



Deliverable D2.3

Report on Comparative Analysis of Transversal OER Initiatives

Document information	
Due date of deliverable	December 2012
Actual submission date (final version)	31/07/2013
Organisation	Sero Consulting (originally University of Leicester, but the main author, Ming Nie, left before the deliverable was completed in its final version)
Revision	Version 1.0
Dissemination Level	
PU	Public ×
PP	Restricted to other programme participants (including the Commission Services)
RE	Restricted to a group specified by the consortium (including the Commission Services)
CO	Confidential, only for members of the consortium (including the Commission Services)

Contents

Executive Summary	3
1 Introduction	4
2 Introduction to POERUP and the context of this report.....	5
3 Methodology.....	7
4 Findings	10
4.1 Types of initiatives.....	10
4.2 Geographical distribution.....	10
4.3 Educational sectors	13
4.4 Subject.....	14
4.5 Size and format	14
4.6 Languages.....	15
4.7 Licensing.....	16
4.8 Quality assurance	16
4.9 Pedagogical approach	19
4.10 Certification and accreditation	22
4.11 Business models	24
5 Conclusions.....	27
References.....	29
Appendix: Inventory of 120 notable OER initiatives worldwide.....	30

Executive Summary

This report (Deliverable 2.3) is developed as part of Work Package 2 of POERUP. It synthesizes key findings from POERUP by examining similarities and differences in 120 *notable* OER initiatives worldwide against a number of key areas concerning OER development. The report demonstrates that OER-based learning, as an extension of online education, offers the potential of wider access to high quality education at relatively low cost. In order to foster effective deployment of OER in a country or an institution, policy advice is needed explicitly to address issues such as business models and the use of new technologies/media to enable pedagogical innovation and enhance quality. Individual countries or institutions should review and revise their own policies and strategies to ensure that OER-based learning can play a role in its existing framework of online provision to help the country or institution achieve its educational, economic and social goals in a sustainable way.

This report analysed 120 notable OER initiatives worldwide against a number of key areas concerning OER development. The analysis indicates a complex and changing tapestry of significant OER initiatives across the world:

- we identify three distinct categories of initiatives: open courses, open textbooks and collections of digital assets.
- whilst the largest number of initiatives (in all three categories) are to be found in north America, there are more than might have been suspected across Europe and rather fewer than expected in the far East.
- almost half of the initiatives are focused on higher and further/technical/vocational education with only a quarter on schools - though there is further work to be done in separating higher from vocational education both from CPD and lifelong learning initiatives.
- almost all initiatives cover a wide range of subjects.
- there is greater diversity of formats than has previously been suspected and mobile apps for accessing OER are increasingly available.
- most OER are in English, some exclusively and many others with English as one of a range of languages. However the list of notable initiatives includes 13 single-language initiatives, ten of which are European languages.
- the licensing picture is complex and it is not always easy to discern the degree of openness from an initial scrutiny of websites.
- educators express some continuing concern about quality assurance, but learners appear largely confident in identifying good quality resources. QA models range from centralised top/down systems, through peer reviewing to contributor/user-driven models.
- pedagogical approaches are not always clearly indicated, except in many MOOCs and other open courses. Learning pathways and the extent of learner support are not always clear.
- patterns of certification and accreditation vary across MOOCs and other open courses and whilst courses may be free, certification sometimes comes at a price and accreditation, if offered, invariably attracts a fee.
- the development of sustainable business models is clearly a significant issue. This will form one of the key areas for development in the policy papers in Work Package 4.

1 Introduction

This is Deliverable 2.3 of Work Package 2 of POERUP. The Deliverable Title from the proposal is:

Report on Comparative analysis of transversal OER initiatives

The Work Package title is:

Cross-sector analysis and comparison

The brief for the Deliverable states:

A report synthesising the experiences documented in the programme's inventory and country reports and examining similarities and differences across sectors and countries.

POERUP will prepare a report exploring the distinctive features and common experiences of OER and identifying the characteristics that appear to be required for success with OER. It will explore the range of needs being met through the use of OER and analyse the extent to which the needs and the solution differ by sector, country and region.

The report will be written with the aim of persuading regional, national and European decision makers that in order to be fully successful in the modernisation and innovation of their schools and universities, they have to look beyond one's own region/country/continent and also learn from other educational sectors. The report will be reviewed by the International Advisory Committee and, in a later stage, by OER initiative managers and coordinators. It will be used as input for WP 4.

This report focuses on cross-sector analysis and comparison of OER initiatives. The content is structured into four main headings. It begins with an introduction to the POERUP project, its context, partners and key deliverables, followed by the description of the methodology used for developing the report and key findings in terms of common experiences and distinctive features of OER development across countries and sectors. It concludes with an analysis of the key issues that present a challenge for the sustainability of OER development.

The main author of this report is Ming Nie (University of Leicester to July 31, 2013). Contributors include Professor Gráinne Conole (University of Leicester), Professor Paul Bacsich, Nick Jeans and Giles Pepler (Sero Consulting) and the report uses the material collected from the project wiki for D2.1 - included as the Appendix to this report. Giles Pepler was the editor of the final version.

2 Introduction to POERUP and the context of this report

POERUP is part funded by the European Commission’s Lifelong Learning Programme. The project, which builds on previous OER initiatives, such as OPAL (<http://www.oer-quality.org/>), OLnet (<http://www.olnet.org/>), and OERtest (<http://www.oer-europe.net/>), produces country reports, case studies investigating the communities behind OER activities, and policy papers. The overall aim of POERUP is to develop policies to promote the uptake of OER, especially across the EU, in all main educational sectors. The project is led by a consortium of institutions and organisations in Europe and Canada. Partners include Sero Consulting (UK), the University of Leicester (UK), Open University of Netherlands (Netherlands), University of Lorraine (France), SCIENTER (Italy), EDEN (UK/Hungary) and Athabasca University (Canada).

POERUP started in November 2011, and is funded to April 2014. The project has already created an inventory of more than 400 OER initiatives worldwide which are documented on the project wiki (http://poerup.referata.com/wiki/Countries_with_OER_initiatives). POERUP put substantial effort into understanding the state of play of OER in a range of countries, within the policy context and as part of the wider development of online learning in these countries. The project has already produced 11 country reports and 13 mini-reports, each covering individual countries except for a combined report on the Gulf States (<http://poerup.referata.com/wiki/Countries>). Each report provides an overview of the educational system, internet policy and provision, state of e-learning, copyright law, and major OER initiatives in that particular country. Table 1 lists the 24 country reports that have been produced by POERUP:

Country reports	Country mini reports	
Australia	Argentina	Portugal
Belgium	Denmark	Romania
Canada	Finland	South Africa
France	Greece	Spain
Hungary	Gulf States (Bahrain, Kuwait, Qatar, Oman, UAE)	Sweden
Italy	Mexico	Thailand
New Zealand	Norway	
Poland		
The Netherlands		
UK		
USA		

Table 1: Country Reports Produced by POERUP

Before the end of the project, POERUP is scheduled to produce seven in-depth case studies, chosen across the various education sectors for examining the communities behind these OER initiatives (Work Package 3). The seven in-depth case studies will be supplemented with a small number of mini-case studies, covering other significant initiatives in less detail.

This report (and the other two deliverables from Work Package 2), together with the case studies in Work Package 3 will feed into the policy recommendations in Work Package 4 - the core of the whole POERUP project. There will be an over-arching policy review paper (D4.1), feeding in to three EU-wide policy papers for different educational sectors: schools, further education and universities. In addition to the sectoral papers, reports will be produced on a number of key EU countries and regional administrations.

3 Methodology

This report is based on four stages of analysis:

Stage one: A global inventory of more than 400 OER initiatives (Deliverable D2.1) was generated on the basis of the analysis of the following resources:

- 11 country reports and 13 mini country/regional reports produced from POERUP (Deliverable 2.2), <http://poerup.referata.com/wiki/Countries>.
- OER reports for Brazil, China, Lithuania and Russia, published by UNESCO, <http://iite.unesco.org/publications/themes/oer/>.
- OER reports produced by other individuals for countries such as Turkey and Saudi Arabia, and by regional projects such as OER Asia (reports including China, India, Indonesia, Japan, Korea, Philippines, Vietnam), <http://www.col.org/resources/publications/Pages/detail.aspx?PID=441>.
- Case studies produced by OPAL, <http://cloudworks.ac.uk/cloudscape/view/2085>.
- OER case studies from Creative Commons, http://wiki.creativecommons.org/OER_Case_Studies.

Stage two: A list of 120 *notable* OER initiatives was selected from **Step one**, by applying a number of criteria:

- To qualify as *notable*, the OER initiative should focus on producing content, material or resource for teaching and learning. Initiatives whose main focus appeared to be the provision of information, guidance and other services were excluded. For this reason, initiatives such as OPAL and OLnet are not included in this report.
- To be categorised as a notable initiative, Creative Commons licence or other types of open licence must be used for at least a significant amount of content. For this reason, some initiatives which are usually considered as OER initiatives, such as the programme of the Norwegian Broadcasting Corporation (<http://nrk.no/skole/>) and TED Ed are excluded, as their content is not openly licensed.
- All initiatives whose focus is on producing e-textbooks and making them freely available or at a low cost to students (even the textbooks are not openly licensed) are included as notable initiatives in order to highlight the significance of open textbooks in terms of removing financial barriers to access to educational content.
- MOOCs are currently considered as notable initiatives, even those which are not licensed under CC. They are named as one of the emerging technologies to have an effect on higher education by the 2013 Horizon Report (<http://net.educause.edu/ir/library/pdf/HR2013.pdf>). As the number of MOOCs is increasing rapidly, it is not possible for this report to include every single MOOC that is being offered worldwide. For this reason, we have so far studied the highlights of MOOC initiatives for the purpose of the report. For a complete and up-to-date list of MOOCs, please visit <http://www.mooc-list.com/>.
- Because the USA dominates the list of worldwide OER initiatives, this report has only included a representative selection, whereas countries with less visible OER have been more broadly represented.

Stage three: A classification scheme was developed, consisting of a number of categories including political scale, educational sector, funding/financing model(s), pedagogical approach, quality

procedures, content providers, content users, language of the materials, subjects, formats, licences used, size, and the visible role of OER communities. An inventory was then generated in a spreadsheet in which the 120 initiatives were mapped onto the above categories using the classification scheme.

The complete spreadsheet with 120 initiatives mapped onto a number of key categories is provided as an illustration in the Appendix to this report.

