserve some, but not all, rights' (OECD 2007, p. 119).

(10) **Availability of the source code or original files:** The provision of source code (or of the original, editable file or files that make up a resource) is based on the General Public License 2.0 (GNU) and sustained by the CCL scheme. Both GNU and CCL aim to protect the intellectual rights of the authors of the resources while at the same time enabling and facilitating access to the source code or original files. This, in turn, enables users to reuse, revise, remix and redistribute OER (Atkins, Brown, and Hammond 2007; Petrides and Nguyen 2008; Tuomi 2006; UNESCO 2011).

Thus, any development of ROER must consider three main areas, which are the social and technical characteristics of the ROER, the specific QI, and the extent to which the repository supports the themes, as summarised in Table 1.

Conclusions: toward evaluation of ROER

This literature review represents a high-level synthesis and analysis of the research related to OER and ROER to date, with the aim of understanding whether or to what extent this body of work is in agreement, and on which points, if any, we find voices diverging. We have understood OER as, first of all, a movement grounded in a particular philosophy, and secondly, as a term representing a collection of resources which have been 'declared open' via the application of the OER movement's specified practices and technologies. Happily for the OER movement, there are significant areas of commonality among the diverse group of perspectives represented here.

Notwithstanding the problematic nature of the term 'open' when used in wider contexts, there does seem to be a shared understanding of an underlying ethos of openness where it comes to OER. It is within the discussions of the varied interweaving routes to achieving the aims of the OER movement where different priorities and concerns emerge. The body of literature reviewed can thus be said to support our four themes, and the principle that repository design and implementation should reflect their importance. But authors have advanced a range of perspectives in relation to the more practical questions of how best to enable participation in, and support sustainability of, ROER projects.

ROER developers have aimed to address the need for what UNESCO (2012) calls 'appropriate user-friendly tools' for the exchange of OER by implementing a variety

Citation: Research in Learning Technology 2014, **22:** 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

Table 1. Quality indicators.

Quality indicator	Description of the indicator	Characteristics	Themes
Featured resources	Ability of feature and highlight resources that are potentially of high interest to the users	Social	Search; share; collaborate
User evaluation tools	Tools for the resources to be evaluated by users aiming to rate a resource.	Social	Collaborate
Peer review	Peer review as policy to revise and analyse each resource to ensure its quality.	Social	Collaborate
Authorship of the resources	Analyse if the repositories include the name of the author(s) of the resources.	Social	Search; reuse
Keywords of the resources	Methodically describe the resources to facilitate the retrieval of the materials within certain specific subject areas	Technical	Search
Inclusion of metadata (Dublin Core – IEEE LOM – OAI-PMH)	Introduce standardised formats of metadata to describe OER such as Dublin Core – IEEE LOM – OAI-PMH to comply with international standards for quality making descriptions interoperable amongst ROER	Technical	Search; share; reuse
Multilingual support	Design the interface of the in a multilingual way to widen the scope of users by allowing them to perform search of content in different languages.	Technical	Search; share; reuse: collaborate
Inclusion of social media tools for sharing resources	Introduce social media tools to enable the users to share the resources within social media platforms.	Social; Technical	Search; share; reuse: collaborate
Specification of the type of Creative Commons Licences per resource	Specify the type of Creative Commons Licence per each resource or give information about the specific type of licence for all the resources.	Technical	Search; reuse; collaborate
Source code or original files available	Allow the download of the source code or original files for resources.	Technical	Reuse; collaborate

of socially- and technically- oriented features which assist in opening resources and practices. Ten such features have been conceptualised in this study as QI for ROER; the presence of an indicator shows that the repository has been designed to support a particular aspect of open practice.

