

Chapter 9

Research on open educational resources (OER) and the challenge of the extended lifecycle

This chapter investigates research challenges specific to OER. Reviews of existing research have concluded that there have been insufficient analyses of the use, sharing and adaptation of OER. This chapter will cover three sources of information about OER usage, sharing and adaptation patterns: 1) automatic tracking of usage in OER repositories; 2) user surveys and 3) qualitative studies. The potential of each of these information sources is examined and the real benefits in practice are presented. The main purpose is to examine the research potential of each of these information sources and how they can be combined to provide more insight into the practices of OER use, sharing and adaptation.

Main policy messages

More research on OER is required. Adaptability and the extended lifecycle are the two main benefits of OER, but they also make their impact difficult to study. To understand how OER can succeed, more research and evaluation of successful initiatives are necessary to find the best ways to achieve widespread adaptation and reuse of existing OER.

Challenges to tracking OER usage exist. Whilst OER repository managers recognise the benefits of tracking OER usage, they are confronted with two main challenges: 1) many users of OER are not registered members of a platform, which means that their activities cannot be tracked extensively; and 2) some or all of the extended lifecycle of an OER happens outside of the repository in which the resource was originally found.

User surveys can capture information on users. User surveys have the potential to capture information on user practices but are confronted with the almost insurmountable challenge of recruiting a representative sample of users. Nevertheless, user surveys do provide indications that OER have an extended lifecycle and sharing and adaptation do occur frequently.

Communities of practice foster sharing. Qualitative research based on activity theory provides a broader insight into what inhibits or fosters the sharing and adaptation of OER. Research finds that the communities of practice necessary for the development and sharing of OER are often at least partly closed to outsiders. This suggests that OER sharing – until it reaches common practice – is reliant on closed or semi-closed communities of practice, which inhibit some of the user diffusion that might be expected. The challenge is to inject permeability into these community structures in order to promote a more dynamic and extensive practice of sharing.

The research challenge

As already noted, the key traits of OER are that they are open to access and open to adaptation; the latter being unique to open practices (as in open source programming).¹ If OER are to make the transition from having innovation potential to being well integrated into common educational practice, many more and many different users need to take up this form of open practice (Weller, 2014). The more that different types of users are integrated into the practice of using OER, the richer that OER will become over their lifecycle of production, sharing and adaptation. This process has been termed “generative diffusion” of innovation, i.e. the same innovation has impact across the board, but instead of being replicated, it is adapted to new contexts (Murray, Caulier-Grice and Mulgan, 2010: 82).

This report argues that OER should be considered a social innovation which can only be successful if it leads to new social practices (Howaldt and Schwarz, 2010). There is criticism that many social innovations focus too much on production and not enough on use, as outlined in a report by Murray et al.: “The promotion of social innovation has tended to focus on the supply side and how innovations can be diffused among service providers through experts, intermediaries, and collaboration. However, we argue that the design of services should start from the user, and that its diffusion should be approached from the perspective of users, not least because they are in many cases also co-producers” (Murray, Caulier-Grice and Mulgan, 2010: 85).

Over the past few years, the United Kingdom’s Open University’s OER Research Hub² has established itself as a facilitator and supporter of research initiatives across the world. In a recent report it concluded that not enough research on OER is being carried out, and that it is often based on small-scale initiatives of persons involved in OER project themselves (de los Arcos et al., 2014). Exceptions to this trend are becoming more frequent as shown by Hilton’s Review Project on OER

research.³ At the same time, Hilton also notes that most of this serious research focuses on OER as a replacement technology and not on answering the question of what new practices OER lead to:

“In each of the studies reported above [i.e. on the website], OER were used in a manner very similar to the traditional textbooks they replaced. We look forward to reviewing empirical articles describing the learning impacts of open pedagogies.”

With a focus on research that accompanies OER initiatives, a recent Europe-wide review of OER in adult education concluded (Falconer et al., 2013: 32):

“Many initiatives collect download statistics and use Google Analytics, but have very little information on the ways in which users are using OER, or of why users do not come flooding to repositories.”

Describing the OER lifecycle

One of the outstanding characteristics of OER is their lifecycle (Fulantelli et al., 2008). Due to the openness and adaptability of the resources, they will often have an extended lifecycle in a way that other closed and more tightly controlled educational resources do not. The lifecycle of an open educational resource can be described in three stages:

1. Original production of a resource by a certain producer.
2. Ascription of a resource to a particular use and (at least implicitly) to a particular user group.
3. Adaptation of a resource. This adaptation can take two main forms:
 1. The adaptation of the resource by changing the ascription, i.e. repurposing the resource for an alternative use or an alternative group of users, thereby returning to phase 2.
 2. The adaptation of the resource by changing its content or the content with which it is used, thereby creating a new product and returning to phase 1.

Figure 9.1 below illustrates this iterative process. The real dynamic of this process is determined by people sharing and redistributing OER so that they reach a larger and broader group of users and potential adaptors.

Figure 9.1. **Iterative process of OER production and reproduction**

Process	Outcome	Person(s)
1. Production	Product (OER)	Producer
2. Ascription	Metadata	Producer User
3. Adaptation	Metadata New product	User Producer-User ("prosumer")

Content can be adapted through revision or remixing. Revision is based on the original product (i.e. OER), whereas remixing combines different products or works. Revision, therefore, produces an OER that is likely to be an improved version of the original OER, whereas remixing is likely to result in a completely new OER.