Examples of the classification scheme are illustrated in Table 2 below:

Categories	Dimensions	Examples
Political scale	<ul style="list-style-type: none"> - International - Multinational (a few nations) - Continental (European) - National - Provincial/Regional - Consortium - Institutional 	<ul style="list-style-type: none"> - Open Courseware (OCW) - TESSA (UK, sub-Saharan Africa) - Learning Resource Exchange (LRE) for schools - Wikiwijs - BCCampus (British Columbia) - OERu - Open Learning Design Studio (OLDS) MOOC
Educational sector	<ul style="list-style-type: none"> - Schools (Primary & Secondary) - FE (colleges) - HE (universities) - Professional development - Lifelong learning - All sectors 	<ul style="list-style-type: none"> - Digital School Programme - Washington State's Open Course Library - OpenLearn - Virtual Campus of Public Health (CVSP) - ALISION - Open Science Resources (OSR)
Funding/financing model	Funding models (see Downes, 2007): Endowment, Membership, Donation, Conversion, Contributor, Advertising, Institutional, Government, Partnership or exchange	<ul style="list-style-type: none"> - Endowment: Vietnam Open Educational Resources (VOER) - Membership: OERu - Donation: The Gutenberg project - Conversion: Flat World Knowledge - Advertising: ALISON - Institutional: OpenLearn - Government: BCCampus - Partnership: OCW
Pedagogical approach	Description of the pedagogical approach used by the initiative.	Udacity: xMOOCs with highly interactive, project-based exercises, bite-sized videos, learning in context, virtual "field trips", talking to industry experts and passionate educators, and certificates on completion.
Quality procedures	<ul style="list-style-type: none"> - Top-down (e.g. quality criteria and peer-review procedure set up by the consortium) - Bottom-up (e.g. user rating, comments and review) 	<ul style="list-style-type: none"> - Gleducar: Quality standard and review procedure set up by Gleduwiki. - Eduteka: All content published on Eduteka has social interaction capabilities and the option to mark items as 'favourites' by registered users.
Content provider	e.g. example partner organisations	Textbooks published by NCERT (National Council Of Educational Research and Training)
Content user	e.g. health worker in Africa	Thutong: South African teachers
Language	English, Spanish, Dutch, multilingual, etc.	Coursera: MOOCs in six languages
Subject	Science, Health, etc.	PhET Interactive Simulations: simulations for teaching science and mathematics

Categories	Dimensions	Examples
Format	Text, audio, video, multimedia, etc.	The Open Source Courseware Animations Repository (OSCAR): Multimedia, interactive learning objects
Licence used	CC BY, CC BY-NC-SA, etc.	i-cleen: Some resources are licensed under CC-BY 3.0 (Italy)
Size	Course, textbook, digital asset	The openED course consists of 10 distance learning modules with each module lasting between 2-3 weeks.
Role of community	Description of how the community is formed and worked in the initiative.	LeMill is a web community for finding, authoring and sharing learning resources. Communities are divided by languages, subject areas, and countries. Members may use email or instant messaging to contact people. For each group there is a group blog to coordinate and discuss the group's work.

Table 2: POERUP OER Classification Scheme

Stage four: This report was then developed through analysing the inventory. Key themes and findings are discussed in the following sections.

4 Findings

4.1 Types of initiatives

The 120 notable OER initiatives fall into three broad categories: open courses (such as MOOCs and *OpenCourseWare*), open textbooks, and digital assets. Digital assets are resources of different sizes and in various formats (such as video clips, audio clips, articles, simulations, games, lesson plans, assessment activities, etc.). Figure 1 shows that around half (51%) of these initiatives produce OER as digital assets, whilst open textbooks are more in evidence than many commentators realise.

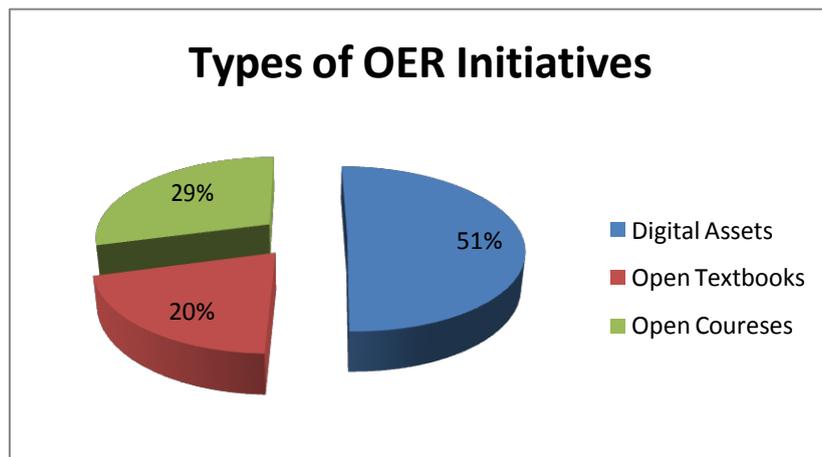


Figure 1: Types of OER Initiatives

4.2 Geographical distribution

The 120 notable OER initiatives include 101 initiatives identified from 34 countries around the world, four international initiatives (such as *OERu* and *OpenCourseWare*), six multinational initiatives (most of these initiatives involve US, UK and African countries), and nine continental initiatives (seven European projects and two Latin American initiatives).

Figure 2 displays the geographical distribution of these initiatives:

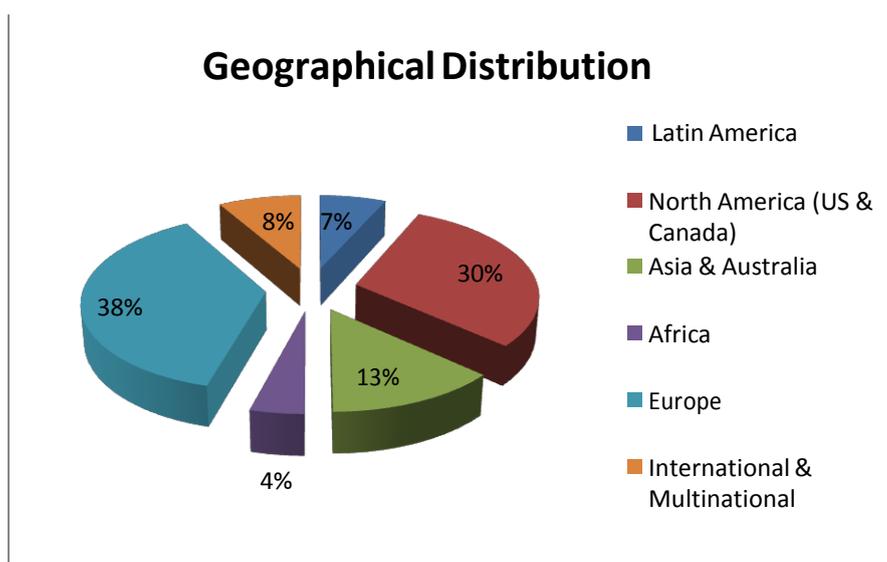


Figure 2: Geographical Distribution of OER Initiatives

North America (30%) and Europe (38%) emerge as world leaders in OER development, followed by Asia and Australia (13%). The figure for North America is slightly misleading, however, as the USA in particular has a much larger number of OER initiatives than any other country and these have been relatively extensively documented, so this report has not examined the USA in the same amount of detail as most other countries. However, it is notable that Europe as a whole has more initiatives than many governments may be aware of, but they are dispersed across many different countries. The figure of 13% for Asia and Australia is lower than expected, considering the rapid development of Sino and Japanese initiatives.

Significant country players in OER are shown in Figure 3. These are: the USA with 34 initiatives in total, followed by the UK (10), India (6), Spain (5), and South Africa (4). (The figures along the vertical axis give the number of significant OER initiatives included for each country.) It is noteworthy that only two of the top five players are EU members.

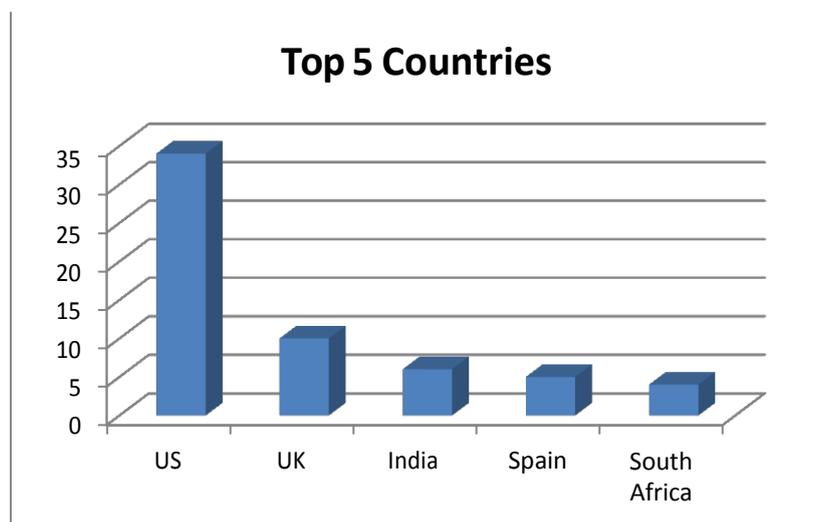


Figure 3: Top Five Countries in OER Development

The USA, in particular, is the world leader in open textbooks with nine initiatives. Elsewhere, initiatives are widely spread geographically, but initiatives are largely concentrated in the developing world: only three of the countries shown in the Figure 4 are EU members and two of these are fairly recent entrants with a relatively low level of economic development. Only the USA and India show in both figures 3 and 4.

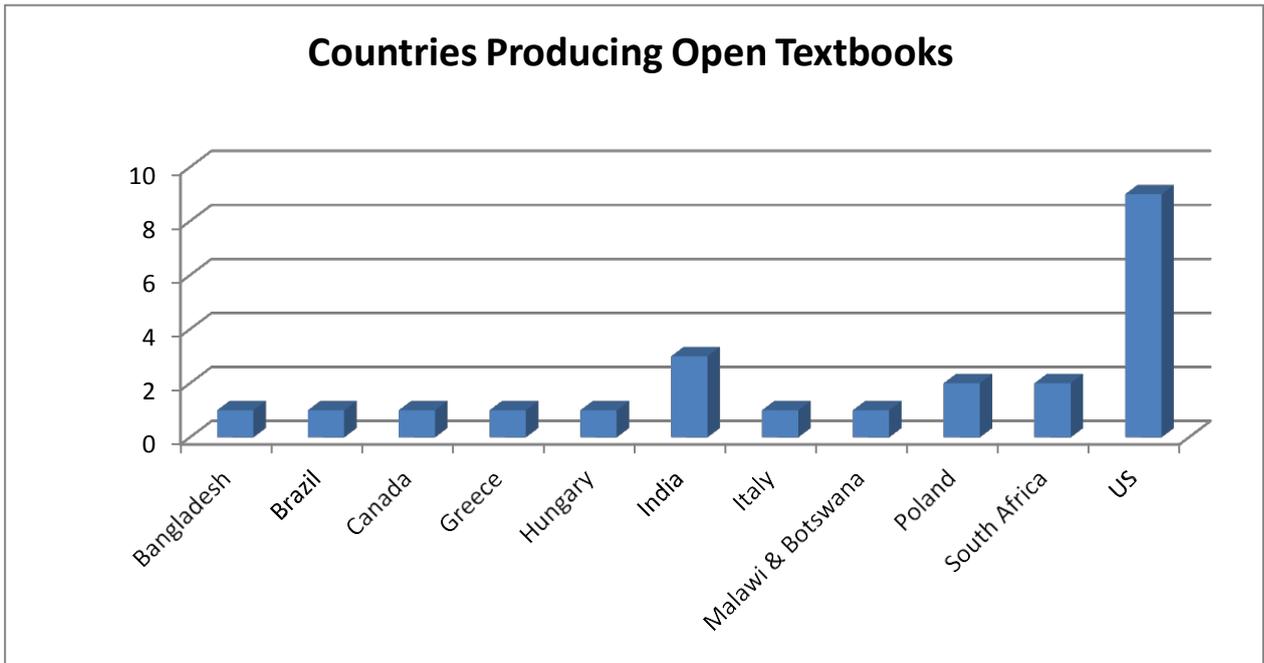


Figure 4: Countries Producing Open Textbooks

Figure 5 below shows Open Course initiatives where the USA again leads the way, but here there is a wider spread of countries than in figures 3 or 4, with five individual EU countries involved. Interestingly, Germany features quite strongly - and this is a country where most commentators report little OER development.