The four themes and 10 QI can form the basis for a framework which is suitable for evaluating an individual ROER initiative, or conducting a macro-level analysis of a group of ROER. Evaluation of each repository should begin by checking for the presence or absence of the QI. Through an understanding of which QI are present in the repository, it is possible to determine what functionality is in place to support the four themes. As seen in Table 1, some QI are relevant to a single theme, while others act to support more than one theme. An additional consideration is that some QI are in a

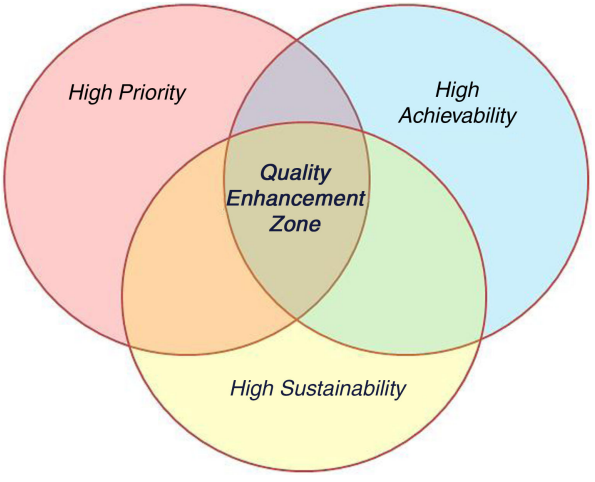

Figure 1. Three-dimensional analysis.

sense, 'in competition' with each other. For example, both **keywords** and **standardised metadata** are designed to facilitate users in searching and retrieving relevant content. Similarly, both **peer review** and **user evaluation tools** represent methods of assessing the quality of resources. Repository managers may view some QI as providing functionality, which overlaps with, or adds little to, what is present in the existing toolset, or view some QI, no matter how desirable, as too resource-intensive to set up or maintain.

For an organisation which is planning to either enhance an existing repository, or develop a new one, we suggest an additional level of analysis. We call this level 'three-dimensional analysis' because we consider that the desirability of implementing a feature must be considered in relation to the three dimensions ***priority***, ***achievability*** and ***sustainability*** (see Figure 1).

- **Priority** reflects the perceived importance and urgency of adding a particular feature, on the basis of the value added for the user community.
- **Achievability** is a measure of the relative ease or difficulty of adding a feature to the repository, taking into account available resources for development.
- **Sustainability** considers the long-term resource implication of inclusion of a feature, whether in terms of on-going technical support or other forms of management or co-ordination.

Each feature should be rated low or high for each dimension. A feature must be rated highly across the three dimensions in order to fall into the zone of quality enhancement (Figure 1). By conducting this level of analysis, it should become clear which features should be implemented.

From our point of view as learning technologists, embracing OEP represents a significant cultural shift for academics, as well as a technical toolset to be mastered. It is therefore our hope that current and future repository managers considering the next iterations of ROER platforms will be aided by our evaluation model in assessing which QI are going to best fit the needs of the communities they aim to serve. In this way, repositories can enhance the level of support they provide to academics who are attempting to adopt new, open ways of working.

Citation: Research in Learning Technology 2014, **22:** 20889 - http://dx.doi.org/10.3402/rlt.v22.20889

Acknowledgements

We thank Andreas Link, Vice President of the Learning Agency Network, for his invaluable assistance to this research.

References

Abeywardena, I., Tham, C. & Raviraja, S. (2012) 'Conceptual framework for parametrically measuring the desirability of open educational resources using D-index', *Journal of Research in Open & Distance Learning*, vol. 13, no. 2, [online] Available at: http://www.irrodl.org/index.php/irrodl/article/view/1177/2181

Alevizou, P. (2012) 'Open to interpretation? productive frameworks for understanding audience engagement with OER', *Cambridge 2012: Innovation and Impact – Openly Collaborating to Enhance Education, a Joint Meeting of OER12 and OpenCourseWare Consortium Global 2012*, Cambridge, [online] Available at: http://oro.open.ac.uk/33452/

Andrade, A. *et al.* (2011) *Beyond OER: Shifting Focus from Resources to Practices*, Duisburg-Essen, pp. 1–191, [online] Available at: http://www.oerasia.org/OERResources/8.pdf

Armellini, A. & Nie, M. (2013) 'Open educational practices for curriculum enhancement', *Open Learning: The Journal of Open, Distance and E-Learning*, vol. 28, no. 1, pp. 7–20. doi: 10.1080/02680513.2013.796286.