This iterative process involves the producers and users of OER in different ways. The producer, who makes the original product, is likely to provide the first description of an OER through free text

and ascribe metadata according to various schemes (e.g. Learning Resource Metadata Initiative – see Chapter 6). In addition, many host repositories allow users to add metadata and annotations to describe the resource and how it can or should be used (e.g. lower secondary schooling for the field of biology). Annotations may also be added to only a part or parts of an OER (e.g. on specific “pages” of a book).

User ascription to a certain usage may signify an adaptation from the original purpose (repurposing type a). If, however, a user is involved in a more fundamental adaptation of an OER that results in the production of a new OER (repurposing type b), this person is acting both as a user and a producer (often called a prosumer).

OER are often placed in online repositories for ease of access and distribution. Initiatives to track OER usage along their lifecycle are confronted with the challenge that the initial repository used to distribute the OER may not be where iterations, such as adaptation and/or improvement, take place.

Figure 9.2 sets out a general scheme for the likelihood of a particular process in the OER lifecycle taking place within the same repository, starting from the original upload. As the major argument in support of OER is ease of redistribution, the programmatic assumption is that the producer of an OER uploads it to a repository in order for it to be redistributed.

Figure 9.2. **Scheme – likelihood of iteration in same repository**

Process	Likelihood of process occurring in original repository	
Upload of OER to repository	High	
Ascription of OER to use and user	High	
Adaptation of OER:		
– Repurposed	High (if change to metadata)	Low (if change to product)
– Revised	High	
– Remixed		Low

Even though this is a general scheme that may not mirror reality in all instances, it shows the potential for capturing and tracking usage data within a repository. Information on, for example, the type of person making changes to a resource may be available as soon as users log in to a repository.

The scheme identifies that it is unlikely that a repository will capture the repurposing of an OER if a product has substantially changed during its lifecycle. Substantial changes include a change in the digital format of a media file or changing the format from digital to non-digital (as shown in the case from Malawi, Chapter 7); a simplification of the language used; or changing exemplary practice cases in an OER to tailor it to the specific context of use (as shown in the case of Leadership Public Schools, Chapter 8).

The scheme furthermore shows that remixing OER to create an entirely new product is unlikely to occur within the original repository as this usually involves bringing together OER elements from various sources, including other repositories. Both quantitative surveys of users and qualitative studies can capture detailed information on who the users are and which processes (e.g. remixing) they undertake in connection with OER.

The potential of automatically tracking user behaviour

Users of OER generally search and retrieve OER from digital repositories on the web. These may be repositories from particular institutions, for particular services or covering particular fields. The repositories may be specifically for educational needs, or more general digital repositories of resources that can be used for education, such as Wikipedia, YouTube or Flickr. Some of these repositories directly contain OER, while others, also known as meta-repositories or registries, contain links to OER in other places on the web. Each of these repositories presents, to some extent, the opportunity to track the volume of traffic to, from and within their site.

Automatic tracking built into the repositories helps to make the processes of sharing, adapting and (re)creating OER visible. This is of interest to stakeholders who are funding or indirectly supporting OER initiatives, and it is important for users, producers and prosumers as the information is likely to encourage more people to share adaptations of original OER.

In 2012, OER tracking was still judged to be in its infancy due to the dynamics surrounding OER use and reuse. However, Thomas et al. state that “while it is true that no single approach will capture all use and reuse of a resource, and that some use will be hidden from all reasonable attempts at tracking, there is still more to be lost than to be gained from making no attempts to track the use and reuse of open educational resources” (Thomas et al., 2012: 82).

Following a review of the European situation, a recent EU report stated that currently there is “no way to track the quantity or quality of reuse or repurposing of learning objects” (Camilleri, Ehlers and Pawlowski, 2014: 45). This suggests that there is work to be done in the area of usage tracking within OER practice, and that a greater understanding of the challenges of tracking OER use is needed.

A short survey of tracking in OER repositories

In mid-August 2014, a survey of 20 questions was sent out to 121 OER repositories across the world in order to better understand the practice of tracking. The repositories addressed by this survey were chosen first from the list of OER compiled by Atenas (Atenas, 2014). Additionally, the survey aimed to include some repositories with mixed resources – i.e. both OER and non-open resources – as they may have different tracking practices that could motivate the discussion around tracking for all repositories. Twelve responses were tendered within the short time given (the deadline was mid-September).

The responses from a variety of repositories (see Table A9.1, in Annex A9) across the world highlighted a general reluctance to require users to log in. Delta University of Technology (Netherlands), for instance, said that the repository does not require a login as “we aim to have our materials accessible as openly as possible.” Jorum (United Kingdom), said: “We have found that by reducing barriers to access/reducing authentication requirements, the use of Jorum services increases.”

However, there were a few exceptions. In the cases of SNAR (Faroe Islands), Metodický portál RVP (Czech Republic) and Maknaz (Saudi Arabia), the respondents signalled that login was required to access the comments functions or learning analytics. This may be a way forward for other repositories, i.e. to keep standard access free of login, but to add functions that are only accessible to those who log in. As the respondent from Maknaz stated: “The users require a login to access most of the OERs. This helps us to analyse patterns of the access and usage. Our system is still under development. We plan to have a robust tracking system to track the usage of OERs, by which we intend to enhance the value and usage of OER.” This approach, which is systematically followed by the Khan Academy’s portal (Box 9.1), seems to be unusual at present for most OER repositories.