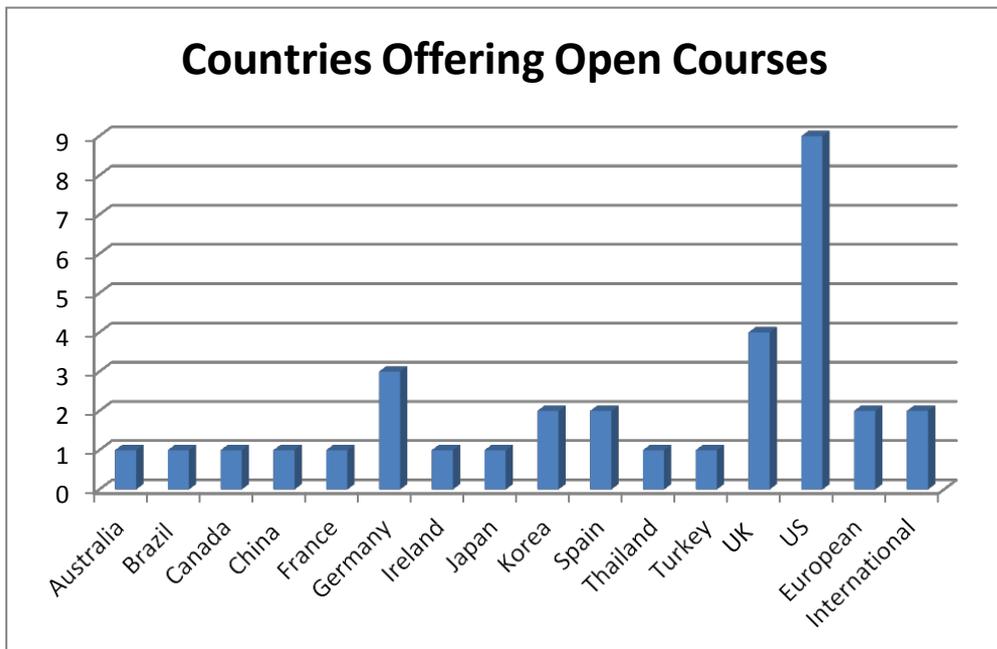


Figure 5: Countries Offering Open Courses

The metrics in figures 3, 4 and 5 are crude and should be interpreted with caution, but they do show that apart from the US dominance in all matters OER there are interesting variations in geographical spread and economic development status between different types of OER initiative.

4.3 Educational sectors

Figure 6 shows the distribution of the 120 notable initiatives across different educational sectors. A large portion (43%) of the initiatives focus on the HE/FE sectors. Unfortunately it is not always possible to differentiate between HE and FE in some countries and the use of OER in further education, including vocation and training requires further investigation.

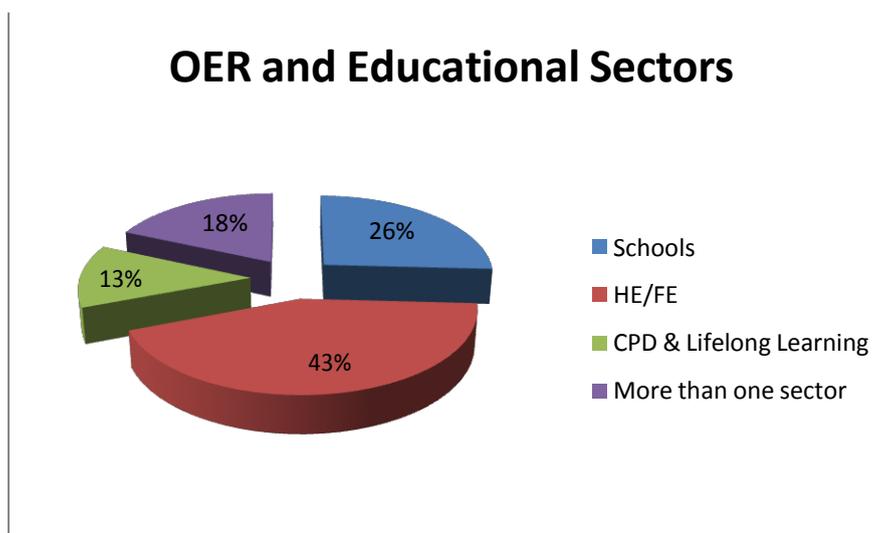


Figure 6: OER Initiatives across Educational Sectors

Equally, CPD and lifelong learning could usefully form separate categories with further research, though they are not the main focus of this study. We suspect that initiatives running across more than one sector may be under-represented in the diagram.

Figure 7 shows that of the 34 countries where notable OER initiatives were identified, eight countries have OER initiatives in the schools sector, ten countries have OER initiatives in HE/FE, one country focuses on lifelong learning only, and 15 other countries provide OER for more than one education sector. Again, these are relatively crude metrics at this stage of research, but it is noticeable that the largest number of countries represented (around 44%) have initiatives in more than one educational sector.

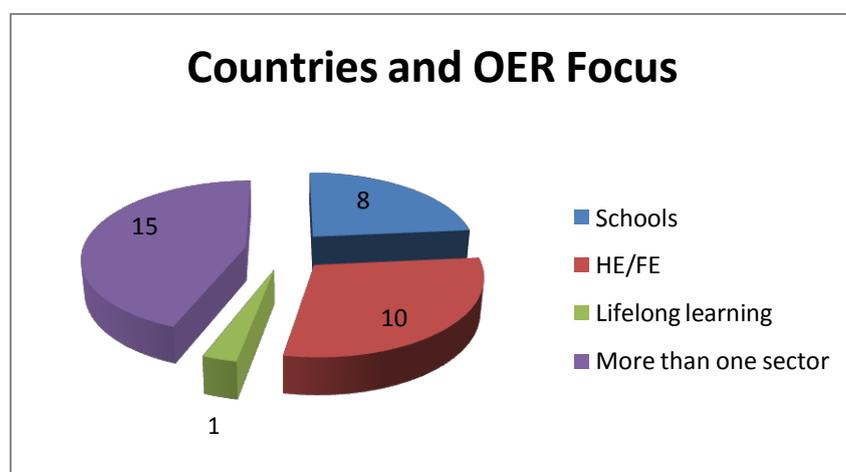


Figure 7: Countries and OER Focus

4.4 Subject

The majority of 120 notable initiatives provide OER for a wide range of subjects, with a few exceptions offering resources for one or a few specific subjects. For example, *Red REA/OER* and *Health Academics in Africa* offer resources for subjects in public health.

4.5 Size and format

Figure 1 (on page 10) shows that around half (51%) of the 120 initiatives focus on producing digital assets of different sizes and granularity, in a variety of different formats, including text (such as article, documents) and mixed media (such as video, audio clips, images, simulations, etc.), and for different pedagogical purposes (such as lesson plans, experiment guidance, assessment activities, etc.)

All open course initiatives offer completed courses of various lengths, ranging from 3-4 weeks to 16-18 weeks to complete. Most of these courses use multimedia for delivery. For example, most lectures offered by *Korean OCW* are made of Flash content whereas *Japan OCW* provides streaming lectures, lecture notes and syllabi, and the *Thailand Cyber University* delivers courses via video lectures, PDF, multimedia interactive presentations, with all their lessons downloadable.

Open textbooks are made available in a variety of formats, including print version (usually in PDF), online version (such as webbook in *Flat World Knowledge*, FlexBook in *CK-12*), and e-book version for mobile devices (such as ePub, MOBI).

The overall diversity of formats is substantially greater than are conventionally found in traditional repositories. Providing OER in a variety of formats is very important in increasing flexibility in learning. With the rapid development of mobile technologies, OER content is increasingly made available in formats that support students use on mobile devices. For example, de Vries and Thuss (2013) report that the *Khan Academy* has a number of mobile apps for accessing its resources; users of *iTunes U* can access a large range of freely available educational resources via Apple devices; *Temoa* provides an iPhone app offering mobile access to the OER portal of the University of Monterrey in Mexico. With over a third of internet users worldwide accessing the web only through mobile devices (see http://www.slideshare.net/kleinerperkins/kpcb-internet-trends-2013?utm_source=slideshow&utm_medium=ssemail&utm_campaign=weekly_digest), the accessibility of OER through mobile apps is of increasing importance.

4.6 Languages

Figure 8 provides an overview of the 120 initiatives in different languages.

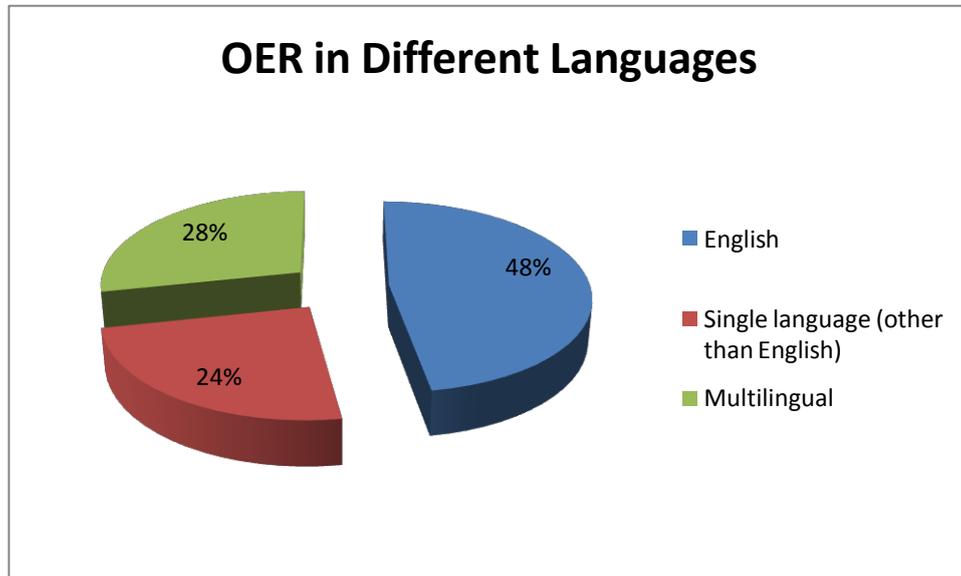


Figure 8: OER Initiatives and Languages

Nearly half (48%) of these initiatives provide OER in English. In initiatives (28%) which offer OER in multiple languages, English is almost invariably one of the languages included.

However almost a quarter of listed initiatives (24%) provide resources in a single language other than English. These initiatives aim at promoting quality materials and targeting at specific language speaking audiences. Thirteen languages are represented in this segment of the chart, ten of which are European languages, one from the Near East (Turkish) and two from Asia. For example, **Turkey Academy of Sciences (TUBA) OCW** disseminates resources in Turkish for Turkish speaking faculty, students, and self-learners. **OCW Universia** promotes resources from Spanish and Portuguese speaking countries for Spanish and Portuguese speaking academics and learners around the world.

A significant proportion of OER have been produced in English. This might present a barrier to use these resources for users whose first language is not English. A number of POERUP initiatives have identified the need or demand for translating OER from English to other languages to help bridge the barrier. For example, **Khan Academy** lessons are translated with subtitles in multiple languages, and simulations produced by **PhET Interactive Simulations** are translated into 66 languages. **OCW** has attempted to accommodate the language barrier by translating its content into different languages. **The Turkish Academy of Sciences (TUBA)** has launched a site containing Turkish translations of 16 MIT OCW courses, becoming the sixth OCW translation affiliate. The initial publication includes Turkish versions of MIT maths, chemistry, physics, and earth, atmospheric, and planetary sciences courses. Several dozen more translations are forthcoming. Similarly, **China Open Resources for Education (CORE)** translates MIT OCW into Chinese, and **SNOW** translates lectures from world class universities and scholars into Korean.

It is possible that the activities in these initiatives go beyond simple translation to adaptation of the resources, making them appropriate for the local and cultural contexts, as in the case of **UnisulVirtual** who hired staff to translate the OER from **OpenLearn** and to discuss them with lecturers for adaptation and localisation purposes (OPAL, 2010).

4.7 Licensing

Finding out what licence schemes are used in the OER initiatives is not a straightforward task as the licence information is not always provided clearly on OER websites. Sometimes relevant information can be found from the 'Terms of Use' page of the website. Sometimes the licence information is only attached to individual resource. The display of attribution and licence information on OER websites and the standardization of licence information in metadata should be promoted in future OER development (McGill et al. 2013).