Atkins, D. E., Brown, J. S. & Hammond, A. L. (2007) *A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities*, The William and Flora Hewlett Foundation, [online] Available at: http://www.hewlett.org/uploads/files/ReviewoftheOERMovement.pdf

Barker, E. & Ryan, B. (2003) 'The higher level skills for industry repository', in *Case Studies in Implementing Educational Metadata Standards* (CETIS), eds. P. Barker & E. Barker, [online] Available at: http://metadata.cetis.ac.uk/guides/usage_survey/cs_hlsi.pdf

Bissell, A. (2009) 'Permission granted: open licensing for educational resources', *Open Learning: The Journal of Open and Distance Learning*, vol. 24, no. 1, 97–106. doi: 10.1080/02680510802627886.

Browne, T. *et al.* (2010) 'The challenges of OER to academic practice', *Journal of Interactive Media in Education*, pp. 1–15, [online] Available at: http://www-jime.open.ac.uk/jime/article/viewArticle/2010-3/html

Butcher, N. (2010) 'OER dossier: open educational resources and higher education', *Workshop for Heads of Commonwealth Universities*, South Africa, [online] Available at: http://www.col.org/SiteCollectionDocuments/OER_Open_Educational_Resources_and_Higher_Education.pdf

Butcher, N., Kanwar, A. & Uvalić-Trumbić, S, eds. (2011). *A Basic Guide to Open Educational Resources (OER)*, Commonwealth of Learning & UNESCO, Paris, p. 133.

Campbell, L. M. *et al.* (2013) 'The learning registry? social networking for open educational resources?' *OER13: Creating a Virtuous Circle, Nottingham*, pp. 1–6, [online] Available at: http://www.medev.ac.uk/oer13/108/view/

Clements, K. I. & Pawlowski, J. M. (2012) 'User-oriented quality for OER: understanding teachers' views on re-use, quality, and trust', *Journal of Computer Assisted Learning*, vol. 28, no. 1, pp. 4–14. doi: 10.1111/j.1365-2729.2011.00450.x.

Currier, S. *et al.* (2004) 'Quality assurance for digital learning object repositories: issues for the metadata creation process', *ALT-J, Research in Learning Technology*, vol. 12, no. 1, pp. 5–20. doi: 10.1080/0968776042000211494.

Davis, H. C. *et al.* (2010) 'Bootstrapping a culture of sharing to facilitate open educational resources', *Learning Technologies, IEEE Transactions*, vol. 3, no. 2, pp. 96–109.

Downes, S. (2003) 'Copyright, ethics and theft', *Stephen Downes Web*, [online] Available at: http://www.downes.ca/post/65

Downes, S. (2007) 'Models for sustainable open educational resources', *Interdisciplinary Journal of Knowledge and Learning Objects*, vol. 3, pp. 29–44.

Ferguson, R. & Shum, S. B. (2012) 'Towards a social learning space for open educational resources', in *Collaborative Learning 2.0: Open Educational Resources*, eds. A. Okada, T. Connolly, & P. Scott, Hershey, PA, IGI Global, pp. 309–327. doi: 10.4018/978-1-4666-0300-4.ch017.

Geser, G. (2007) 'Prácticas y recursos de educación abierta: la hoja de ruta OLCOS 2012', *RUSC. Universities and Knowledge Society Journal*, vol. 14 (Special Issue: Contenidos educativos en abierto), [online] Available at: http://www.uoc.edu/rusc/4/1/dt/esp/geser.pdf

Gourley, B. & Lane, A. (2009) 'Re-invigorating openness at The Open University: the role of open educational resources', *Open Learning: The Journal of Open and Distance Learning*, vol. 24, no. 1, pp. 57–65. doi: 10.1080/02680510802627845.

Hylén, J. (2006). 'Open educational resources: opportunities and challenges', *Proceedings of Open Education*, [online] Available at: http://library.oum.edu.my/oumlib/sites/default/files/file_attachments/odl-resources/386010/oer-opportunities.pdf

Jacobi, R., & van der Woert, N. (2012). *Trend Report on Open Educational Resources 2012*, SURF Netherlands, Utrecht, p. 81.