Box 9.1. Tracking by the Khan Academy web portal

The Khan Academy is a non-profit organisation created in 2006 by Salman Khan to provide “a free, world-class education for anyone, anywhere”. The organisation produces micro-lectures released via YouTube. The Khan Academy web portal integrates video lectures, practice exercises and tools for educators into planned lesson paths. The Khan Academy learning materials meet OER criteria as content is released with an open Creative Commons licence (CC-BY-SA) on the Khan Academy portal, and videos on YouTube (where they are hosted). The lack of restriction on access, use and reuse of the resources provided has led to the learning materials being integrated into existing learning settings, such as classroom learning, with the goal of providing learners with more individualised learning beyond the normal limitations of the classroom (see case in Chapter 3).

Although openness is actively supported by the Khan Academy, the main strategy of the organisation is to provide a well-structured and interactive learning environment on their own web portal. This leads to a rather closed and top-down approach to learning resource production and quality assurance, which is unusual for OER-based initiatives. With the objective of improving the learning experience of users and making it more effective, the Khan Academy uses learning analytics, which cannot be implemented without effective tracking. Tracking is also used to better understand users’ learning paths so that resources and the learning environment can be improved.

The potential of user surveys

Usage tracking within a repository is generally very limited as even with registered users, only search behaviour, downloads, and perhaps reviews can be seen. The really interesting usage – what teachers and learners actually do with OER to aid learning – almost invariably happens outside the repository and will only become visible if users redistribute the OER back into the repository or post an account of their use. User surveys have the advantage over automatic tracking of being able to cover the following key questions:

1. Who are the OER users? (e.g. personal and socio-demographic characteristics)
2. How do they use OER? (e.g. in what learning environment)
3. Do they adapt OER for other purposes? (e.g. create a new OER from one or more existing one/s)
4. Do they share OER with others, especially through uploading them to a repository or similar?
5. Do they also share the adapted OER with others?

There are two main types of survey:

- Surveys that focus on users of a particular service or repository.
- Surveys that focus on a particular group of (potential) users, e.g. non-traditional learners or learners enrolled at a particular educational institution.

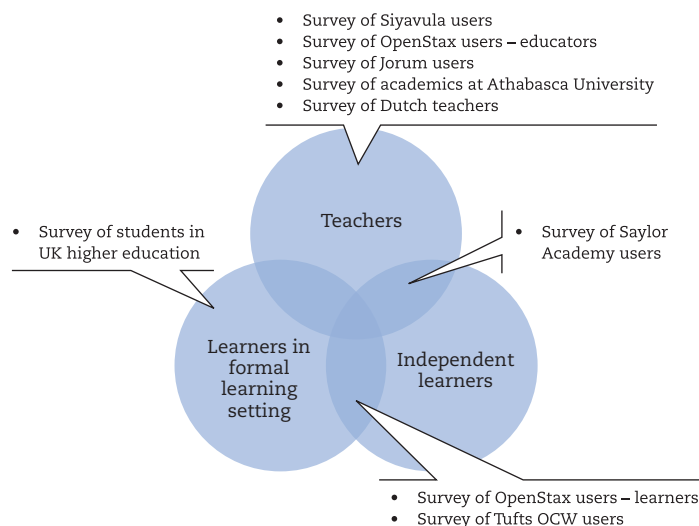
In general, a survey will try to recruit a subgroup (sample) of potential addressees to participate in the survey. The difficulty of this task depends on the group of addressees that the survey is targeting:

- *Users of a particular service (e.g. repository):* Obtaining a balanced sample may be difficult, and the survey will not be able to generalise the findings to those who do not use the repository. The problem of sampling for this group is that sufficient information about all of the users is necessary in order to draw a sample. Unless this is captured by the repository in some way (e.g. through tracking), such information is not likely to be available. For this reason, the sample is unlikely to be representative of the total population of users since these two groups (subgroup of total population and total population) cannot be directly compared on any standard variables.

- A *particular group of (potential) users*: Sampling is likely to be easier as some information (e.g. via administrative statistics) on this population will already exist (e.g. the total share of non-traditional students in a national system). Sampling is most feasible when this group of (potential) users is limited by geographical boundaries (e.g. all potential users in Germany). However, most OER services are not limited to a geographical boundary, which makes drawing a representative sample of all (potential) users difficult. An additional problem is that the object of investigation – the OER – must be described in sufficient detail for the survey respondents to meaningfully answer the questions on OER use. For instance, there is a risk that the respondents may be answering with digital educational resources rather than OER in mind.

The remainder of this chapter highlights the central findings of implemented surveys, which are used as practice examples throughout this report. For the analysis of the survey data, surveys were categorised based on the user groups they captured – see Figure 9.3 below. The very nature of OER being open to access, and also open to adapt and to (re-)use for different purposes means that OER may be used by more than one user group. The three main groups of user are: learners primarily in a formal learning setting (e.g. enrolled in school or university), independent learners (e.g. those working primarily without being enrolled in a formal learning setting), and teachers at primary, secondary or tertiary education level. However, users of a particular OER or OER service may belong to more than one of these user groups.

Figure 9.3. **Categorisation of OER surveys**



What can we learn from practice and where are the gaps?

The review of well-known surveys (see Table A9.2 in Annex A9) shows the prevalence of low respondent numbers and the use of convenience sampling⁵ for recruiting survey respondents, which are significant weaknesses in the surveys. Whilst low respondent numbers simply requires more effective recruitment, the use of convenience sampling can only be improved through combining the automatic tracking of some basic user characteristics and sample recruitment.

a) Surveys of learners in a formal setting

- *Students in United Kingdom's higher education* (NUS UK, 2014): The National Union of Students in the United Kingdom, with the support of the Higher Education Academy (a governmental

body), carried out a representative survey in order to better understand how tertiary education students, a main user group of OER in the United Kingdom, viewed OER. The survey split the respondents into two groups of similar size – traditional and non-traditional students. Non-traditional students had at least one of the following characteristics: enrolled at the Open University UK, enrolled for part-time studies, and/or aged 25 or over. The survey asked students to define OER in a free text box: 23% of traditional and 14% of non-traditional students managed to identify most OER features. Almost all students identified open access and distribution as key features of OER. However, less than one-fifth of traditional students and only 6% of non-traditional students identified all characteristic features of OER. This does mean that the ensuing questions on OER in the survey lack reliability due to the students' very broad understanding of OER (i.e. they are likely to have mixed up OER with their understanding of digital media used for educational purposes in general).