All initiatives releasing digital assets subscribe to some form of Creative Commons licensing, at least to some of the content, in particular the use attribution, non-commercial, share-alike basis. The majority of OCW initiatives also use CC licensing.

MOOCs vary. Some are licensed under CC, some are not. The materials for xMOOCs (content-based), in particular, cannot be freely used/reused (Schuwer et al., 2013). As a generalisation, MOOCs are less open than might appear at first sight, or than many proponents would like them to be.

Open textbooks vary too and some initiatives are not as open as might appear from their titles. Some are licensed under various CC. Some initiatives do not use CC, but they give users almost the same level of permission as allowed by CC. For example, **Flat World Knowledge** states that their textbooks can be used for free download, personal use, modification, distribution by educators. Similarly, **Folhas Project** states that the total or partial reproduction of the textbooks is permitted as long as the original authors are cited. Some textbooks are partially open. For example, most of the textbooks from **Textbook Revolution** are licensed by CC, some use other licences, and some are 'all rights reserved'. A number of textbook initiatives do not use any kind of open licence. These include textbooks produced by the **Digital Schools Initiative** in Greece, **National Textbook Repository** in Hungary, and **Bookinprogress** in Italy. The **NCERT** states clearly on its website that its textbooks are copyrighted and republication is strictly prohibited.

There has been a long debate on 'how open is open?' Even Creative Commons implies some kind of barrier. For example, the 'non-derivative' clause in a licence prevents others from modifying the material in any way, and therefore, presents a barrier for others who want to repurpose OER. Non-restrictive open licensing of educational materials and resource components is essential if repurposing/re-use is to become established practices (McGill et al. 2013).

In this report we adopt a flexible approach to licensing used in different types of initiatives. This is due to the copyright challenge, especially in producing open textbooks: Gorisen (2013) emphasised that the big obstacle in opening up textbooks is the struggle with publishers regarding copyright. There is similar discussion concerning the **Coursera** MOOCs, which are freely accessible but do not make the educational resources available under open licences. McGill et al. (2013) suggest that education experts and government should continue to work with publishers to establish content permissions processes for OER and simplify copyright issues for academia.

4.8 Quality assurance

The quality of OER is voiced by educators as a significant concern. OPAL (2010) identifies a range of Quality Assurance (QA) models adopted by 59 OER initiatives across Europe, along a spectrum from light weight, user-defined models to strictly controlled hierarchical models. Conole (2013)

categorises QA models used in OER initiatives into three broad categories: individual-driven, peer-based, and QA clear criteria. As part of the OER4Adult project, Falconer et al. (2013) identified a list of the most frequent quality indicators used by OER initiatives for adult learners including user rating, user reviews, reputation of the institutional provider, reputation of the funder, reputation of the author, and 'recommender' system.

The QA models are not always clearly stated by all POERUP initiatives. In initiatives where the QA criteria are explicitly defined, a mix of the above models and criteria is evident.

Highly controlled models

In top-down highly controlled QA models, quality criteria and processes are clearly defined and articulated. For example, the textbooks produced by the **California Learning Resources Network (CLRN) Free Digital Textbook Initiative** must comply with the highly controlled CLRN review standard and criteria, as noted on its website (<http://www.clrn.org/home/criteria.cfm>). The CLRN review of supplemental electronic learning resources includes the following three major components: Social Content review, California Content Standards Match verification, and CLRN minimum requirements review. Only resources that meet all of the CLRN review criteria (approved by the California State Board of Education on October 11, 2000) will be included in the CLRN database and website.

Similarly, learning resources contributed to the **Norwegian National Digital Learning Arena (NDLA)** must fulfil a list of quality criteria defined by NDLA. These criteria emphasize the currency of content, relevance to curriculum, suitability for students' age, degree of using digital media and copyrighted cleared content, etc. In addition, NDLA content must be in line with the quality criteria for digital learning materials set up by the Centre for ICT in Education (<http://iktsenteret.no/aktuelt/kvalitetskriterier-digitale-laeringsressurser>). In the **College Open Textbooks Collaborative (CCOT)**, reviews are done against a set of pre-defined criteria. These include sub-dimensions around accuracy, importance or significance, pedagogical effectiveness, completeness of documentation, ease of use for teachers and learners, inspirational/motivational for learners, and robustness as a digital resource (OPAL, 2010). The **I-CLEEN** project provides resources around earth science topics. I-CLEEN sets up a selection process (<http://www.icleen.museum/web/guest/selezione>) to ensure the scientific authority and pedagogy (interactivity and wearability) of its resources. Only those fulfil these criteria and rules will be included in the I-CLEEN database.

Reputation of the provider

The reputation of the content provider is taken into account in the selection process by a number of POERUP initiatives to ensure quality. For example, **SNOW** only makes lectures from world class universities and scholars (such as lectures from TED, MIT, Stanford, Harvard, etc.) available to Korean learners.

In open textbook initiatives, the selection of the textbooks is considered in relation to the reputation of the publishers or the sponsorship of the site. For example, the **NCERT** initiative only produces textbooks published by NCERT. Similarly, the **Project Gutenberg** ensures high quality e-books through ensuring that all material has been previously published by bona fide publishers.

Institutional reputation is considered important in gaining membership of the **Japan OCW** consortium, with membership applications authorized by an internal committee. Through this

selection process, JOCW makes only highly selective courses contributed by high-ranking Japanese universities available to ensure sustainability and quality.

Top class universities are usually invited to contribute MOOCs to a number of platforms. For example, **FutureLearn** involves 21 leading UK universities; **Couseira** is in collaboration with prestigious universities around the world; **EdX** offers only MIT and Harvard courses, and **NovoEd** only offers courses from Stanford University. However, MOOCs have been criticised for their lack of formal quality assurance, as quality is largely enhanced through reflection, evaluation and comments from the creators, tutors and participants informally via social media (Yuan & Powell, 2013).

Classroom evaluated

Classroom testing is another criterion used by a number of POERUP initiatives to ensure quality. For example, all of the simulations created by the **PhET Interactive Simulations** are extensively tested and evaluated to ensure educational effectiveness and usability. These tests include student interviews in relation to actual utilization of the simulations in a variety of settings, including lectures, group work, homework and lab work. The PhET rating system (<http://phet.colorado.edu/en/for-teachers/legend>) indicates what level of testing has been completed on each simulation. For instance, if a 'yellow tick' symbol is given to a simulation, this means that the simulation has been used and tested in the classroom, and on multiple computer platforms. The simulation has also been refined based on the evaluation. Other initiatives such as **I-CLEEN**, **Free High School Science Texts (FHSST)** project, **Free Reading**, and **Carnegie Mellon Open Learning Initiative**, also emphasize that the quality of their resources have been ensured through research, classroom testing and trails.

Peer-reviewing

Peer-reviewing is widely used by many POERUP initiatives as a means of assuring quality. Some initiatives go through a multi-layer review process. For example, in the **Folhas Project**, textbooks produced by teachers of public schools in Paraná state in Brazil will go through a 3-stage validation process:

- Stage 1: The textbook produced by one teacher is validated by other teachers.
- Stage 2: The textbook is submitted to the Folhas system, and will go through validation by the Educational Regional Nucleus (NRE).
- Stage 3: The textbook is validated by the Secretariat of Education.

Once the Folhas textbook has gone through the 3-stage validation process, it is officially published in the educational portal (<http://www.educacao.pr.gov.br/>) to be used by teachers.

Another example of multi-layer review is used in **Writing Commons**. In the first round of review, submissions are reviewed by the staff of Writing Commons. Subsequently, the second round of review is conducted by the review editors of Writing Commons.

Subject matter experts are commonly brought in the peer-reviewing process. For example, in **OSCAR**, the Subject Matter Expert (SME) selects the concept. The Instructional Designer (ID) creates the Instruction Design Document (IDD) for the concept, in consultation with the SME. The Animator does the coding of the Learning Objects (LO). The SME then periodically reviews the LO which are then uploaded into the repository. All **Saylor.org** courses will eventually be peer reviewed by a panel of three subject matter experts with college-level teaching experience. Similarly, in **Curriki** subject

matter experts and/or master teachers in maths, science, social studies, and English language arts are included in the review team.

Some initiatives adopt a more lightweight peer-review model. For example, In *BCCampus*, the textbooks will be created by faculty or publishers, and reviewed by B.C. faculty. In *mathcentre*, anyone contributing a resource will need to arrange for it to be reviewed by a suitably qualified colleague who will be named on the resource. The resource will then be submitted together with other information, including a Creative Commons licence, keywords and other metadata in the Excel template.

Contributor/user-driven models

Many POERUP initiatives use a bottom-up contributor/user-driven approach. *Bookinprogress* is an example of quality control driven by content producers. Individual subject teachers from different schools work together to produce and update a common textbook. Quality is assured by the subject teachers who produce the textbook and the subject coordinator. This academic-driven approach is widely adopted by a lot of other initiatives, such as the large number of OER projects funded through the *JISC/HEA OER Programmes* (OPAL, 2010).

Many POERUP initiatives also use a more user-driven community-based model which enables users to comment and/or vote a resource. For example, content published on *Eduteka* have the option to mark them as 'favourites' by registered users. Similarly, in *Portal das escolas*, people can vote resources 'up'. In the *Oilproject*, the quality of the lessons is judged by the public through voting mechanisms and peer evaluation. In *P2Pu*, the process of improving the quality of the courses relies on community review, feedback and revision. In *Project Gutenberg*, thousands of volunteers helped digitize and proofread the e-books. Another community-based example can be seen in the *CCCOER/CCOT* initiative which enables educators to share reviews of materials, and also to look at and comment on the reviews of others (OPAL, 2010).

It is common that more than one QA approach is used in one initiative. For instance, whilst *OpenLearn* is an example of a top-down highly controlled QA model, it also provides the bottom-up user-rating option. A number of other initiatives, such as *Indian NROER*, *E-tutor* and *MERLOT* provide mechanisms for both peer-reviewing and user-rating.

In spite of the concerns voiced by many educators, we do not feel there is a need for significant concern about quality assurance. Students are more critical in their use of OER than some commentators think - see Bacsich, Phillips & Bristow (2011).

4.9 Pedagogical approach

This section examines different pedagogical approaches used in POERUP initiatives, mapped against a number of pedagogical dimensions developed by Conole (2013). These dimensions include the degree of formal learning, learner autonomy, learning pathway, communication and collaboration, assessment and certification.

The challenge is that the pedagogical approaches are not usually explicitly stated or clearly defined by POERUP initiatives. Some initiatives state that the pedagogy they use is broadly in line with the pedagogies associated with open education, for example, to encourage independent learning by shifting from a teacher-centred to a learner-centred approach. Some initiatives, especially those focusing on open textbooks are only discussed in terms of their relationship to formal learning. A

number of initiatives are more specific about the pedagogical purposes that they intended to achieve. For example, materials created by the **Skills for a Changing World** programme emphasize reflective learning. These materials were developed based on Kolb's Experiential Learning Cycle, using structured reflective activities. In the **Computer Masti** initiative, the textbooks for computer literacy skills were developed using real-life problems, with emphasis on scaffolded learning and constructivist pedagogical approach. The **I-CLEEN** and **OER4Schools** projects aim at producing learning resources focusing on interactive pedagogy. The **openED** course develops experimental approaches for participatory learning within open educational environments. **Discover the COSMOS** is described as an experimental laboratory, providing more challenging and authentic learning experiences.

So far, MOOCs and other open courses are the only OER initiatives in which pedagogical dimensions such as the level of learning pathway, learner support, communication and collaboration, assessment and certification, are relatively clearly established.