Koppi, T., Bogle, L. & Bogle, M. (2005) 'Learning objects, repositories, sharing and reusability', *Open Learning: The Journal of Open and Distance Learning*, vol. 20, no. 1, pp. 83–91. doi: 10.1080/0268051042000322113.

Larsen, K. & Vincent-Lancrin, S. (2005) 'The impact of ICT on tertiary education: advances and promises', *Paper Presented at the OECD/NSF/U Michigan Conference 'Advancing Knowledge and the Knowledge Economy*, 10–11 January 2005, Washington, DC.

Marcus-Quinn, A. & Diggins, Y. (2013) 'Open educational resources', *Procedia—Social and Behavioral Sciences*, vol. 93, pp. 243–246. doi: 10.1016/j.sbspro.2013.09.183.

McAndrew, P. *et al.* (2012) 'Learning the lessons of openness', *Journal of Interactive Media in Education*, pp. 1–13, [online] Available at: http://www-jime.open.ac.uk/article/2012-10/pdf

McAndrew, P., Scanlon, E. & Clow, D. (2010) 'An open future for higher education journal', *Educause Quarterly*, vol. 33, no. 1, [online] Available at: http://www.educause.edu/ero/article/open-future-higher-education

McGreal, R. (2011) 'Open educational resource repositories: an analysis', *The 3rd Annual Forum on e-Learning Excellence, Dubai, UAE*, Dubai, [online] Available at: http://elexforum.hbmeu.ac.ae/Proceeding/PDF/OpenEducationalResource.pdf

McGreal, R., Kinuthia, W. & Marshall, S, eds. (2013) *Open Educational Resources? Innovation, Research and Practice*, UNESCO, Commonwealth of Learning and Athabasca University, Atahbasca.

Nikoi, S. & Armellini, A. (2012) 'The OER mix in higher education: purpose, process, product, and policy', *Distance Education*, pp. 37–41, [online] Available at: http://www.tandfonline.com/doi/abs/10.1080/01587919.2012.697439

Organisation for Economic Co-operation and Development (OECD). (2007) *Giving Knowledge for Free: The Emergence of Open Educational Resources*. OECD Publishing, Paris.

Pawlowski, J. & Hoel, T. (2012) *Towards a Global Policy for Open Educational Resources: The Paris OER Declaration and its Implications*. White Paper, Version 0.2, Jyväskylä, [online] Available at: http://monet.informatik.rwth-aachen.de/giotto/OpenScout_df6f1252-bfa6-11e1-a668-e13baff9bd23.pdf

Pegler, C. (2012). 'Herzberg, hygiene and the motivation to reuse: towards a three-factor theory to explain motivation to share and use OER', *Journal of Interactive Media in Education*, no. 1968, pp. 1–18, [online] Available at: http://jime.open.ac.uk/2012/04

Petrides, L. & Nguyen, L. (2008) 'Open educational resources? inquiring into author use and reuse', *International Journal of Technology Enhanced Learning*, vol. 1, pp. 98–117.

Richter, T. & Ehlers, UD. (2010) 'Barriers and motivators for using open educational resources in schools', *Open ED 2010 Proceedings*, Barcelona, pp. 1–12, [online] Available at: http://www.icde.org/filestore/Resources/OPAL/RichterEhlers-BarriersandMotivators-forUsingOERinSchools.pdf

Richter, T. & McPherson, M. (2012) 'Open educational resources: education for the world?' *Distance Education*, pp. 37–41, [online] Available at: http://www.tandfonline.com/doi/abs/10.1080/01587919.2012.692068

Rolfe, V. (2012) 'Open educational resources: staff attitudes and awareness', *Research in Learning Technology*, vol. 20, no. 1063519, pp. 1–13. doi: 10.3402/rlt.v20i0/14395.