The key results regarding usage were: students felt that OER improves the quality of their learning experience (60%) and gives them the opportunity to improve their grades (50%). They appreciate OER for providing access to content at home and the opportunity to grasp complex subject matter. Regarding their own sharing practices, students stated that they are very likely to share good OER that they have found (64% of traditional students and 61% of non-traditional students). Around 45% of students from both groups also agreed or strongly agreed that they would share resources they had created. Regarding how students see academics' practices of sharing: 52% of traditional students and 54% of non-traditional students stated that they value academics who integrate other people's or institutions' OER into their own materials more than academics who do not. Furthermore, 61% of traditional and 60% of non-traditional students value academics who make their materials openly available more than academics who do not. These assessments echo a perception that is common in academic research practice: that sharing through peer review is a positive activity that improves the reputation of researchers whose work is used by others.

b) Surveys of learners in a formal setting and independent learners

- *OpenStax College openly licensed textbooks – learners' survey* (Pitt, 2014b): The OpenStax initiative grew out of the Connexions OER repository at Rice University, a private research university in Texas, USA. Started in 2012, it aims to provide free textbooks in major course areas (e.g. statistics, physics, chemistry) to over 10 million tertiary education students. The materials are currently used by 489 colleges in the United States. In 2014, OpenStax started a new initiative to provide textbooks targeted at upper secondary schooling. Nearly two-thirds of the respondents to the learners' survey were between the ages of 15 and 18, and four-fifths were younger than 24. Despite the textbooks being intended for use in formal settings of early stage tertiary education, 18% of the user-respondents had already obtained a Masters' degree and 30% of respondents had not finished upper secondary schooling. This highlights the envisaged spill over of OER from the original formal setting (first years of tertiary education) into other formal or non-formal learning settings. The fact that two-thirds of respondents (63%) said they were using the resources for personal development supports this assertion.
- *Tufts OCW (Open Courseware)* (Tufts, 2011, 2012): This repository from the private research university Tufts University, in Medfield (United States), was established in 2005 and aims to distribute free and open content to as many people as possible. It does not provide credit for taking courses nor access to university staff. The repository had around 650 000 visits in 2012, with approximately half of the visitors situated in North America and one-quarter in Asia. In 2011 and 2012, the repository carried out a short pop-up questionnaire of its users, which appeared when users accessed the repository. In both years, around half of the

respondents classified themselves as self-learners and one-third as students in a formal setting, which fits with the portal's mission. The three most frequently chosen reasons for visiting the portal in both years were: personal learning, planning course of study, and to complement a course being taken in another formal setting. Regarding the benefits of the course, respondents agreed most strongly that the resources increased their interest in the topic area and supplemented their existing knowledge.

c) Surveys of independent learners and teachers

- *Saylor open licensed course materials – users' survey* (Farrow, 2014): The Saylor platform currently contains 317 courses, chosen based on subject areas that have high enrolment figures in higher education in the United States and for which there is subsequently a high demand. The service is particularly focused on non-formal learners. The materials are peer reviewed, but the site provides no direct pedagogical support for students. There is no obligation to register in order to use the site. Registered users, however, can take automated examinations at the end of their courses and obtain a digital portfolio of what they have achieved.⁶ Respondents to the user survey were recruited through a pop-up survey upon logging in.

Only 42% of the respondents were from the United States, which indicates a high level of usage of the repository from outside the country. In keeping with Saylor's mission, only 16% of the survey respondents were in formal learning settings, with most being non-formal learners. Two-thirds of the respondents (64%) were currently in employment. The main motivations for using the site were the opportunity to study at no extra cost (91%) and the desire to have a learning experience (76%). Of those in formal education, over half stated that the participation in Saylor courses increased their enthusiasm for their studies and their interest in the subject studied. More than one in ten users of the site (11%) were teachers who stated that usage of the materials provided inspiration for their own lessons (72%), broadened their coverage of the curriculum (55%), and broadened the range of teaching and learning materials they used (57%). Nearly half of the teachers also stated that studying the Saylor materials helped them develop their own teaching (44%). No information was obtained on users' adaptation of the Saylor materials for their own purposes.

d) Surveys of teachers

- *Siyavula openly licensed textbooks and associated services* (Pitt, 2014c): This non-profit organisation based in Cape Town, South Africa, provides openly licensed textbooks, particularly in the subject areas of mathematics and science. The textbooks are provided in many media formats in order to increase their accessibility and are aimed at learners in primary and secondary education, with a particular focus on upper secondary level. Since 2011, around ten million hardcopies of the textbooks have been distributed throughout South Africa and the website has around 800 000 learners reading its content each month. The survey of users of Siyavula services particularly captured those users who have closest contact with the enterprise: well-qualified educators largely from private independent schools that have the technical and digital infrastructure that enables them to profit most from Siyavula products in their various media formats. The sample is therefore not representative. The user-respondents stated that the Siyavula products enabled them to broaden their coverage of the set teaching curriculum (65%) and inspired them to new ideas (71%). Although the OER were mostly used to supplement other materials (58%), one-third of respondents had made changes to the textbooks for their own use and 15% of user-respondents had created their own OER and uploaded them to a different repository.