Formal learning

Up to now, the majority of OER were intended for use within existing educational structures by teachers. Some resources are created with the focus for them to be used in specific formal teaching contexts. For example, some of the materials in **LORO** have been specifically designed to support language courses offered by the Open University. The two open courses created by the **Bridge to Success** project are intended to be used and delivered at the US colleges for adult learners.

Many open textbook initiatives aim to transform textbooks used in the existing school curriculum into e-textbooks which are free or at low cost to students. For example, the **ebooks in Bangladesh** project transformed 33 primary level and 73 secondary level textbooks into e-textbooks. Brazil's **Folhas Project** produces and distributes textbooks free of charge, encompassing all the subject areas of secondary education. Other similar examples include the open textbooks created by **BCCampus** in Canada, **Digital Schools Initiative** in Greece, **Bookinprogress** in Italy, **Digital School Programme** in Poland, and various open textbook initiatives in the US (i.e. **CLRN Free Digital Textbook Initiative**, **CCOT**, **Free High School Science Texts (FHSST)** project, and **Utah Open Textbook project**). Other open textbook initiatives aim to create new customized versions of textbooks aligned and tailored specifically to the country's national curriculum standards. For example, the **IADP-SADC** digital resources project created an OER textbook on Communication Skills, which has been formally embedded in two universities' teaching programmes at the University of Malawi and Botswana. The SAIDE's **ACEMath** project produced a textbook which is used as a guide to teaching mathematics for in-service teachers in primary schools in South Africa. These textbooks usually contain materials taken from a variety of different open sources and put together as tailor-made textbooks. In this way, it is possible to provide learning resources that match exactly with a specific educational situation (Gorissen, 2013). All these textbooks aim to be used or embedded in the formal school curriculum.

Some other initiatives encourage their resources to be used to enable innovation in formal teaching practice. For example, **Agrega** encourages the widespread use of its content in the classrooms of Spanish educational system with the aim of fostering innovation. **PhET Interactive Simulations** enables flexible use of its simulations, transforming the way science is taught and learned across K-16 levels. **Khan Academy** suggests giving students the video lecture to watch at home at their own pace, repeating as often as necessary, and using classroom time to tackle any difficulties

encountered, with the teacher and peers available to help. These initiatives also have a focus on providing resources to support formal learning.

Learning pathway

Many POERUP initiatives indicate that their resources are flexible enough to enable integration into formal classroom teaching, but also to allow for independent and informal learning. However, these resources may not always be suitable for independent study because many of them are in the form of digital assets (separate components of a course, such as a diagram, an image, or a video of a lecture). **OpenCourseWare** does comprise a coherent body of course material, but the learner using it is not given any guidance (Dopper & Draaijer, 2013). It is not easy for learners to find their way and make the best choices around these resources given the number of OER available and their fragmented nature (Janssen et al., 2013). How to create the best possible learning path through the resources remains a challenge for learners and instructors. Janssen et al. (2013) suggest that providing metadata on the content, learning process, and schedule (such as title, language, provider, supervision, testing, contact hours), and giving instructions on the order of learning activities (i.e. 'it's better to do activity X before activity Y') help learners construct their learning path.

In this section, we examine the level of support and guidance POERUP initiatives offer in terms of guiding their learners through the resources.

A number of POERUP initiatives offer a certain level of guided learning pathways. For example, **Thutong** describes the teaching and learning pathways and processes that learners should work through the resources in order to achieve identified learning outcomes and assessment standards as set out in the South African National Curriculum Statements. **OER4Schools** creates a professional learning resource for teachers, focusing on interactive pedagogy for teaching with and without ICT. The resource is available in a version for participants with guidance on how to navigate around it, as well as a version for facilitators with additional notes to guide the teachers how to use it in teaching.

MOOCs often provide a clear and structured learning path to their learners. For examples, MOOCs offered by **Udacity**, **Coursera** and **EdX** use lectures as their didactic model. The instructor provides subject matter via video lectures. Participants watch the lectures, carry out assignments, and take a final test. As an example, **Open2Study** provides the learning path to its students as follows:

Every subject is split into four modules. Each module covers a number of topics, and each topic is taught with a short video (usually about 5-10 minutes). Once the student has finished watching each video, she/he will be able to take a quiz to test knowledge. These quizzes are not mandatory, but they are a great way to check how well the student understands the topic. Once the student has completed all the topics in a module, she/he has a short assessment to complete. All assessments are in the form of multiple choice tests. The assessments open at the start of each week, and remain open until the end of the subject. It is best to complete the assessment after the student has watched the week's video lectures. Each module takes 2-4 hours to complete, including watching topic videos, taking quizzes and taking assessments. For each subject, the student must achieve an average mark of at least 60% across the entire subject to pass. The student can miss one assessment and still be eligible to pass; however, the student will be awarded 0% for that assessment so she/he will need to maintain high grades in the other three assessments to get a 60% average and pass the subject (Open2Study, <https://www.open2study.com/howitworks>)

However, MOOCs, specifically in the case of xMOOCs (content-based) are criticized for their overwhelmingly supply-driven approach in which students are only free to choose the course, and it is the provider that controls the learning process (van der Woert, 2013). They are also questioned for their assessment methods and lack of constructive feedback (Daniel, 2012, Armstrong, 2012),

and high drop-out rates (Daniel, 2012). By contrast, cMOOCs (based on connectivism) provide great opportunities for non-traditional forms of teaching approaches and learner-centred pedagogy where students learn from one another (Yuan & Powell, 2013).

The number of MOOCs is currently growing very rapidly. They are increasingly becoming a platform for institutions to experiment with emerging pedagogical models.

Learner support

The majority of MOOCs and open courses offer some degree of learner support by course tutors. For example, *Peoples Uni* uses a volunteer workforce (including more than 100 tutors from more than 20 different countries) to develop and deliver course modules, including supporting and moderating student learning on discussion forums. *Athabasca University OCW* indicates that students can communicate with a course tutor by Course Mail.

Peer learning through small group work and projects are highly emphasised in some initiatives to increase the level of communication and collaboration between learners. For example, the *Open Learning Design Studio MOOC* takes an active and collaborative approach to learning. Participants worked in small groups on projects of their choice, and learn the art and science of learning design through practical experience. In *P2PU* learners work together to learn a particular topic by completing tasks, assessing individual and group work, and providing constructive feedback to each other. MOOCs offered by *Udacity* also emphasize project-based learning.

Platforms are created and a variety of tools are used to facilitate the building of learning communities. For example, *OpenCourseWare* has a dedicated website – *OpenStudy*, which is the social learning network where students ask questions, give help, and connect with other students studying the same things. Discussion forums are widely used by many initiatives to increase the level of collaboration and interaction between learners. For example, *Open2Study* offers two types of forum: the community forum, and individual classroom discussion boards. The community forum is where the students can share their experience studying through Open2Study whilst the classroom discussion boards are used for students to discuss specific topics to do with the subject or module. In both types of fora students can comment on other students' questions and comments, vote them up or down, follow them, share them on social media, or flag them as spoilers or inappropriate. Both types of fora are monitored by Open2Study moderators.

In some cases, social media are widely used to support learning communities. For example, in the *UniMOOC aemprende*, the level of communication and collaboration between learners is greatly increased through the use of a range of social media including Facebook, YouTube, Google+, Twitter, LinkedIn. In *Open2Study*, students can make subject-related comments using Twitter. When students are in the Open2Study classroom, they are able to see a feed of the latest tweets about their subject, and they can keep up to date with the main feed in the website footer. Students can also use Facebook, or subscribe to the YouTube channel to stay up to date with new developments at Open2Study.

4.10 Certification and accreditation

Making the evaluation and certification of learning activities sustainable is a key challenge and one of the main conditions for the long-term future of OER (Dopper & Draaijer, 2013). Table 3 provides

an overview of the methods for teaching, assessment, feedback and accreditation used by a number of MOOCs and open courses.

Initiative	Offering	Feedback	Teaching	Assessment	Certification	Accreditation
EdX	Courses	Instructor automated	Instructor-led	Automated quizzes	Completion/Achievement	No
Coursera	Courses	Instructor automated, Peer feedback	Instructor-led	Automated quizzes Peer assessment	Completion/Achievement (fee)	Some (fee)
Udacity	Courses	Instructor automated	Instructor-led	Automated quizzes	Completion/Achievement (fee)	Some (fee)
cMOOC	Courses	Peer feedback	Connectivism	No	Achievement/Badges	No
Open2Study	Courses	Instructor automated	Instructor-led	Automated quizzes	Achievement/Badges	No
OERu	Programmes	May vary per course	May vary per course	May vary per course	May vary per course	Credible qualifications from OERu participating institutions (fee)
Saylor.org	Programmes	No	Instructor-led	Assessment for credits	No	Assessment for credits (fee)
Khan Academy	Lectures	No	Instructor-led	Automated exercises and continuous assessment	Badges	No

Table 3: Methods for teaching, assessment, feedback, and accreditation used by MOOCs and open courses
(adapted from Mulder (2012) and Yuan & Powell (2013))

The majority of MOOCs use quizzes (short multiple choice questions with automated answers and feedback) as their main instrument of assessment. For example, in **Open2Study**, all of the subjects are assessed using multiple choice tests at the end of each module. For each subject, the student must achieve an average mark of at least 60% across the entire subject to pass. Some MOOCs also rely heavily on peer engagement and assessment to support the individual student's learning process. **Coursera**, for example, includes submission of essay style answers, graded through peer assessment.

Many MOOCs offered by **EdX**, **Coursera** and **Udacity** often provide informal evidence of one's competence through earning badges and certificates of completion or participation. One interesting example is from **OpenStudy**. Participants taking an OpenCourseWare course supported by OpenStudy can sign up for a (worldwide) study group, which has a forum where they can ask and answer questions. Activities within the course are tracked. By answering questions put by fellow participants, the learner can demonstrate his/her understanding of the material, thus gaining medals. A participant can gain a certificate if he/she has been active within the system for at least four weeks with questions having been posted and questions answered for at least 70% of the course topics. If the participant complies with the requirements and his/her SmartScore has increased by 20 points, he/she receives a certificate of participation for a 'self-directed learner' (Dopper & Draaijer, 2013).

The majority of MOOCs and open courses do not offer academic credits. There are a few exceptions. For example, **OERu** will provide students worldwide with the opportunities to gain credible qualifications from recognised education institutions. **Peoples Uni** offers the possibility to achieve the Diploma and Master of Public Health. Some partner universities offer credit for their **Coursera** classes to those who want to pay a fee to have some extra assignments and work with an instructor and be assessed. Similarly, **Saylor.org** also offers the option of assessment for credits. Some universities began offering transfer credit for **Udacity** students who then take the final examination at a Pearson centre.

There has been rapid development in assessment and certification for MOOCs in recent years. For example, MOOC providers are actively making secure supervised examination possible (i.e. at Pearson testing centres around the world). It will also be possible for students to take exams at home under controlled conditions in the near future (Dopper & Draaijer, 2013). All of these will increase the possibility for gaining formal recognition by means of OER in the near future. Institutions need to review and consider revising their existing accreditation systems in order to respond to qualifications achieved by learners who undertake studies via OER-based learning.

4.11 Business models

The Trend Report: *Open Educational Resources 2013* (<http://www.surf.nl/trendreportoer2013>) concludes that OER have reached the peak of the initial hype – platforms have been created, large quantities of resources have been developed, MOOCs are being offered, and certification systems are being piloted, and OER appear to be entering the next stage of their development and maturity. In the initial stage, the majority of OER initiatives were funded in the form of projects with external or internal funding. An ongoing challenge faced by these initiatives is what business models might be appropriate to make them sustainable in the longer term.