Smith, M. & Casserly, C. (2006) 'The promise of open educational resources', *Change: The Magazine of Higher Learning*, vol. 38, no. 5, pp. 8–17. doi: http://dx.doi.org/10.3200/CHNG.38.5.8-17

Schuwer, R. *et al.* (2010) 'Production of OER? a quest for efficiency', *7th Annual Open Education Conference*, Barcelona, [online] Available at: http://openaccess.uoc.edu/webapps/o2/handle/10609/5103

Timmermann, C. (2014) 'Limiting and facilitating access to innovations in medicine and agriculture: a brief exposition of the ethical arguments', *Life Sciences, Society and Policy*, vol. 10, no. 1, pp. 1–20.

Tosato, P. & Bodi, G. (2011) 'Collaborative environments to foster creativity, reuse and sharing of OER', *European Journal of Open and Distance Learning of Open and Distance Learning (Special Edition OER)*, (Special Edition OER), pp. 1–6, [online] Available at: http://www.eurodl.org/materials/special/2011/Tosato_Bodi.htm

Tuomi, I. (2006) 'Open educational resources: what they are and why do they matter report prepared for the OECD', [Online] Available at: http://www.meaningprocessing.com/personalPages/tuomi/articles/OpenEducationalResources_OECDreport.pdf

Tuomi, I. (2013) 'Open educational resources and the transformation of education', *European Journal of Education*, vol. 48, no. 1, [online] Available at: http://onlinelibrary.wiley.com/doi/10.1111/ejed.12019/full

UN General Assembly. (1949) 'Universal Declaration of Human Rights', [Online] Available at: http://www.refworld.org/docid/3ae6b3712c.html

UNESCO. (2002) 'Forum on the impact of Open Courseware for higher education in developing countries final report', [Online] Available at: http://unesdoc.unesco.org/images/0012/001285/128515e.pdf

UNESCO. (2011) *Guidelines for Open Educational Resources (OER) in Higher Education*, UNESCO – COL, Paris.

UNESCO. (2012) '2012 Paris OER Declaration', *2012 World Open Educational Resources (OER) Congress, Paris, June 2012*, United Nations Educational, Scientific and Cultural Organization, Paris, [online] Available at: http://www.unesco.org/new/index.php?id=64395

Wang, M. Y. & Hwang, M. J. (2004) 'The e-learning library: only a warehouse of learning resources?' *The Electronic Library*, vol. 22, no. 5, pp. 408–415.

Weller, M. (2010) 'Big and little OER Conference Item', *OpenED2010: Seventh Annual Open Education Conference*, Barcelona, [Online] Available at: access.uoc.edu/webapps/o2/bitstream/10609/4851/6/Weller.pdf

Wiley, D. (2007) *On the Sustainability of Open Educational Resource Initiatives in Higher Education*, OCDE, [online] Available at: http://www1.oecd.org/edu/ceri/38645447.pdf

Wiley, D., Bliss, T. J. & McEwen, M. (2014) 'Open educational resources: a review of the literature', *Handbook of Research on Educational Communications and Technology*, pp. 787–794, Available at: http://link.springer.com/chapter/10.1007/978-1-4614-3185-5_63

Wiley, D. & Gurrell, S. (2009) 'A decade of development...', *Open Learning: The Journal of Open and Distance Learning*, vol. 24, no. 1, pp. 11–21. doi: 10.1080/02680510802627746.

Willems, J. & Bossu, C. (2012) 'Equity considerations for open educational resources in the glocalization of education', *Distance Education*, pp. 37–41, [online] Available at: http://www.tandfonline.com/doi/abs/10.1080/01587919.2012.692051

Wilson, T. (2008) 'New ways of mediating learning: investigating the implications of adopting open educational resources for tertiary education at an institution in the United Kingdom as compared to one in South Africa', *International Review of Research in Open and Distance Learning*, vol. 9, no. 1, pp. 1–19.

Windle, R. *et al.* (2010) 'Sharing and reuse in OER: experiences gained from open reusable learning objects in health', *Journal of Interactive Media in Education*, pp. 1–18, [online] Available at: http://jime.open.ac.uk/jime/article/viewArticle/2010-4/html