- *OpenStax College openly licensed textbooks – educators’ survey* (Pitt, 2014a): Respondents to the survey of educators using OpenStax stated that they used OpenStax textbooks as a supplement to other materials (96%), to gain new ideas and inspiration for their own practice (80%), and to offer a broader range of materials to learners (76%). On the matter of adaptation, 90% of respondents stated that they had made changes to the textbooks for their own use. Regarding general practice in the context of OER, one-third of respondents stated that they had added resources to a repository in the past and a smaller share (14%) had also created their own OER and uploaded them to a different repository.
- *Users of Jorum* (Burke, 2014): This repository for British further and higher education contains around 16 000 OER and had approximately 400 000 views in 2014. The site is open to any user, however, uploads are largely by users from within British tertiary education as most of the United Kingdom-based OER projects deposit their final products in this repository. The split of content between higher and further education is roughly 80% to 20%. This small user survey from 2014 (first of a planned annual survey) showed that 40% of respondents were from further education institutions, which may be an indication of the possibilities offered by OER for dissemination across educational sectors (i.e. from higher to further education). The large majority of respondents were not teachers or academics, with 42% of them librarians and 16% from e-learning support services. This reflects the role of libraries and e-learning support centres as internal disseminators of information and advisors at their respective educational institutions within British higher education. No information was contained on their adaptation practices.
- *Survey of academics and staff at Athabasca University, Canada* (Mckerlich, Ives and McGreal, 2013): Athabasca University is a distance educator for higher education with 40 000 students enrolled (equivalent to around 8 000 full-time students). The institution employs 1 300 staff, of which around 200 are academic staff. The university has a strong focus on using OER for its course provision. The survey of staff was introduced as a possible long-term monitoring tool for OER familiarity, creation and use. It elicited 154 responses, with 75% of respondents involved in course design and delivery as academics or course developers. Unsurprisingly, given the mission of the university, only 11% of respondents were unfamiliar with the term “open educational resources”, and 41% of respondents said that they use OER, with the most common formats being scholarly journal access, videos, images, textbooks and audio files. Almost one-third of respondents (29%) stated that they create OER, with the most common formats being tutorials, quizzes, audio, video, images, group lessons and textbooks. Mckerlich et al. (ibid.) suggest using the ratio of use to creation of OER as a benchmark for the intensity of OER creation and use. In the case of the Athabasca University, which has a strong focus on OER and open practices, the ratio is 29:41, which equals 71%.
- *Survey of teachers and academics in Dutch education sector* (van Acker et al., 2014): This survey covered a representative sample of teachers and academics in the Dutch education sector based on simple demographic characteristics: 47% of the sample worked in primary education, 42% in secondary education and 11% in higher education. The study focused on the sharing of OER (loosely defined in the study as “digital learning materials”) and differentiated between sharing OER via the Internet and sharing interpersonally with colleagues from the same institution. It found that 50% of educators shared digital learning materials interpersonally, and 25% shared them via the Internet (e.g. through a repository). For frequent sharers: 20% of teachers shared digital resources frequently within their institution (at least several times a month), and only 10% via the Internet. Resources shared included their own tests, their own texts, other people’s texts with adaptations or their own images, and presentations. Resources were least likely to take the form of audio or video fragments.

The study found that one of the main reasons for sharing was the teachers/academic's belief that they had something of value to share, a construct that the authors of the study termed "knowledge sharing self-efficacy". The authors also noted that there was a high share of educators with an intention to share, but only a weak correlation between the characteristics of educators intending to share and those that actually share learning materials. The authors concluded that the findings suggest a cultural change to foster the value of sharing may be necessary to encourage sharing behaviour.

Interpretation of survey results

There are caveats to interpreting the survey results due to problems with the various samples used in the surveys. However, some patterns can still be identified.

The surveys of students and independent learners give an impression of why learners use OER. The main arguments emerging from the surveys of students in the United Kingdom, learners using OpenStax and those using Tufts OCW were that OER *support personal learning and supplement knowledge* from other areas. When asked about the benefits of using Saylor Academy OER, over half of the learners who were concurrently enrolled in formal learning settings at higher education institutions stated that the resources increased their enthusiasm for their studies and their interest in the area studied.

The surveys that focused on particular services (OpenStax, Tufts OCW, Saylor Academy) had a high share of independent learners. While it is to be expected that there will be a high share of non-formal learners using Tufts OCW and Saylor Academy, where these learners are the main focus group, it is interesting to note that OpenStax, which focuses on the early years of tertiary education, appears to be used by much younger and much older students than envisaged (over half of the respondents were studying at the Master's level or had not left school yet). This is a strong argument for the distributive benefits of releasing educational resources as OER.

Statistics for the creation of OER were captured in the surveys from Siyavula, OpenStax and Athabasca University. The two textbook repositories reported that around 15% of users created their own OER. Athabasca University's figures were twice as high at 29%, which is unsurprising as the university has a focus on OER. It is interesting to note that for Wikipedia, 31% of its active users (i.e. users who have performed an action in the last 30 days and who make up less than 1% of all Wikipedia users) make contributions to the encyclopaedia, but only 8% do this regularly (van Acker et al., 2014). Although this makes the ratio of 15% look relatively high, as the adaptation, improvement and redistribution is a central tenet of OER, the ratio should ideally be higher than for an encyclopaedia, where the bulk of users are meant to be passive readers.