In this section, we will analyse POERUP initiatives to look at the issues of business model and sustainability, using Downes's models. Downes (2007) categorises nine different funding models for OER initiatives which are described as follows:

1. Endowment models: The initiative receives base funding
2. Membership models: Each partner organisation contributes membership fees
3. Donation models: The initiative receives donations
4. Conversion models: Fee payment by users/consumers
5. Contributor-pay models: The contributor pays for the cost of maintaining the contribution and the provider makes it freely available
6. Sponsorship models, such as commercial advertising
7. Institutional models: The initiative is funded internally by the institution
8. Government models: The initiative receives direct funding via government agencies
9. Partnership or exchanges: The focus is on sharing and exchanging resources

Most OER projects start up through some funding initiative and then to move to an alternative model once that initial funding finishes. Therefore, the majority of POERUP initiatives fit in well with Downes's endowment model, where the project obtains base funding from foundations, commercial companies, institutions or a combination of different sources.

In the past few years significant funding has been made available by governments worldwide to drive OER development. Examples of large-scale government-funded OER initiatives include the £13 million **OER Programme** from 2009 to 2012 in the UK, the **Wikiwijs Programm** involving €8 million public funding in the 2009-2013 period in the Netherlands, the €13 million **Digital School Programme** in Poland, and many more in other countries. These initiatives initially fit in with the government model.

Some of these initiatives funded through endowment and government models will be continuously supported by the same source of funding for a longer term, like **iTunes U** and **YouTubeEd**. However, the majority of them will need to change the basis of their business model over time, and it is the commonplace that a number of models might be used in conjunction to sustain a particular initiative.

In some cases, the institution takes over and provides ongoing support (including money and resources) to the initiative after obtaining the base funding, and therefore these become institutional models: for example, the majority of projects funded through the three-year **JISC/HEA OER Programme** are essentially a mix of endowment and institution (OPAL, 2010).

Some initiatives adopt the membership model to sustain themselves. For example, there are two types of membership through which organisations and individuals can join **Gleducar**: Active and Associate memberships. **MERLOT** is another example of membership model, after receiving the seed funding start up, each institutional partner contributes fees.

Other initiatives have developed into conversion models. For example, **Bookinprogress** in Italy has received set-up funding from a number of sources. The initiative is then self-sustained through a registration fee paid by each member school (€500), and a small amount charged to the students (€2.50). **Pratham Books** are available for purchase at low cost or can be accessed for free online. **Flat World Knowledge** initially gained profit from customers paying for textbooks in printed form or upgraded to digital form. It is now developing its commercial exploitation further: starting from January 2013, students read a complete online textbook with the Study Pass product, which includes note-taking, highlighting and study aids for \$19.95 (still much lower than the \$100+ that students are used to paying for commercial textbooks).

The major MOOC providers are initially set up as for-profit organisations (such as **Coursera** and **Udacity**), and they generate revenue from activities such as fees for certification, testing, assessment; job placement services (i.e. providing companies with the details of appropriate job candidates from among course participants in return for payment); advertising for sponsored courses; and tuition fees for credited courses (Yuan & Powell, 2013; Schuwer & Janssen, 2013). In **Udacity**, enterprises such as Microsoft and Google pay to fund their own training courses. From this perspective, Udacity also fits in with the sponsorship model.

There are other for-profit MOOCs and open courses. For example, **Saylor.org** offers assessment in return for payment for credits. **ALISON** provides the option to purchase a certificate or diploma on completion of most of its courses. **Udemy** currently offers over 5,000 courses, 1,500 of which require payment, with the average price for classes falling between \$20-200 (Yuan & Powell, 2013). In **Peoples Uni**, each module costs £30. After six modules, students are eligible for a Diploma and to take the Dissertation for the Masters degree (which is equivalent to three modules). The total cost of a Peoples-uni Diploma is £180 and Masters is £270.

More and more institutions are offering MOOCs as a way to give learners a taste of higher education for free. These institutions consider offering MOOCs as a branding and marketing activity which might lead to student recruitment in the future (McGill et al., 2013). Examples include the MOOCs offered by **Open2Study** and the University of Edinburgh via **Coursera**. **EdX** offers MOOCs for a different purpose – to understand how students learn and improve innovations in teaching and learning on campus (Yuan & Powell, 2013). These MOOCs, for the moment remain not-for-profit and institutionally supported. In the longer term they might become examples of the conversion model if there is evidence of direct revenue return.

Donation is widely used by many POERUP initiatives as a means of sustainability after receiving base funding through the endowment model. Examples include **LeMill**, **Khan Academy**, the **PhET Simulations**, etc. In **Peoples Uni**, donation is through corporate or individual sponsorship of students to help with fees or Internet access. In **Project Gutenberg**, the Project Gutenberg Literary Archive Foundation (PGLAF) - a not-for-profit corporation, receives and processes donations to the project.

Partnership model is also evident in POERUP initiatives. The **OpenCourseWare** consortium is a good example of partnership focused on sharing and exchanging resources by a large number of institutions worldwide. Other partnership examples are **BCCampus** and **OERu**.

There is a variety of business models currently being trialled for the development and sustainability of OER initiatives and a mix of business models is likely to be most commonly used in the near future. **OpenLearn** is such an initiative. It initially fitted the endowment model through funding from the Hewlett Foundation. It is now mainly supported internally as an institutional model. **OpenLearn** also receives donations and it also fits in to the partnership model, through sharing and exchanging resources with **UnisulVirtual**. **OERu** is another example of a mixed model. It has received income from three major sources: funding from the OER Foundation, Commonwealth of Learning, and UNESCO (endowment); fees contributed by 25 OERu partner institutions (membership); and fees paid by students for assessment once OERu starts to offer courses (conversion).

The big challenge now is that the scale of investment, especially from governments is unlikely to continue. Lack of government support has already been reported by several countries in POERUP, including the UK, Canada and Italy, as a major barrier restricting further development of OER. The current economic crisis affecting many countries has caused a decrease in government investment in education and innovation. This has worsened the already challenging situation concerning the promotion of OER in some countries, such as Italy, where OER was considered weak even before the crisis. As a result of the economic and financial situation, some national programmes have declined, downsized, or not even started. For example, in England, there seem to be few OER activities in schools, and activities in higher education institutions are inhibited by the cessation of almost all funding from the government since 2012. For this reason, the endowment model of funding is not likely to be sustainable, and new business strategies and models will need to be developed in response to the challenges and new contexts in which educational institutions operate in.

5 Conclusions

The analysis in section 4 of this report indicates a complex and changing tapestry of significant OER initiatives across the world:

- we identify three distinct categories of initiatives: open courses, open textbooks and collections of digital assets.
- whilst the largest number of initiatives (in all three categories) are to be found in north America, there are more than might have been suspected across Europe and rather fewer than expected in the far East.
- almost half of the initiatives are focused on higher and further education with only a quarter on schools - though there is further work to be done in separating higher and vocational education and CPD and lifelong learning initiatives.
- almost all initiatives cover a wide range of subjects.
- there is greater diversity of formats than has previously been suspected and mobile apps for accessing OER are increasingly available.
- most OER are in English, some exclusively and many others with English as one of a range of languages. However the list of notable initiatives includes 13 single-language initiatives, ten of which are European.
- the licensing picture is complex and it is not always easy to discern the degree of openness from an initial scrutiny of websites.
- educators express some continuing concern about quality assurance, but learners appear largely confident in identifying good quality resources. QA models range from centralised top/down systems, through peer reviewing to contributor/user-driven models.
- pedagogical approaches are not always clearly indicated, except in many MOOCs and other open courses. Learning pathways and the extent of learner support are not always clear.
- patterns of certification and accreditation vary across MOOCs and other open courses and whilst courses may be free, certification sometimes comes at a price and accreditation, if offered, invariably attracts a fee.
- the development of sustainable business models is clearly a significant issue. This will form one of the key areas for development in the policy papers in Work Package 4.

In the past ten years, governments worldwide have invested considerable amounts of money and effort in OER that are freely available for use/reuse online. A wide variety of international organisations, such as UNESCO, OECD and European Union, and Foundations such as Hewlett and Shuttleworth are also active in providing financial support to the area of OER. However, this kind of funding is drying up, and it currently appears unlikely that there will be mass investment from governments in OER in the foreseeable future. Educational sectors worldwide are facing a similarly challenging situation in terms of widening access to education for all against a background of reduced funding and support from governments. Many educational institutions are under significant pressure to find new ways of delivering education at low cost. From this respect, it would seem clear that OER-based learning can play a significant role in meeting the increasing demand for education based on financial constraints.

One of the major challenges is developing viable business models that can sustain the development of OER-based learning. New business models are emerging and being trialled at the moment. Commercial providers such as **Coursera** and **Udacity** provided MOOCs as for-profit activities. Their business model includes disaggregating teaching activities from assessment and accreditation. Students undertake largely independent study with free courses, and pay for external examinations for degrees awarded. At the same time as expanding educational markets has become more pressing, OER activities are becoming widely used by many institutions as a means of marketing - to increase institutional recognition and attract students to specific courses of study through 'tasters' (McGill et al., 2013). So far, there is no clear evidence that these new models will work in the longer term. They need time to be established and the business models for e.g. Coursera and Futurelearn appear to be still changing.

Another issue concerning the sustainability of OER is the pedagogy and quality of OER-based learning. Open education by means of OER emphasises the potential for flexibility, independent and self-directed learning. Learners collect educational resources, and repackage them to meet their learning needs. This places learners in charge of their own learning, especially along the line of shifting focus from teacher-centred to learner-centred approach (Yuan & Powell, 2013). However, OER-based learning has been questioned for its lack of structure and guidance. There is no clear evidence to show to what extent the learner can construct an appropriate learning pathway with minimum guidance. The LUOERL report (Bacsich, Phillips & Bristow, 2011) offers some initial guidance on these aspects.

MOOCs offer an example of relatively structured learning in which the pedagogy is more explicitly defined. However, MOOCs, especially xMOOCs have been criticized for the lack of innovation in pedagogy, particularly with regard to their strict schedules, prescribed didactic sequences, and no individual variation in learning pathways (van der Woert, 2013).

At the moment, the approach that offers combined learning arrangements (such as in the form of MOOC-like courses) instead of separate educational resources is widely adopted by more and more institutions. The question is how structured these MOOC-like courses should be. Many MOOC providers are using it as a platform to experiment with innovative pedagogies. It is possible that future provisions will have more cMOOC elements, such as approaches for peer support and peer assessment.

There seems little doubt that open education by means of OER will play an increasingly important role in driving and transforming the landscape of education in all countries and educational sectors worldwide. OER-based learning should be seen as part of online education, and it fosters the potential of new technologies for enhancing innovation and creativity. The big challenge ahead is to ensure the quality of OER-based learning by means of implementing innovative pedagogical practices and sustainable business models. In order to achieve this, policies need to be in place to sustain and support openness as a core value in education. The policy should emphasise that, for example, OER-based learning receives the same level of support as face-to-face and other means of online education. Each individual country or institution should review and revise its own policies and strategies to ensure that OER-based learning can play a role in its existing framework of online provision and help the country or institution achieve its educational, economic and social goals in a sustainable way.