Siyavula and OpenStax showed high levels of adaptation: 33% and 90% respectively. The United Kingdom's student survey found that students appreciate academics' open practices, with around half of the students surveyed stating that they valued academics who integrate other people's or institutions' OER into their own materials more than academics who do not. Furthermore, well over half of the respondents stated that they *value academics who make their materials openly available* more than academics who do not.

The survey of Dutch educators differentiated between sharing (and adapting) OER with colleagues at the same institution, which was termed "interpersonal sharing" and sharing via the Internet, i.e. digital sharing. The analysis showed that 50% of the surveyed teachers share interpersonally, but only 25% share via the Internet. This highlights a reluctance of educators to share educational resources unless they see value in the resource being shared digitally: "knowledge sharing self-efficacy". The authors noted, however, that they did not investigate the possible effects of communities of practice on rates of sharing. Such research is more feasible in the form of a qualitative study.

The potential of qualitative studies on the practice of sharing by teachers and academics

If OER are extensively integrated into the learning setting (see Chapter 4), they can lead to a new type of teaching and learning. This is a challenge for educational research, but one that is familiar to research on distance education. In his review of online distance education, Saba notes a growth in the application of qualitative research as a reaction to a predominantly quantitative approach where “distance education is not examined on the basis of its own merits. In contrast, it is looked at in comparison to other forms of education, such as face-to-face classroom instruction, on-campus education, and so forth” (Saba, 2014). He says that this comparison has not led to any significant findings for educational practice.

Knowledge sharing is a key element to the dynamic nature of OER: creation, sharing and repurposing. In a review of research on knowledge sharing (Wang and Noe, 2010: 126), Wang and Noe argue that future research on knowledge sharing should bring together quantitative and qualitative approaches and contributions. They say that many existing studies in the field are quantitative and pay too little attention to the underlying structures and mechanisms that can influence sharing. They argue that more qualitative research is necessary in order to better understand practices and to design new quantitative research.

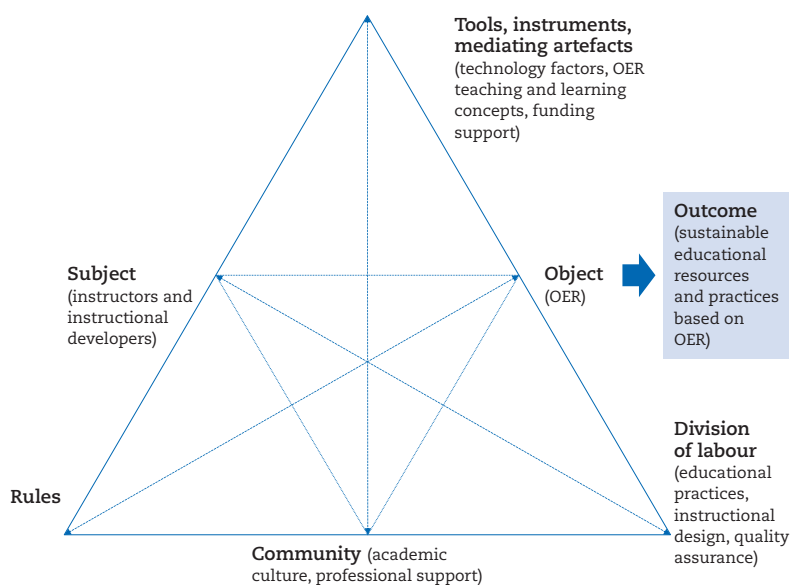
The most common framework used for discussing the development of OER sharing is Engeström’s activity theory, which takes a more holistic view of human activities (Engeström, 2001, 2011).

What makes this approach particularly useful is the possibility to focus on OER development and sharing as an outcome that is influenced by the inter-relations of various activities. The approach starts out from the understanding that the production of an outcome (e.g. the practice of sharing) involves a process between a subject (e.g. an academic) and an object (e.g. a learning resource), which is mediated by a socio-cultural context. The socio-cultural context is made up of tools, on the one hand, and rules, community and the division of labour, on the other. This construct is termed an activity system. “Activity systems are socio-cultural settings where community members (subjects) work on some sort of object or problem space, transforming it into an outcome using tools which may be technological (such as software) or conceptual (such as pedagogic theory). The tool-mediated action may be constrained or enabled by implicit and explicit rules and the broader social context (community) within which the activity takes place. Labour is divided among the community members’ (roles).” (Littlejohn et al., 2014).

It has, among other things, been applied to the conceptualisation of the UK Open University’s OpenLearn (McAndrew, 2011; McAndrew et al., 2009), to learning materials in a South African university (Hodgkinson-Williams and Paskevicius, 2012), to developing OER for adult learners in Europe (Falconer et al., 2013) and by academics in Canada (Porter, 2013).

For his analysis, Porter translates the Engeström triangle of activities into the OER context – see Figure 9.4 (Porter, 2013: 141). The activity theory approach starts off from the assumption that a certain configuration of the activity system exists. However, this configuration can be disturbed by an emergent contradiction, which is caused by a reform. A simple example would be that of educators (subjects) who are used to producing (and using) commercial textbooks (objects) to support the attainment of learning objectives (outcomes). For this, they use specific tools within a context of rules (e.g. only accredited books), a collective community (e.g. other teachers) and with a certain division of labour (e.g. production of the textbook by a publisher with the support of selected authors). Changing the object to an OER (e.g. an open textbook or even alternative educational resources) can lead to disruptions due to the contradictions, for instance, of a new definition of the community of practice or new definitions for quality assurance. The activity theory approach thus provides an insight into the inhibitors and enhancers for sharing OER, construed as an innovation and therefore an emergent contradiction to common practice. Policy interventions can help to change this configuration or help to deal with new challenges resulting from the new configuration (Chapter 11).

Figure 9.4. Activity theory approach for OER practices



Source: Adapted from Porter (2013), *Exploring the Practices of Educators Using Open Educational Resources (OER) in the British Columbia Higher Education System*: 141.

Lessons learnt

Activity theory was also extensively used to analyse the practice of sharing OER in a study on British higher education in the framework of a large-scale, nationwide programme to release OER from universities across the United Kingdom (UKOER), which ran between 2009 and 2012 (Littlejohn et al., 2014). This study focused on the role of communities of practice in encouraging collaboration and sharing between academics to develop of OER.

The study identified significant tensions between the twin goals of open release (worldwide instead of only to a certain group of users) and open development (in a collaborative fashion cutting across traditional geographic, institutional, and disciplinary boundaries, etc.). Tensions arose around tools due to the use of different technologies; around the concept of dynamic adaptation instead of more controlled static resources (with discrete versioning) (see Chapter 9); and around rules, community and division of labour in relation to the assignment of roles for developing and assessing the quality of OER.

The survey of Dutch educators (above) showed that academics are reluctant to share and use other people's work, even though this practice is appreciated by students (as shown in survey of British students). However, Littlejohn et al.'s (2014) research showed that academics felt reusing others' content reflected poorly on their own expertise and academic identity. This accounted for a reluctance to share and adopt other people's work on their part. One solution to this emergent contradiction, which Littlejohn et al. have observed, has been the release of resources on closed platforms that are only accessible to a certain community of users and that provide a certain exclusivity and safety for experimentation.

However, Littlejohn et al. (2014) consider this solution restrictive as it generates a new barrier to openness. They found that communities with common values and ways of doing things were most able to adapt to change. In the case of the United Kingdom's OER programme, many of these communities of practice were formed around projects. These communities achieved adaptation

through a partial opening of their practices, for instance by working less hierarchically or releasing OER in repositories meant for certain user groups. In this way, they also managed to keep some elements of their closed community intact. For this reason, the authors conclude that the biggest challenge to practices that enhance sharing and adaptation of OER lie in the issue of how to achieve diffusion across communities.

For this reason Littlejohn et al. suggest that membership of communities of practice should be more fluid, with new members entering and old members leaving in order to keep the boundaries more permeable. This can be seen with communities that combine around projects. The challenge with making membership more fluid is to enable some stability at the same time, as too much instability will inhibit new practices forming around the new tools or ways of working.

One solution to this challenge is presented by the Free High School Science Texts (FHSST) project and the later practices of Siyavula for the production of additional open textbooks (see Chapter 10). Although OER in this case are also entirely peer-produced texts, the responsible community of practice is centred around a South African non-profit organisation, Siyavula, which systematically recruits contributors for specific tasks and centrally integrates their inputs (Benkler, 2006: 101). This structure has led to the national success of this initiative within South Africa.

Littlejohn et al. (2014) highlight that an alternative approach to more fluid membership of communities is to make communities broader, pointing to the OER characteristic of adaptability and the principle that they can be perceived by different user groups as relevant objects for different reasons. In this context, OER are “boundary objects” (Star and Griesemer, 1989), around which different communities can collaborate to work on the same object for different end-uses or end-users (see Pawlowski, 2012). Along these lines, Benkler makes the case for working with OER that can be used by many different user groups (Benkler, 2006: 101). A recent survey of Community Colleges in the United States showed the predominance of such OER, with videos and images found to be the most widespread types (Farrow and Daly, 2014). However, the Catalyst from WikiSeats, which encourages various types of learning around the practical problem of creating a stable stool, is perhaps the best example of such a boundary object and how it can foster innovation (see Chapter 3).

Combining approaches to confront the research challenge

The argument that OER will become richer if an increasing amount of different types of users are integrated into the practice of using and adapting OER leads to the challenge of trying to capture these new groups. This chapter has focused on the central characteristics of OER – adaptability and extended lifecycle – and found considerable gaps in the available studies. It argues that OER tracking, though seldom used extensively in practice, could provide a basis for more representative quantitative surveys on use, reuse and adaptation by different user groups. At the same time, it finds that quantitative approaches will struggle to capture and understand the extended lifecycle of OER, which leaves qualitative research with an important role to play.

It is especially important to better understand the differences between active and passive OER users. As passive users are less likely to respond to an OER survey, or even recognise the term OER, they are likely to be under-represented in any survey. This does not mean, however, that they do not benefit from OER, but they are unlikely to adapt OER for reuse and redistribution. As Weller states, they are likely to be “consuming rather than creating and sharing” (Weller, 2014).

The optimistic view is that passive users can be “infected” by the OER “bug” and will become active prosumers at a later date. Research taking this view should look into drivers that can foster this development, and how to remove inhibitors. The more pessimistic view would be that the majority of users will remain passive. Research taking this view should focus on how to make OER transparent (e.g. through ascriptions in a repository), how to use standardised information and

quality assessments to foster discoverability and use, and how to promote trust in OER even if they have not been created by a member of a person's own (local) network (see Chapter 6).

Notes

1. But not common to MOOCs – Massive Open Online Courses.
2. <http://oerresearchhub.org/>
3. <http://openedgroup.org/review> (status on: 18.05.2015).
4. Information largely based on a telephone interview with Jessica Yuen, head of staff at the Khan Academy, 28 August 2014.
5. According to Wikipedia: “Accidental sampling (sometimes known as grab, convenience or opportunity sampling) is a type of nonprobability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, a population is selected because it is readily available and convenient. (...) The researcher using such a sample cannot scientifically make generalizations about the total population from this sample because it would not be representative enough.”
6. For a new initiative on formal recognition by higher education institutions see Hilton et al. (2014).