References

- Armstrong, A. (2012). Coursera and MITx - sustaining or disruptive? *Changing Higher Education*. <http://www.changinghighereducation.com/2012/08/coursera-.html>.
- Bacsich, Phillips & Bristow (2011). Learner use of On Line Educational Resources for Learning (LUOERL) <https://oerknowledgecloud.org/?q=content/learner-use-online-educational-resources-learning-luoerl-%E2%80%93-final-report>
- Conole, G. (2013). POERUP OER classification. <http://e4innovation.com/?p=765>.
- Daniel, J.S. (2012). Making sense of MOOCs: Musing in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education*. <http://www.jime.open.ac.uk/article/2012-18/pdf>.
- de Vries & Thuss (2013). Mobile devices and apps as accelerators for OER. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- Dopper & Draaijer (2013). Evaluation and certification of open educational resources. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- Downes, S. (2007). Models for sustainable open educational resources. *Interdisciplinary Journal of Knowledge and Learning Objects, Vol 3*. <http://www.oecd.org/edu/cei/36781698.pdf>.
- Falconer, McGill, Littlejohn, & Boursinou (2013). Typology report. OER4Adult.
- Gorissen, P. (2013). Open textbooks: Trends and opportunities. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- Janssen, Berlanga & Koper (2013). Learning paths and open educational resources: Trends and opportunities. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- McGill, L., Falconer, I., Dempster, J.A., Littlejohn, A. and Beetham, H. (2013). Journeys to open educational practice: UKOER/SCORE review final report. JISC. <https://oersynth.pbworks.com/w/page/60338879/HEFCE-OER-Review-Final-Report>
- Mulder, F. (2012). Open educational resources in opening up education. Ministerial conference Opening up education through technologies, Oslo. <http://ministerialconference2012.linkevent.no/F%20Mulder%20parallel.pdf>
- OPAL (2010). Scope of desk research and case study identification. Deliverable from OPAL.
- Schuwert, Janssen, & van Valkenburg (2013). MOOCs: Trends and opportunities for higher education. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- Schuwert & Janssen (2013). Trends in business models for open educational resources and open education. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- van der Woert, N. (2013). Ecosystems for open education: Trends and opportunities. Trend Report: Open Educational Resources 2013. SURF. <http://www.surf.nl/trendreportoer2013>.
- Yuan & Powell (2013). MOOCs and open education: Implications for higher education. A white paper by JISC CETIS. <http://publications.cetis.ac.uk/2013/667>.

Appendix: Inventory of 120 notable OER initiatives worldwide

Inventory of 120 notable OER initiatives worldwide

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
1	Argentina	Gleducar , http://www.gleducar.org.ar	National	Schools	Spanish	A range	CC-BY-SA	Digital assets
2	Australia	Open2Study , https://www.open2study.com	Institutional consortium	HE/FE	English	8 subjects including management, advertising, education and nursing	Copyright of Open Universities Australia	MOOCs - 19 courses
3	Bangladesh	ebooks in Bangladesh , http://www.ebook.gov.bd	National	Schools - Primary & Secondary (for grades 1-12)	Bengali	A range	National Curriculum and Textbook Board all rights reserved	Textbooks
4	Belgium (Flanders)	Klascement , http://www.klascement.net	National	Schools –Primary & Secondary, Teacher training, Adult education	Dutch	A range	Various CC applied to some resources	Digital assets (learning objects, exercises, lessons docs, presentations, multimedia, etc.)
5	Brazil	UnisuVirtual , http://labspace.open.ac.uk/course/view.php?id=3194	Institutional	HE	Portuguese, English	A range	CC BY-NC-SA	Courses
6		Folhas Project (Projeto Folhas), http://www.educacao.pr.gov.br	Provincial (Paraná State)	Schools - Secondary	Portuguese	All the subject areas of secondary education	Total or partial reproduction of the works is permitted as long as the original authors are cited.	Textbooks
7	Canada	BCCampus , http://www.bccampus.ca	Provincial (British Columbia)	FE & HE	English	A range	CC	Textbooks & courses
8		Athabasca University Open Courseware , http://ocw.lms.athabascau.ca	Institutional	HE	English	English, Math, Science, Humanities	CC BY	Full & partial courses, digital assets

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
9	China	China Open Resources for Education (CORE), http://www.core.org.cn/en	National	HE, Professional development	Chinese, English	A range	CC BY	Courses
10	Columbia	EduTEKA , http://www.eduteka.org	National	Schools - Primary & Secondary	Spanish	A range	CC BY-NC-SA	Digital assets
11	Czech Republic	The RVP Metodický Portal, http://dum.rvp.cz/index.html	National	Teacher training	Czech	A range	CC-BY-NC-ND or CC-BY-NC-SA	Digital assets (articles, audio, video, etc.)
12	Finland	Le Mill , http://lemill.net	Institutional	Schools	83 languages	A range	CC BY-SA 2.5	Digital assets (media pieces, teaching methods, tools)
13	France	Digital Universities , http://www.universites-numeriques.fr	National	HE	French	A range	Some use CC	Digital assets
14		SILLAGES , http://plateforme.sillages.info	National	Schools	French, English	A range	CC BY-NC-SA	Digital assets (courses, exercises)
15		MOOC ITyPA , http://www.itypa.mooc.fr	National	Lifelong learning	French	Learn from internet	CC BY	A 10-week course
16	Germany	Leuphana University MOOC , http://www.mooc-list.com/course/thinktank-cities-leuphana	Institutional	HE	English	Art, Architecture, and Design	No CC	A 18-week course
17		Iversity (By October 2013 the Berlin-based platform will offer free academic online courses for German and international teachers)	Institutional consortium	HE	Not know yet	Not know yet	Not know yet	Courses

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
18		OpenCourseWorld , is a platform from Information Multimedia Communication working with several German universities	Institutional consortium	HE	German	Business Process, Management, Windows 8 App Development	Unknown	Courses
19	Greece	Digital Schools , http://digitalschool.minedu.gov.gr	National	Schools – Primary & High schools	Greek	A range	No CC	Textbooks
20	Hungary	National Textbook repository , http://www.tankonyvtar.hu	National	HE	Hungarian, English	A range	No CC	Textbooks
21	India	OSCAR , http://oscar.iitb.ac.in/aboutOscar.do	National	HE mainly, some Schools	English	Science, Engineering, Technology	CC BY-NC-SA 2.5	Digital assets (animations and simulations)
22		Pratham Books , http://www.prathambooks.org	National	Schools	English, Indian	A range	CC BY or CC-BY-SA	Storybooks, story cards
23		Computer Masti (CM) , http://computermasti.in	Institutional	Schools	English	Computer literacy skills	CC Plus License, CC BY-NC-SA with additional permissions for commercial use	Textbooks
24		NCERT , http://ncert.nic.in/ncerts/textbook/textbook.htm	National	Schools & HE	Hindi, English and Urdu	All subjects	NCERT textbooks are copyrighted. Republication is strictly prohibited.	Textbooks
25		Indian NROER , http://www.cietncert.org/ICT-Schools/NroeratICT/national-repository-open-educational-resources	National	Schools	English	All subjects	CC	Digital assets (documents, video, images, etc.)
26		NPTTEL , http://nptel.iitm.ac.in	Institutional	FE (college)	English	Engineering	CC BY-NC-SA	Lectures

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
27	Indonesia	Universitas Terbuka (UT) Open Educational Resources (SUAKA-UT): http://www.ut.ac.id/OER	Institutional	HE, Schools	English, Indonesian, Thai, Khmer	A range	CC BY-NC-SA or CC BY-NC-ND	Courses, Digital assets
28	Ireland	The National Digital Learning Repository (NDLR), http://www.ndlr.ie	National	HE	English	A range	Some use CC	Digital assets
29		ALISION , http://alison.com	National	Workplace learning	English	A range	Some use CC	Courses
30	Italy	Book in progress , http://www.bookinprogress.it	National consortium	Secondary schools	Italian	A range	No CC	Textbooks
31		i-cleen , http://www.icleen.museum/web/guest	National	Schools	Italian	Earth science	Some use CC-BY 3.0	Digital assets
32		Oilproject , http://www.oilproject.org	National	Lifelong	Italian	A range	CC BY-NC-ND 2.5	Digital assets
33	Japan	Japan Open Course Ware Consortium (JOCW), http://www.jocw.jp	Institutional consortium	HE	Japanese	A range	The JOCW website is licensed under CC BY-NC-SA	Each JOCW member university provides 10 courses
34	Korea	SNOW , http://www.snow.or.kr	National	HE	English, Korean	All	CC BY-NC-ND	Video lectures
35		Korean OCW , http://www.kocw.net	Institutional consortium	HE	Korean	All	Some CC BY-NC-SA, CC BY-NC-ND	Lectures
36	Malawi & Botswana	IADP-SADC digital resources project, http://www.oerafrica.org/malawi/IADPSADCDigitalResourcesHome/tabid/208/Default.aspx	Multinational	HE & FE	English	Communication skills, Midwifery, Teacher training, Aquaculture, Pre-clinical	CC BY-NC-SA; Pre-clinical: mixed licences	Textbooks, courses

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
37	Mexico	Temoa – ‘Knowledge Hub’, http://www.temoa.info	Institutional	Mostly HE, some Schools (Elementary & High schools)	English, Spanish, French, others	All	CC BY-NC	Digital assets (course, module, elements)
38		Educonector.info , http://www.educonector.info	Institutional consortium	HE	Spanish	All	CC BY-NC-SA	Digital assets (module, elements, Learning Objects)
39	Norway	The Norwegian National Digital Learning Arena (NDLA), http://www.ndla.no	National	Schools - Secondary	Norwegian	All	Some use CC	Digital assets
40		Utdanning.no , http://www.utedanning.no	National	HE, FE, Continuous education	Norwegian	All	Some use CC	Digital assets
41	Philippines	E-turo : an online repository of teaching and learning tools, http://e-turo.org	National	Schools	English, Filipino	Mathematics, Science, English, Filipino and Social Studies	CC BY-NC-SA 3.0	Digital assets (lesson plan, exercise, module)
42	Poland	Digital School Programme	National	Primary schools (Grades 4-6)	Polish	All	CC BY 3.0	Textbooks
43		Wolnelectury (Free Reading project), http://wolnelectury.pl	National	Schools	9 languages	Many	Songs (freely publish and distribute), Audio books (rights protected), Footnotes and literary motifs (CC BY-SA 3.0)	Books, audio books, songs
44	Portugal	Portal das escolas , https://www.portaldasescolas.pt	National	Schools - Pre- school & Primary	Portuguese and many others	All	Various Creative Commons	Digital assets

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
45	Spain	OCW Universia , http://ocw.universia.net/es	Institutional consortium	HE	English, Spanish, Portuguese	All	Various CC	Courses
46		Recursos Educativos , http://www.ite.educacion.es/recursos	National	Schools	Spanish	All	CC BY-NC-SA	Digital assets
47		Agrega , http://www.proyectoagrega.es	National	Schools (Secondary)		Training ICT in education	CC BY-NC-SA	Digital assets
48		UniMOOC aemprende , http://unimooc.com/landing/index.html	International (Spanish-speaking organisations) around the world)	Lifelong learning	Spanish	Entrepreneurship	CC BY	Courses
49		Didactalia , http://didactalia.net	National	Pre-schools, Schools (Age 0-18)	Multilingual	28 subjects	CC BY-NC-SA 3.0	Digital assets (articles, books, games, experiment, exercise, etc.)
50	South Africa	Free High School Science Texts (FHSST) project, http://www.fhsst.org/ , http://en.wikibooks.org/wiki/FHSST_Physics/Info	National	Schools (Grade 10, 11 and 12)	English	Mathematics, Physics, Chemistry, Life Sciences, and Computer Literacy	CC BY-SA 3.0	Textbooks
51		Thutong , http://www.thutong.doe.gov.za	National	Schools, FET colleges	English, Afrikaans	All subjects	CC BY-SA 2.5	Digital assets (lesson plans, worksheets, tests and examinations)
52		SAIDE ACEMath project, http://www.oerafrica.org/acemaths/ACEMathsProjectHome/tabid/132/Default.aspx	National	Teacher education	English	Teacher education	CC-BY 3.0	One textbook