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Annex A9. Surveys referenced in Chapter 9

Table A9.1. Results of short survey of OER containing repositories (August-September 2014)

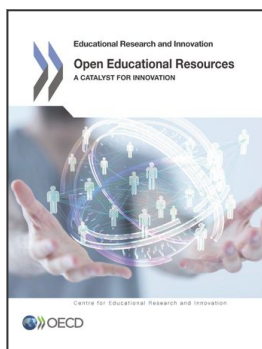
Name	Country	Brief description	Unique visitors per month	Comment on need for login to resources	Comment on need for surveys
Delft Open Courseware	Netherlands	Repository of all open courseware from Delft University of Technology. All of which are available under a CC NC-BY-SA 3.0 License.	Approx. 25 000.	No login required, we aim to have our materials accessible as openly as possible.	We do not have regular surveys, but have carried out two user surveys in the last 7 years.
Economics Network	United Kingdom	Small local repository for the topic area of economics, 95% OER.	Approx. 1 500.	No login for most materials, yes for assessment questions (because these come with answers), approx. 1% of users login.	No survey of users.
Jorum	United Kingdom	100% OER repository for materials from UK higher and further education.	We do not collect this data as we do not require authentication.	No. JISC is committed to an Open Access agenda. We have found that, by reducing barriers to access/ reducing authentication requirements, the use of JISC services increases.	First user survey just completed, planned to be annual survey.
Kursnavet	Sweden	Registry containing 100% OER in the area of upper secondary and adult education.	Approx. 8 000.	No. The hub is free to use for anyone.	No.
Maknaz	Saudi Arabia	National repository for learning objects. Currently in development. Approx. 20% OER.	n/a	The users require a login to access most of the OERs. This helps us to analyse patterns of the access and usage. Our system is still under development. We plan to have a robust tracking system to track the usage of OERs, by which we intend to enhance the value and usage of OER.	Not yet, but in planning. Focus will be to evaluate the ease of access, quality and reusability of OER.
Matemática Multimídia	Brasil	100% OER. Teaching materials for mathematics.	Approx. 8 000.	No login required. We want no obstruction whatsoever for the teachers to get access to the resources.	No.

9. RESEARCH ON OPEN EDUCATIONAL RESOURCES (OER) AND THE CHALLENGE OF THE EXTENDED LIFECYCLE

Name	Country	Brief description	Unique visitors per month	Comment on need for login to resources	Comment on need for surveys
Materiale-plattformen	Denmark	33% OER. Materials for school teachers.	Approx. 30 000 (respondent noted: number probably overestimated).	No. It must be as easy as possible to retrieve the descriptions of the resources and eventually the free resources.	Irregular surveys.
National Science Digital Library	United States	Registry. Refers to open digital resources, but not necessarily to OER.	No data.	No login.	Irregular surveys
Open Education Consortium	United States	Registry. Refers to OER open courseware from member organisations.	Approx. 25 000.	No login.	Annual survey.
Metodický portál RVP (Method portal OER)	Czech Republic	90% OER.	Approx. 75 000.	No login. Users are only required to log in if they want to upload and comment directly on materials.	Irregular management-focused survey on overall quality of OER, technical support and development of (new) tools, new ideas.
SNAR	Faroe Islands	95% OER.	Approx. 3 000.	No, at the moment it is not necessary to log in. However, resources that save personal answers from students, etc. need the user to log in. So we expect to use the login function more in the future.	We plan to do this in the future, but have not found an easy way to implement it. We use Google Analytics, and have to learn how to carry out regular surveys and decide what is important for us to know to improve our resources.
UNITRACC	Germany	No OER. Most resources are free to access, but not to modify. UNITRACC provides up-to-date information from the world of the sewer and pipeline construction including various technical books, documentations and virtual construction sites.	Approx. 14 000.	Around 80% of users log in.	Yes. Focused on structure of the learning content and use of the web platform.

Table A9.2. **Main details of surveys of OER usage included in the analysis**

Target group	Number of respondents	Sampling method	Year of study	Key questions covered			
				Users of OER	Use of OER	Adaptation of OER	Sharing of OER through uploading
Surveys focused on users of particular services							
Users (educators) of Siyavula Open Textbooks	89	Convenience sample recruited via social media	2014	•	•	•	•
Users (educators) of OpenStax College	77	Convenience sample	2014	•	•	•	•
Users (students) of OpenStax College	49	Convenience sample (3 targeted institutions, but 80% of final sample recruited through newsletter)	2014	•	•	•	•
Users of Saylor Academy	3 101	Convenience sample of users of Saylor.org recruited through a pop-up on login for registered users	2013	•	•	–	–
Users of Jorum	80	Convenience sample recruited via newsletter, social media, etc.	2014	•	–	–	–
Users of OCW Tufts, Tufts University	1 026	Pop-up survey for users	2010	•	•	–	–
	1 522		2011	•	•	–	–
Surveys focused on particular target groups							
Students in UK higher education	2 807	Representative sample of UK students	2012	•	•	–	•
Dutch educators in primary, secondary and tertiary education	1 568 (11% working in tertiary education)	Representative sample of Dutch teacher population recruited via online panel	2013				•
Users of OER for adult education and lifelong learning	86	Convenience sample recruited through social media and snowballing	2012	•	•	•	•
Academics at Athabasca University, Canada	154 (return rate 12%)	All staff and faculty members invited	2013	•	•	–	–



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