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
53		The Skills for a Changing World Programme, http://www.oerafrica.org/oeraction/SkillsforaChangingWorld/tabid/324/Default.aspx	National	Foundation (teacher education)	English	English Literacy and Language, ICT Literacy, Mathematical Literacy	CC-BY 3.0	Modules
54	Thailand	Thailand Cyber University OCW, http://www.thaicyperu.go.th/courseware	National	HE	English	Accessible Courseware Development, e-Learning Thai Language	CC	Two courses
55	Turkey	Turkey Academy of Sciences, MIT OpenCourseWare (TUBA), http://www.acikders.org.tr	National	HE	Turkish	All subjects in Engineering, Social, and Basic Sciences	CC BY-NC-SA	Complete courses
56	The Netherlands	Wikiwijs, http://www.wikiwijs.nl	National	All sectors	Dutch	All	CC-BY-NC-SA or CC-BY or CC-BY-SA	Digital assets
57	UK	Jisc/HEA OER Programme	National	HE & FE	English	All	Various CC	Digital assets
58		SCORE	National	HE	English	Various	Various CC	Digital assets
59		FutureLearn, http://futurelearn.com	National	HE	English	All	Not know	Courses
60		Jorum Open, http://www.jorum.ac.uk	National	HE & FE	English	All	Various CC	Digital assets
61		mathcentre, http://www.mathcentre.ac.uk	National	Schools (post-16)	English	Bioscience, Built Environment, Economics, Engineering, Mathematics, Computing Science, Physical Science	CC BY-NC-ND	Digital assets (self-study guides, diagnostics and exercises, video tutorials)
62		OpenLearn, http://www.open.edu/openlearn; LabSpace, http://labspace.open.ac.uk	Institutional	HE	English	All	Some CC	Courses, extracts from course materials

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
63		LORO , http://loro.open.ac.uk	Institutional	HE	Chinese, English, French, Germany, Italian, Spanish, Welsh, others	Language teaching	CC BY-NC, CC BY-NC-SA or CC BY-NC-ND	Digital assets
64		FSLT 12 MOOC , http://openbrookes.net/firststeps12	Institutional	HE teacher training, PG Cert	English	Learning & Teaching in HE	CC BY-SA	A 5-week MOOC
65		Open Learning Design Studio MOOC , http://olds.ld-grid.org	Institutional	CPD	English	Learning Design (curriculum design with OERs)	CC BY-NC-SA 2.0	A 9-week MOOC
66		Peoples Uni , http://www.peoples-uni.org	International consortium	HE	English	Public Health	No CC	Courses
67	USA	TAACCCT grant program, http://creativecommons.org/taa-grant-program	National	FE & HE	English	Education and career training programs	CC BY 3.0	
68		Coursera , https://www.coursera.org	International	HE	English, Spanish, French, Chinese, Germany, Italian	25 subjects	No CC	Over 300 Courses
69		Udacity , https://www.udacity.com	International	HE	English	5 subjects	CC BY-NC-ND 3.0	25 courses
70		NovoEd , http://novoed.com/	Institutional	HE	English	8 subjects	No CC	8 courses
71		EdX , https://www.edx.org/	Institutional consortium	HE	English	23 subjects	No CC	59 Courses
72		Udemy , http://www.udemy.com	International	HE	English	Many	No CC	Courses

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
73		MERLOT , http://www.merlot.org/merlot/index.htm	International consortium	HE	English	All	CC	Digital assets
74		Carnegie Mellon Open Learning Initiative , http://oli.cmu.edu	National	HE/FE	English	Science subjects	CC BY-NC-SA	Courses
75		Kaleidoscope , http://www.projectkaleidoscope.org	National	FE (colleges)	English	10 subjects	No CC, but drive the use of CC licensed OER	10 courses
76		Washington State's Open Course Library Project , http://www.opencourselibrary.org	Washington State (Provincial)	FE	English	for 81 high-enrolling college courses	CC BY 3.0	Courses
77		CCCOER , http://oerconsortium.org	National	High School/FE	English	All		Textbooks
78		Khan Academy , https://www.khanacademy.org	International	Schools, FE	Lessons are translated with subtitles in multiple languages	All	MIT license, CC-BY-NC-SA	Video lectures (each approximately 10 minutes long)
79		P2PU , https://p2pu.org	International	Lifelong learning, K-12 & upwards	Multilingual	Various	CC BY-SA	Courses
80		OER Commons , http://www.oercommons.org	International	All sectors	English	All	CC BY-NC-SA	Digital assets
81		Writing Commons , http://writingcommons.org	National	FE (College)	English	Writing courses	CC BY-NC-ND 3.0 or CC BY-NC-SA 3.0	Textbooks, courses
82		Flat World Knowledge , http://www.flatworldknowledge.com	National	FE (college)	English	All	Free download, personal use, modification, distribution for educators	Textbooks

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
83		K-12 Open Ed , http://www.k12opened.com/index.php	National	Schools (K-12)	English	All	CC BY	Courses, textbooks, lesson plans
84		Free Reading , http://www.freereading.net/index.php?title=Main_Page	National	Pre-schools & Primary schools	English	Early literacy skills (Phonological awareness, Phonics, Vocabulary, Comprehension, and writing)	CC BY-SA 3.0	
85		CLRN Free Digital Textbook Initiative , http://www.clrn.org/fdti	California state (Provincial)	Schools	English	All	CC BY-NC-SA	Textbooks
86		College Open Textbooks Collaborative (COT) , http://www.collegeopentextbooks.org	National	FE & HE	English	All	About half of the textbooks are on the copyright holder's own website	Textbooks
87		Utah Open Textbook project , http://utahopentextbooks.org	Utah state (Provincial)	Schools (K-12 7th to 12th grades)	English	Sciences	CC BY-NC-SA	Textbooks
88		Open High School of Utah OCW , http://openhighschoolcourses.org	Utah state (Provincial)	Schools (K-12 high schools)	English	All	CC BY 3.0	Courses
89		Curriki , http://www.curriki.org	National	Schools (K-12)	English	All	CC BY	Digital assets (lesson plan, assessment, presentation, etc.)
90		CK-12 , http://www.ck12.org	National	Schools (K-12)	English	Mathematics, Science, other subjects	CC BY-NC-SA	Digital assets, Textbooks

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
91		Textbook Revolution , http://textbookrevolution.org/index.php/Main_Page	National	All sectors	English	All	Mostly CC, some use other licences, some all rights reserved	Textbooks
92		Saylor Foundation's free education initiative , http://www.saylor.org	National	HE (universities), Schools (K-12), Professional development	English	All	CC BY 3.0	Courses
93		PhET Interactive Simulations , http://phet.colorado.edu	National	Schools (K12) & HE	English, Translated into 66 languages	simulations for teaching science and math	CC BY and CC GNU General Public License	Digital assets (simulations)
94		Wikiversity , http://www.wikiversity.org	International	All sectors	10 languages	All	CC BY-SA	Digital assets
95		Wikibooks , http://www.wikibooks.org	International	All sectors	10 languages	All	CC BY-SA	Open-content textbooks collection
96		iTunesU , http://www.apple.com/uk/education/itunes-u	International	College & HE	Multilingual	All	Some CC	Digital assets, Courses
97		YouTube EDU , http://www.youtube.com/education	International	all sectors	Multilingual	All	YouTube licence or CC	Videos
98		Project Gutenberg , http://www.gutenberg.org	International	All sectors	English, Portuguese, Dutch	All	<u>e-books are free in the United States. They may not be free of copyright in other countries.</u>	Free e-books (including textbooks)
99		Connexions , http://cnx.org	International consortium	All sectors	Multilingual	All	CC BY	Digital assets (learning objects, small knowledge chunks, textbooks, journal articles, etc.)

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
100	Vietnam	Vietnam Open Educational Resources (VOER), http://www.voer.edu.vn	National	Schools, Lifelong learning		Various	CC BY 3.0	Digital assets
101	Continental	Learning Resource Exchange for schools, http://lreforschools.eun.org	European	All sectors	Multilingual	All	Mostly CC, some GNU General Public License version 2	Digital assets (mostly simulations)
102	Continental	Discover the COSMOS, http://portal.discoverthecosmos.eu	European	Schools	Multilingual	Sciences	Mostly CC BY-NC-SA	Digital assets (scenarios, lesson plans, students projects, animations, online tools and laboratories guidelines)
103	International	Open Science Resources (OSR), http://www.osrportal.eu	European, Taiwan, US	All sectors	8 languages	Science subjects	Mostly CC BY-NC-SA	Digital assets
104	Continental	OpenScout, http://learn.openscout.net	European	HE & FE	24 languages	13 subjects in business and management education	CC BY-NC-SA 3.0	Digital assets (lectures, articles, videos, etc.)
105	Continental	MORIL, http://moril.eadtu.eu	European	Lifelong learning	9 languages	Many	Some CC	Digital assets
106	Continental	Europeana, http://www.europeana.eu/portal	European	All sectors	27 Languages	Cultural heritage	Some CC	Digital assets
107	Continental	OpenUpEd, a pan-European initiative around MOOCs, http://www.openuped.eu	European	HE	12 different languages	A wide variety of subjects	CC	61 courses

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
108	Continental	The openED course, http://www.open-ed.eu	European	HE	English, Greek	Business and Management Competencies in a Web2.0 World	CC BY-SA	Consists of 10 modules, each module lasting between 2-3 weeks
109	International	OCW, http://www.ocwconsortium.org ; Open Study, http://openstudy.com	International consortium	HE	18 languages	All	Mostly CC	Courses
110	International	OERu, http://wikieducator.org/OER_university/Home	International consortium	HE	English	All	CC	Complete courses
111	International	Commonwealth of Learning (COL), http://www.col.org	International	FE & HE	English	All	Mostly CC	Courses and modules
112	International	WikiEducator, http://wikieducator.org	International	All sectors	English	Education, Professional Development, Health, e-learning and ICT	CC BY-SA	Digital assets
113	Multinational	OER4Schools, http://orbit.educ.cam.ac.uk/wiki/OER4Schools	UK, Zambia, South Africa, Sub-Saharan Africa	Teacher training	English	Teacher Education	CC BY-SA, CC BY-NC	Units of resources
114	Multinational	TESSA, http://www.tessafrica.net	UK, sub- Saharan Africa	Teacher training	four languages	School-based teacher education and training	CC BY-SA	Modules
115	Multinational	Bridge to Success, http://b2s.aacc.edu	US, UK	Adult learners, FE & Schools	English	Skills development	CC BY-NC-SA	Two complete courses
116	Multinational	HEAT, http://www8.open.ac.uk/africa/he at	UK, Sub- Saharan Africa	Professional training - Health workers	English	Various subjects in Health	CC	13 modules equate to 450 hours of study time
117	Multinational	AgShare, http://www.oerafrica.org/agshare/AgShareResources/tabid/1405/Def	US, OER Africa	HE, lifelong learning	English	Agriculture	Various CC	Modules, courses, digital assets

No	Country	Initiative	Political Scale	Educational Level	Language	Subject	Licence	Size
		ault.aspx						
118	Multinational	Health Academics in Africa , http://www.oerafrica.org/healthproject/ProjectResources/tabid/976/Default.aspx	US South Africa, Ghana	HE	English	Various subjects in Health	Various CC	Complete programmes
119	Continental	Virtual School for Latin America and the Caribbean , http://escuelapnud.org	Latin America and the Caribbean	HE	English, Spanish	Human Development, Democratic Governance, Crisis Prevention and Recovery	CC BY-NC-SA or CC BY-NC-ND	Complete courses each lasting 10-13 weeks
120		Virtual Campus of Public Health (CVSP, http://argentina.campusvirtualsp.org/); Red REA/OER (http://search.bvsalud.org/cvsp/index.php)	Latin America	Professional development	Portuguese, English, Spanish	Public Health	CVSP (CC-BY-NC), RedREA/OER (some use CC)	Digital assets (courses, case studies, images, articles)